From: Communications.MaineDOT@maine.gov
Sent: Saturday, March 24, 2018 3:41 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

Categories: FJW

The following message was submitted from your MaineDOT website contact form .

Date: 03/24/2018
Name: Joseph Feely
Organization(if applicable): unaffiliated
Phone: 207.844.8195
Email: jafeely2@gmail.com

Topic:

Comments:
Regardless of the minor historical importance and nostalgia for the FJW bridge, the biggest single argument against saving it (to me) is locking Maine residents into an endless cycle of maintaining and aging structure. I hope your presentation on March 28 will include the life-cycle cost (75yrs? 100yrs?) for the two option - new concrete bridge or repair FJW bridge.

If required, please respond as soon as possible.

Mr. Jerome Brannigan
18 Westwind Dr.
Topsham, ME 04086-5703

SO. MAINE P&DC 040
26 MAR 2018 PM 3 L

David Gardner
Maine Dept. of Transportation
Environmental Office
16 State House Station
Augusta, Me. 04333-0016

March 26, 2018

David Gardner
Environmental Office
Dept of Transportation

Re: Frank Wood Bridge

Having lived in Topsham since 1935 and the family since 1914, we all believe a new bridge would be better than redoing the old bridge for many reasons.

Please tear down that rusted piece of Junk and build the new bridge!

Thanks,

Jerome Brannigan

Jerome P. Brannigan
18 Westwind Dr.
Topsham, Me 04086

From: Paul Womer <pauldoren@yahoo.com>
Sent: Thursday, March 29, 2018 10:49 AM
To: Gardner, David
Subject: Frank J. Wood Bridge - Comments

Dear Mr. Gardner,

After receiving notice from the Bike Coalition of Maine, I attended the open discussion at Mt. Ararat High School on 28 March 2018. Even so, I was (and am) representing myself. I am retired and live in Brunswick. Contact info follows at the end
of this note.

As a bicyclist, the issue of safe riding is important to me. However, unlike many others who see bicycling as a weekend avocation, I believe there should be emphasis on bicycling as a routine means of transportation: running errands to the grocery store, a visit to friends, travel to a restaurant, etc. As such, I am very much in accord with last night speakers who
favored Alternative 2 because of its wide bike lanes that would promote daily use of the bridge by bicyclists (and pedestrians). Bike lanes that are only four feet wide court trouble.

That said, I was disappointed in the style of Alternative 2. As a person in the row in front of me mumbled, “It’s just a highway.” She was right. While I have mixed emotions about Alternative 2’s location, its style is something only a soulless
beancounter could love.

If the state is going to spend millions of dollars on a connector between two vibrant communities, why not spend a few dollars more and invite architects to weigh in and compete for a winning design? I concur with those who believe that eliminating the superstructure of the extant bridge will improve the overall look of the area. So assuming that Alternatives 1
and 2 constitute the semi-finalists, architects could carry the metaphorical ball to the finish line by considering the following:

Stylish observation (and also for fishing?) points to enhance walking and lingering on both sides of the bridge. These could
include benches and appropriate lighting (see below regarding lighting).
Given that neither side of the bridge constitutes a high speed intersection, last night’s recommendation that the vehicles lanes incorporate some feature (not speed bumps) to slightly slow the pace and make the drive across a “wonder” and not
simply a point-to-point connection have merit.
Use the Penobscot Narrows (Verona Island), Bunker Hill (Boston) or Paris (France) bridges as inspirations. Even if the replacement bridge will not use overhead lattice work, it should be something more than a concrete connector.
In regards to valid concerns about lighting, consider something indirect that illuminates just the road. Or, and better, advanced mood-enhancing LED lighting that provides changes of color to match the season or mood. Think: Empire State
Building.

The bridge offers an opportunity for the state and communities to excel. Take advantage of it.

Last night’s meeting was very interesting, informative, helpful, and well-managed. Thank you.

Sincerely,

Paul Womer
26 Dionne Circle

Brunswick, Maine

From: Communications.MaineDOT@maine.gov
Sent: Thursday, March 29, 2018 10:46 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 03/29/2018
Name: Leslie Mortimer
Organization(if applicable):
Phone: 2075223772
Email: lamortimer@gmail.com

Topic:

Comments:
I am a resident of Topsham. I am in favor of replacing the FJW bridge instead of repairing it. It is more cost effective and will enhance the communities it serves.

If required, please respond as soon as possible.

From: Thomas Connelie <Tom@blacklantern.net>
Sent: Thursday, March 29, 2018 11:04 AM
To: Gardner, David
Subject: Frank J Wood Bridge EA Comments - WIN 22603.00

Attachment (Comments) to MaineDOT Brunswick – Topsham Frank J Wood Environmental Assessment – WIN 22603.00

The following comments are forwarded to be included as part of the Public Comment portion of the March 28 Public Comment Meeting.

As a resident and business owner, Black Lantern Bed and Breakfast, of Topsham I strongly endorse the selection of Alternative 2, Replacement Bridge on Upstream Alignment. The functional benefits of second sidewalk and wider, open bike lanes far outweigh the (subjective) esthetic loss of the existing truss structure. All of our guests as well as my wife and I use the existing bridge, frequenting restaurants on Maine Street , visiting the Bowdoin Campus, Church, etc. . Those guests that walk into Brunswick comment on the narrowness of the existing sidewalk, the few that bike into Brunswick say never again. Improving bike access across the river should be a major factor in the design alternative decision.

The recommendation made by “The Friends” to mark the lanes on a Rehabed version of the existing bridge with narrower vehicle lanes to create wider bike lanes strikes me as simply wrong. Even with elimination of the existing grates on the road surface the width between the trusses is simply too narrow for bikes to traverse safely with two lanes of heavy traffic. Restriping with narrower lanes will not shift the opposing traffic closer together. While the proposed surface width of 32’ is only 2’ wider than the “between the truss width” of the existing structure having a 6” curb on the outside edge as opposed to steel members at riding height will allow bike riders to utilize more of the width of the bike lane on the Alternative 2 replacement..

I strongly support the recommendations of the Bridge Design Advisory Group in their Preliminary Report of Design Recommendations of August 25, 2017. The esthetic features of overhanging light fixtures similar to those presently used on Main Street, low concrete wall with attractive black railings mounted on it and integrated light posts and overlooks will make the walkways user friendly. I particularly support including provisions, preferably as part of the project or, if not, for future development, for walkways under the bridge on both sides of the river. Having lived in Orange County, CA for a number of years I am very familiar with the paved bike and walking trails alongside the Santa Ana River where the trail crosses under every bridge along the 29 mile or so length of the river though the county, approximately 30 under bridge crossings. The trail system gets high usage from both casual walkers and serious cyclists. The replacement bridge option provides a one-time opportunity to provide under bridge connections to the fledgling trail systems on both the Topsham and Brunswick sides of the river. In Orange County the under bridge trail crossings are closed about two weeks each spring during high river flows and the potential for seasonal high flows on the Androscoggin should not preclude designing under river trail crossings accessible the majority of the year.
There were several questions regarding both the height of the roadway and visual impact with Alternate two that should be clarified.

Will the depth of the structural steel beams in Alternate two and projected high water levels necessitate raising the road height above the road height of the existing bridge, (and Alternate 3 & 4) and, if so, by how much?

When viewed from the side what will be the depth of the bridge structure (Steel beams plus road deck plus concrete railing plus metal railing)? How does this compare with the visual depth of the existing truss structure (bottom chord, assorted steel, sidewalk, metal walkway rail)?

I feel that info should have been readily available at the March 28 meeting.

Name: Thomas P Connelie
Address: 57 Elm Street
City, State, Zip: Topsham, ME 04086
Contact Info; Blacklantern@blacklantern.net / 207-725-4165

Judy and Tom Connelie, Innkeepers
Black Lantern B & B
57 Elm Street, Topsham, ME 04086
888-306-4165 / 207-725-4165
www.Blacklanternbandb.com

From: Jim Hamilton <jimham1@gwi.net>
Sent: Thursday, March 29, 2018 3:58 AM
To: Gardner, David
Subject: Frank J Wood bridge replacement

Dave,
I attended the public meeting at Mt. Ararat last night and wanted to submit my opinion on the Frank Wood bridge project. First of all, I think the State did an excellent job presenting the facts. As an avid cyclist, I'm strongly in favor of option-2, to replace the bridge with a new one that has adequate bike lanes. The current bridge is very dangerous for cyclists. There is very little room for error. One mistake and a cyclist could be seriously injured or killed. Option-2 would be the safest and least expensive, and would help to bring both communities closer together.

Thank you,
James Hamilton
162 Columbia Ave
Brunswick, ME
(207)841-1388

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
Public Meeting - Environmental Assessment
Mt Ararat High School Commons

March 28, 2018
6:00 pm

The Federal Highway Administration (FHWA) and the Maine Department of Transportation (MaineDOT) are accepting public comments and community input regarding the National Environmental Protection Act (NEPA) Environmental Assessment through April 11, 2018. This comment sheet can be mailed to the following address:

David Gardner
Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at: http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment: Whichever option is selected vehicle lanes should be limited to 10' widths. This will reduce speeds + make travel safer for all users.
Give it a try via striping study it + change if needed, but lets start w/ narrower lanes.

(Use additional sheets if necessary)

Name (Please Print) Richard Roedner Topsham Town Manager
Street Address 56 Wildwood Dr.
City, State, Zip Saco ME 04072
Contact Info (Email or Phone) rroedner@topshammaine.com

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
Public Meeting - Environmental Assessment
Mt Ararat High School Commons

March 28, 2018
6:00 pm

The Federal Highway Administration (FHWA) and the Maine Department of Transportation (MaineDOT) are accepting public comments and community input regarding the National Environmental Protection Act (NEPA) Environmental Assessment through April 11, 2018. This comment sheet can be mailed to the following address:

David Gardner
Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at: http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment:
The bridge was ugly when it was younger back when I first saw it in the 50's. It is uglier now. It is not historic - it is old.
Replace it!

(Use additional sheets if necessary)

Name (Please Print) Mike Dumais
Street Address 11 Foreside Rd
City, State, Zip Topsham ME 04086
Contact Info (Email or Phone) 729-4291

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
Public Meeting - Environmental Assessment
Mt Ararat High School Commons

March 28, 2018
6:00 pm

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David Gardner
Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at: http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment:
Personally I appreciate the concerns of "loss of community" but I don't understand how the commodity of a community evaporates by upgrading a bridge to make it last longer and safer for pedestrians?
I personally believe that a safer and ~~[illegible]~~ longer lasting bridge, which is open air, is better for both communities.

Thank you for the fairness

(Use additional sheets if necessary)

Name (Please Print) Cory R. King
Street Address 520 Quaker Meeting House Road
City, State, Zip Durham ME 04222
Contact Info (Email or Phone) executivedirector@midcoastmaine.com

From: Communications.MaineDOT@maine.gov
Sent: Thursday, March 29, 2018 2:56 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 03/29/2018
Name: Tom Rumpf
Organization(if applicable): Resident
Phone: 2074158540
Email: trumpfy@gmail.com

Topic:

Comments:
I support replacement of the current bridge with a new bridge that is designed for pedestrian and bike traffic, as well as cars. The current bridge is unsafe for bicyclists and blocks views of the historic mill buildings on each side of the river.

If required, please respond as soon as possible.

13 Main Street
Topsham, Maine 04086
March 18, 2018

Ms. Cheryl B. Martin
Assistant Division Administrator
Federal Highway Commission
Edmund S. Muskie Federal Building
40 Western Avenue, Room 614
Augusta, Maine 04330

Re: The Frank J. Wood Bridge

Dear Ms.Martin:

I own a historic commercial building that abuts the Frank J. Wood Bridge in Topsham because it is in the Village near two historic mills, the historic Bridge, and the Androscoggin.. MDOT wants to significantly alter the historic quality of the Village by demolishing the Bridge and replacing it with a nondescript, concrete highway forever changing the character of the Towns of Topsham and Brunswick.

My question is why did the MDOT fail to be objective in the Section 106 process? At the first public meeting in April 2016 MDOT presented the new bridge as the only option that made sense, completely ignoring our historic Bridge. The decision had already been made. Topsham and Brunswick were forming an Advisory Committee to design the new bridge before the completion of the Section 106. Many community people left the meeting frustrated by what appeared a flawed process.

After the meeting a group of community members from Topsham and Brunswick formed a non-profit corporation (The Friends of the Frank J. Wood Bridge)) and requested to be included as a party to the Section 106. The Friends have met on an almost monthly basis in an effort to be heard by the MDOT and the U. S. Highway Administration since April 2016, attended all meetings relating to the Bridge, hired an environmental lawyer, formed a Facebook page with over a 1,000 followers, signed petitions, written letters to MDOT, met with experts on historic bridges, and hired an engineering firm from Boston to do a feasibility and cost analysis of a rehabilitated Bridge. To say the least, it has been difficult for us to get answers to our many questions. An example of this is the last public meeting where the U. S. Highway Administration and MDOT changed the framework of the meeting process by breaking people into small groups so that many people were confused and upset and ended up walking away frustrated by not having a free flowing discussion that everyone could hear and participate in.

I still have questions about speed, elevation, and the position of the new bridge as it hits the abutments. Will all the concrete act as a back drop for graffiti? Won't the new bridge alter the quality of life for the historic Summer Street residents, cover up the lower falls, and forever damage that feeling one gets when crossing the Bridge…call it a sense of place?

And what about economic development? I have heard many people from across the country comment positively on the Bridge and how fortunate we are to have it in our community. Actors from the Maine State Music Theatre championed it on TV 207; the Bangor Savings Bank proudly displays a photograph of the Bridge in its entry way; it's on the cover of the telephone book and in Bowdoin College literature; and painted and photographed by artists from around the world. Maine Preservation's 2017 List of Most Endangered Historic Structures puts it as number one. Do the research—states across the country are saving truss bridges because they have a calming affect on traffic and are good for tourism. I can guarantee most historians, artists, photographers, and Bridge enthusiasts (engineers included) will ignore the new bridge if it is ever built.

Please do the right thing and rehabilitate our Bridge so that future generations shall know what can happen when science and art come together to create an iconic structure: The Frank J. Wood Bridge.

Thank you for your consideration.

Sincerely yours,

Arlene Morris

From: Communications.MaineDOT@maine.gov
Sent: Friday, March 30, 2018 7:54 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 03/30/2018
Name: Georgia Bancroft
Organization(if applicable): citizen
Phone: 207-373-0850
Email: bancrj@comcast.net

Topic:

Comments:
My husband and I moved to Brunswick from Portland in August of 2017. We began to read about the FJW Bridge project then. My personal reaction to the bridge came one evening when cars filled the lanes both way and I began to wonder, "How much is 25 tons?" We have experienced the change in the Casco Bay Bridge in Portland, Tukey's Bridge to Falmouth and the new Hollis bridge over the Saco River. The former Hollis Bridge was similar to FJW - metal, narrow and a bit scary. In all of the above instances new bridges have allowed for SAFE biking, walking and travel lanes, actual views of the rivers that are not impeded by metal work and wider lines for vehicle travel. I find the aesthetics much better with a new bridge for all the reasons the planning board has mentioned. I appreciate that sometimes we want to preserve history but I don't view this is not a Roebling suspension bridge, but a 1937 era structure. Construction, community priorities and modes of travel have chang ed since then and new approaches can offer better alternatives. My support would be for a new structure as presented by the design committee. Respectfully submitted.

If required, please respond as soon as possible.

From: Kittredge, Joel
Sent: Monday, April 2, 2018 11:12 AM
To: Chamberlain, Kristen; Gardner, David; Damren, Janet
Subject: FW: Question or Comment from the Frank J. Wood website

Categories: FJW

FYI and Tedocs

-----Original Message-----
From: Shofner, Pamela
Sent: Monday, April 02, 2018 11:10 AM
To: Kittredge, Joel <Joel.C.Kittredge@maine.gov>
Subject: FW: Question or Comment from the Frank J. Wood website

-----Original Message-----
From: jimbyrnedpt@gmail.com [mailto:jimbyrnedpt@gmail.com]
Sent: Friday, March 30, 2018 7:33 PM
To: MaineDOT, Communications <Communications.MaineDOT@maine.gov>
Subject: Question or Comment from the Frank J. Wood website

Comments: To whom it may concern regarding the Frank Wood Bridge project. I read in the Times Record today that comment is being accepted. I wanted to give my strong support on replacing the bridge. From the information I have read it is less costly then repairing the old bridge, would have less immediate impact on traffic flow and personally prefer the look of the new modern bridge. I also support the support for improved pedestrian access with wider side walks and overall feel it will be safer. I look forward to the new bridge someday and thank you for your hard and patient work.
Sincerely, Jim Byrne
Organization: Topsham Resident
E-Mail: jimbyrnedpt@gmail.com
Name: Jim Byrne
Phone: 207 729-3901
Verifiy: 15

From: Kittredge, Joel
Sent: Monday, April 2, 2018 11:13 AM
To: Chamberlain, Kristen; Gardner, David; Damren, Janet
Subject: FW: Question or Comment from the Frank J. Wood website

Categories: FJW

Tedocs FJW 22603.00

-----Original Message-----
From: Shofner, Pamela
Sent: Monday, April 02, 2018 10:44 AM
To: Kittredge, Joel <Joel.C.Kittredge@maine.gov>
Subject: FW: Question or Comment from the Frank J. Wood website

-----Original Message-----
From: mpavitt@gmail.com [mailto:mpavitt@gmail.com]
Sent: Saturday, March 31, 2018 9:32 AM
To: MaineDOT, Communications <Communications.MaineDOT@maine.gov>
Subject: Question or Comment from the Frank J. Wood website

Comments: I went to the Frank J. Wood Bridge project presentation recently at Mt Ararat High School and while I can appreciate the replacement opponents' point of view, I think it's clear that Alternative 2, the alternative recommended by the DOT, is the best choice. I think the lower cost, safety and usability of a new bridge significantly outweighs the perceived aesthetics and historical value of the current bridge. I was really impressed by the work done on this project. Thanks.
Organization:
E-Mail: mpavitt@gmail.com
Name: Mark
Phone: 2073145476
Verifiy: 15

From: James Mixon <mixj444@gmail.com>
Sent: Tuesday, April 3, 2018 2:32 PM
To: Gardner, David
Cc: Cheryl.Martin@dot.gov; Phinney Baxter White
Subject: In support of rehabilitating the Frank J. Wood Bridge

Dear David and Cheryl,

My name is James Mixon. I am 34 years old and have been a resident of Topsham my entire life. I am writing in support of rehabilitation to the Frank J. Wood Bridge, in order that we might preserve some of the only remaining history and charm in our town.

Growing up in Topsham, I've seen a lot of change. The Topsham Fair Mall has grown from a small strip mall with surrounding lands where my mother, father and I used to walk our dogs, to a bustling place of business filled with stop lights and traffic. The quaint town offices are gone, as is the old library, replaced with modern buildings that look like they came out of a catalog.

The river walk in Topsham, once known only to residents of the area, is now a paved and accessible bike/walking path advertised to the public, with ugly signs and bollards on Summer St. and more foot traffic behind the houses of those living on Bridge St.

The "lower village" was a poorly conceived idea that has done nothing to enhance the charm of the town. None of the businesses have any foot traffic, aside from Blueberries perhaps (and the Sea Dog which was already there) yet we have a massive parking lot behind them all that is 90% empty every day. Think of what a missed opportunity this was. What if the town had understood the charm of Topsham, and created a riverside park in place of the enormous brick business building that now sits there, driving visitors and tourists from Brunswick to enjoy a river view while getting food at the businesses nearby. What if the shops in the lower village were similar to those in Downtown Brunswick, where all the foot traffic in the area now is. What if the TOWN of Topsham understood the charm of Topsham like its citizens do?

It is for this reason that I am writing you to encourage you NOT to replace the Frank J. Wood Bridge, but to rehabilitate what we have now. It is the only remaining charming piece of Topsham history we have left.

I worked in Southern Connecticut on independent films when I was fresh out of college, and the amount of care those people put into preserving their towns is admirable. The Merrit Parkway still has the original stone bridges to serve as over passes. The Parkway itself is devoid of ugly guardrails, signage and other things to spoil the beauty of the area. It's one of the most enjoyable drives (despite bumper to bumper rush our traffic) I've ever been on.I believe Topsham could take a page out of their book on how to treat our town.

The Frank J. Wood Bridge sits above the Androscoggin River, not directly above the rapids, but below them slightly, where you can see them if you peer over the edge while walking. It offers not only a great view of the islands below, the dam and the rapids, but also is a picturesque reminder of old Maine when you look at it.

I currently live on Summer St, and the bridge is viewable right out my window, and was raised on Walnut Street, so the bridge has been a large part of my life. I was photographed below it as a child while fishing with my father, a photo that made the front page of the Times Record. The FRONT PAGE! Can anyone imagine these days a simple photo of a boy fishing with his father being front page news of the Times Record?

Do not mistake this as a yearning for nostalgia. I want to save the bridge because WE want to save the bridge. The residents of this town, clearly voicing their opinions at the last meeting at Mt. Ararat, understand the historical importance of this bridge, as well as the aesthetics it adds to the town. We don't want an ugly overpass like the new Durham Bridge in Lisbon. Who wants to come look at that?

The black bridge is gone, and if the Frank J. Wood bridge goes, what will Topsham be? A re-zoned town filled with chain stores that pushed out all the local businesses, while all the tourists and summer visitors spend all their time (and money) in Brunswick, where they can actually enjoy the scenery.

Topsham will have nothing left. The Topsham Fair Mall isn't beautiful, the Lower Village is a place to drive through on your way to the highway, the river walk can only handle so many people, and everyone will end up going to Brunswick to walk around Bowdoin and the downtown mall.

Please, reach out to other contractors to get estimates on preserving the bridge. Sometimes everything isn't always about money. This town has been my home, and I want it to continue to be a place that people love and want to visit. I can't count how many times I've seen people standing on the bridge taking pictures in the summer, sitting down by the river taking pictures of it, or just walking on it at night when it's warm out.

Other concerns have been voiced as well, about this bridge being safer for pedestrians as they are separated from the through traffic by the girders, and I'm sure other estimates could lend themselves to a financial argument as well -- but I'd like to appeal to you to preserve what is left of our town's history and beauty, because the Frank J. Wood Bridge is really all we have left.

Thank you

--
James Mixon

From: Communications.MaineDOT@maine.gov
Sent: Tuesday, April 3, 2018 3:20 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/03/2018
Name: Richard A. Bryant
Organization(if applicable):
Phone: 725-5019
Email: rbryant6@myfairpoint.net

Topic:

Comments:
I was born in Brunswick and have lived here all my life. I would love to see that dirty, rusty eyesore green bridge replaced with a nice neat new bridge.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Tuesday, April 3, 2018 4:07 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/03/2018
Name: Joan Sheldon
Organization(if applicable):
Phone:
Email: joan@hutchinsbrothers.com

Topic:

Comments:
I live in Topsham and agree that replacement of the bridge is the smart option.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 4, 2018 7:18 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/04/2018
Name: Michael Gray
Organization(if applicable):
Phone: 2077219402
Email: mikegray69@hotmail.com

Topic:

Comments:
I have lived in the Brunswick/Topsham area for most of my 59 years. The Green bridge (Frank J Woods) has been a problem for all of my years here. The original open grate was very problematic. When that was filled in, I believe the added weight and inability of water to run off has severally damaged the bridge. The bridge has also become an eyesore. When it is refurbished/repainted it looks good for a year, then returns to its shabby look. I agree it is historic, however, if we want to be historic with its original construction, return it to the open grate as it was originally constructed to reduce stress on it!
I ride bicycles regularly and will not ride over this bridge as it is totally unsafe for bikers and always has been!
I feel the best option is to replace it with well thought out modern bridge. One with good, safe bike lanes, sidewalks and good visibility.
I also believe that a small part of the FJW should be left as a memorial to its construction. Similar to what was done with the bridge between Bangor/Brewer.
Thank you for your time!
Michael Gray
Topsham, Maine

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 4, 2018 9:38 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/04/2018
Name: Lloyd M. Van Lunen
Organization(if applicable): N/A
Phone: 207-729-0584
Email: boreas-me@comcast.net

Topic:

Comments:
I cannot express how much I will welcome a new bridge to replace the current structure. The planned design for a replacement is esthetically a vast improvement on the current truss, to say nothing of the practical benefits of wider lanes and a longer life expectancy with lower maintenance costs. In addition to this, we already have a perfectly good example of a truss bridge just downstream in the railroad bridge over the Androscoggin. There is no accounting for taste of course, but the enthusiasm of some for the current structure is truly baffling.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 4, 2018 10:38 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

Categories: FJW

The following message was submitted from your MaineDOT website contact form .

Date: 04/04/2018
Name: william sadler
Organization(if applicable): none
Phone: (207) 725-4041
Email: wstackpole@comcast.net

Topic:

Comments:
when looking at the drawing of the proposed new bridge, I note there are not hand rails, etc between the road and the sidewalk. can those be added? offers more protection to walkers.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 4, 2018 11:09 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/04/2018
Name: Jeff Runyon
Organization(if applicable): NA
Phone: 207-373-3958
Email: jrunyon@yahoo.com

Topic:

Comments:
I live in Brunswick Me and travel over the Brunswick/Topsham (Frank J. Wood) bridge frequently. It is an eyesore and, most importantly, an unsafe structure. I spent 25 years in the "metals" industry and I know the dangers of the environmental effects on metals and the associated effects of load and vibration stresses on affected structures. You will never be able to permanently remediate this bridge. Money spent will be completely wasted on an outdated, unsafe bridge. This is not a historic home or building. It is a structure that is constantly openly exposed to the elements and varying loads. Remove it as soon as possible and replace it with a functional and safe structure that will last into the next century.

If required, please respond as soon as possible.

From: Kittredge, Joel
Sent: Wednesday, April 4, 2018 1:02 PM
To: Gardner, David; Chamberlain, Kristen; Martin, Cheryl (FHWA) (Cheryl.Martin@dot.gov)
Cc: Damren, Janet
Subject: FW: MaineDOT Contact Form Submission: project FJW

FYI

-----Original Message-----
From: Shofner, Pamela
Sent: Wednesday, April 04, 2018 1:00 PM
To: Kittredge, Joel <Joel.C.Kittredge@maine.gov>
Subject: FW: MaineDOT Contact Form Submission: project

-----Original Message-----
From: funds2raise@gmail.com [mailto:funds2raise@gmail.com]
Sent: Wednesday, April 04, 2018 11:17 AM
To: MaineDOT, Communications <Communications.MaineDOT@maine.gov>
Cc: Shofner, Pamela <Pamela.Shofner@maine.gov>
Subject: MaineDOT Contact Form Submission: project

The following message was submitted from the MaineDOT contact form.

Date: Wednesday, 04-Apr-2018 09:43:47 EDT
Name: Mechelle Given
Phone:
Email: funds2raise@gmail.com

Topic: project

Comments:
I am writing in support of the Topsham bridge replacement project which is being heavily discussed at my work place located in downtown Brunswick. I am not a resident of Topsham or Brunswick but I use the current bridge structure. The mere sight of the bridge is a cosmetic eyesore, not to mention the structural soundness leaves me praying that I do not get stuck in traffic and stuck in the middle of the bridge. Since the weight limit was reduced and many articles published about how unstable this bridge has become, I will use another route to get where I need to go for shopping and conducting business, even if it means extra miles to get there. Many folks are passionate about the historic value and their attachment to this bridge that was built before their time; my opinion is let's put up a new structurally sound and cosmetically pleasing bridge; one that I feel safe to drive and walk over. While I am following the details of the arguments for and against, I realize the only
ones showing up at the meetings are the ones protesting against demolition and new construction. There is no historical value to this bridge unless Herbert Hoover or Franklyn Roosevelt tinkled off the side of the bridge. I am sure they would both approve of the replacement for the safety of the people utilizing this very valuable passage way. I would love to see a new bridge I can feel confident driving across with my grandchildren in the car.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 4, 2018 2:11 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/04/2018
Name: Margaret Schick
Organization(if applicable):
Phone: 207-522-0708
Email: peggyschick@gmail.com

Topic:

Comments:
I was unable to attend the public meeting on March 28 to discuss the options for the bridge between Brunswick and Topsham and appreciate that you are collecting comments until April 11.

For safety reasons, as a driver, cyclist, and pedestrian I greatly prefer the design of the replacement bridge.

I also feel the visual and economic impact of the new bridge design should not be underestimated. The new design is very attractive and reflects the vibrancy of our towns, versus the design of the old bridge which, even if repainted, would remain an aesthetic eye-sore. Let the beautifully restored buildings and homes in both towns be the heralds of our historic character.

With these points in mind and given that the estimated cost will be higher to repair the bridge--and the anticipated backup in traffic much greater-- it makes no sense at all to repair the existing structure.

Thank you,
Margaret Schick

10 Brookside Drive
Topsham

â€‹

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 4, 2018 6:02 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/04/2018
Name: Margaret Wilson
Organization(if applicable):
Phone: 207-729-0584
Email: mawilson911@comcast.net

Topic:

Comments:
I think the old Frank Wood bridge needs to be replaced. It is not safe for bicycles, not particularly attractive, and the cost to rehab it for a shorter useful life than the new bridge is unconscionable. Please build the new bridge.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Thursday, April 5, 2018 8:56 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/05/2018
Name: richard s. moll
Organization(if applicable): citizen of brunswick
Phone: 207 725 5889
Email: faithkmoll@gmail.com

Topic:

Comments:
I want the present outdated and unsafe bridge replaced. Spend my taxpayer dollars responsibly. Also, re-route traffic and build the new bridge without compromised approaches and the chaos of working while traffic is on going. Construction will go faster and the design will be better. Thank you.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Thursday, April 5, 2018 9:04 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/05/2018
Name: faith k. moll
Organization(if applicable): citizen of brunswick
Phone: 207 725 5889
Email: faithkmoll@gmail.com

Topic:

Comments:
I urge MDOT to replace the FJWood bridge with a modern, safe and new design. Actually, the new design fits the earliest known bridge over this span of water. The present open truss design is represented in at least 100 other bridges in Maine and they are in much better condition. The lead paint on this bridge is a daily hazard to all. Removing this material seems dangerous and expensive. Opening the view shed, spending less money to construct a new bridge that will last longer and be safe seems to be the correct and responsible course of action for an agency entrusted with proper design and expenditure. You are professional engineers, experienced bridge designers and I hope you will do your duty.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Thursday, April 5, 2018 11:25 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/05/2018
Name: Robert Pickel
Organization(if applicable):
Phone: 207-766-1080
Email: longshadows@gmail.com

Topic:

Comments:
We have an opportunity to repair an unsightly and out of date situation in Brunswick/Topsham. A new bridge, pedestrian/bicycle-friendly, attractive and with lower maintenance costs is sorely needed and now is our chance. The current "green monster" has outlived it's days. It's not an "historic structure" by any stretch of the imagination. It's my age and I hardly think I'm anything "historic."

Let's move into the 21st Century and replace this old rusty bridge on the heavily used thoroughfare with something we can all safely enjoy and take pride in for years to come.

Thank you!

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Thursday, April 5, 2018 10:12 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/05/2018
Name: Richard Mersereau
Organization(if applicable): Brunswick resident
Phone: 2078418945
Email: rmersere@bowdoin.edu

Topic:

Comments:
The new bridge recommended by MDOT is far superior in every respect to the alternative of saving the not very historical rust bucket of a bridge that cars, bikes, and pedestrians have to endure.
Please proceed to build the modern, safer, and more aesthetically pleasing bridge that youâ€™ve recommended.15

If required, please respond as soon as possible.

From: Kittredge, Joel
Sent: Friday, April 6, 2018 7:59 AM
To: Gardner, David; Chamberlain, Kristen; Martin, Cheryl (FHWA) (Cheryl.Martin@dot.gov)
Cc: Damren, Janet
Subject: FW: MaineDOT Contact Form Submission: project

Fyi and tedoc.

-----Original Message-----
From: Shofner, Pamela
Sent: Friday, April 06, 2018 7:07 AM
To: Kittredge, Joel <Joel.C.Kittredge@maine.gov>
Subject: FW: MaineDOT Contact Form Submission: project

-----Original Message-----
From: mjbriley@comcast.net [mailto:mjbriley@comcast.net]
Sent: Thursday, April 05, 2018 2:57 PM
To: MaineDOT, Communications <Communications.MaineDOT@maine.gov>
Cc: Shofner, Pamela <Pamela.Shofner@maine.gov>
Subject: MaineDOT Contact Form Submission: project

The following message was submitted from the MaineDOT contact form.

Date: Thursday, 05-Apr-2018 14:46:44 EDT
Name: John Briley
Phone: 207-729-7216
Email: mjbriley@comcast.net

Topic: project

Comments:
Regarding the Frank J. Wood Bridge project. I reside in Topsham and am for Option 2. I recommend placing at least two overlooks on the downstream side and two on the upstream side, giving people a place to view the falls without interfering with pedestrians walking by. These overlooks would provide space for historical markers to help observers understand what they're looking at or info about past bridges. An almost identical project was undertaken in Marietta, Ohio with great success a few years back, replacing the Putnam Street Bridge over the Muskingum River. They could certainly offer pointers from experience. Thank you.
John Briley

If required, please respond as soon as possible.

From: Kittredge, Joel
Sent: Friday, April 6, 2018 10:27 AM
To: Chamberlain, Kristen; Gardner, David; Martin, Cheryl (FHWA) (Cheryl.Martin@dot.gov)
Cc: Damren, Janet
Subject: FW: MaineDOT Contact Form Submission: project

-----Original Message-----
From: Shofner, Pamela
Sent: Friday, April 06, 2018 10:23 AM
To: Kittredge, Joel <Joel.C.Kittredge@maine.gov>
Subject: FW: MaineDOT Contact Form Submission: project

-----Original Message-----
From: adairdelamater@gmail.com [mailto:adairdelamater@gmail.com]
Sent: Thursday, April 05, 2018 2:44 PM
To: MaineDOT, Communications <Communications.MaineDOT@maine.gov>
Cc: Shofner, Pamela <Pamela.Shofner@maine.gov>
Subject: MaineDOT Contact Form Submission: project

The following message was submitted from the MaineDOT contact form.

Date: Thursday, 05-Apr-2018 14:40:31 EDT
Name: Adair DeLamater
Phone: 2073894488
Email: adairdelamater@gmail.com

Topic: project

Comments:
I am writing to urge you to build a replacement bridge for the out of date Frank J. Wood bridge.

I understand it will be less costly to taxpayers to build a new bridge, rather than rehabilitating the current bridge. Also, the present bridge is ugly, and is in very poor condition.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Friday, April 6, 2018 6:22 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/06/2018
Name: Richard Winter
Organization(if applicable):
Phone: 2073731312
Email: wintrick@gmail.com

Topic:

Comments:
I would like to enter my strong support for replacing the green monstrosity linking Brunswick and Topsham; the design(s) for the new bridge are elegant and functional. My only concern is maintaining possible access to the fish ladder for fish. The design which curves outward downstream seems to to be the best alternative for that.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Saturday, April 7, 2018 8:10 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/07/2018
Name: Brian Thibeault
Organization(if applicable):
Phone: 725-9225
Email: teebus30@hotmail.com

Topic:

Comments:
I am writing to express my support for replacing the Frank Wood bridge with a completely new bridge.The new bridge will be safer for pedestrians, drivers and bicyclists.It would also open up the views of the river on both sides. The money saved should be used for much needed road improvements in other parts of the state. Remove the rusty eyesore. Thank you for allowing me to give my comment.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Saturday, April 7, 2018 7:00 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/07/2018
Name: Phinney
Organization(if applicable): Governor Baxter, LLC
Phone: 207-725-2707
Email: phin@governorbaxter.com

Topic:

Comments:
I want to insure your site is accepting comments. This is a test.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Sunday, April 8, 2018 8:28 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/08/2018
Name: FC Vitolo
Organization(if applicable):
Phone: 2074490169
Email: f_cureo@hotmail.com

Topic:

Comments:
Regarding the future of a bridge between Topsham & Brunswick: I am 99% behind replacement of the Frank J Wood bridge.
I am typically a 'preservationist' but the current structure has outlived it usefulness and safety.
I believe a local group could preserve the nostalgia through artwork, sculpture & photography.
It's time to let it go.

If required, please respond as soon as possible.

From: Kittredge, Joel
Sent: Monday, April 9, 2018 7:58 AM
To: Gardner, David; Chamberlain, Kristen; Martin, Cheryl (FHWA) (Cheryl.Martin@dot.gov)
Cc: Damren, Janet
Subject: FW: MaineDOT Contact Form Submission: project

-----Original Message-----
From: Shofner, Pamela
Sent: Monday, April 09, 2018 7:07 AM
To: Kittredge, Joel <Joel.C.Kittredge@maine.gov>
Subject: FW: MaineDOT Contact Form Submission: project

-----Original Message-----
From: bowmansc@yahoo.com [mailto:bowmansc@yahoo.com]
Sent: Sunday, April 08, 2018 12:10 PM
To: MaineDOT, Communications <Communications.MaineDOT@maine.gov>
Cc: Shofner, Pamela <Pamela.Shofner@maine.gov>
Subject: MaineDOT Contact Form Submission: project

The following message was submitted from the MaineDOT contact form.

Date: Sunday, 08-Apr-2018 12:03:57 EDT
Name: Stephen Bowman
Phone:
Email: bowmansc@yahoo.com

Topic: project

Comments:
I am a Brunswick resident and am in favor of replacing the Frank J. Woods bridge with the new design. I believe a wider, pedestrian-friendly bridge is what we need to help bring the beauty of the river to the forefront. Thank You.

If required, please respond as soon as possible.

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
Public Meeting - Environmental Assessment
Mt Ararat High School Commons

March 28, 2018
6:00 pm

The Federal Highway Administration (FHWA) and the Maine Department of Transportation (MaineDOT) are accepting public comments and community input regarding the National Environmental Protection Act (NEPA) Environmental Assessment through April 11, 2018. This comment sheet can be mailed to the following address:

David Gardner
Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at:
http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment:
I support alternative 2 - replace upstream.
I have attended several meetings to discuss this, including the March 28 meeting. I believe MDOT did explore alternatives, considered local input, and has the best interests for a safe bridge with longevity. Although I value historic buildings and locations, the new bridge will afford a panoramic view of the mills, river, etc. in the bridge vicinity without metal structure to peer through. The back-ups presently would be exacerbated if the bridge was rehab.ed - as numbers of cars per day are likely to increase in the years ahead. Painting of the structure creates close downs / bottle necks presently which would not change without a new bridge! Bike paths incorporated into a new bridge would
(Use additional sheets if necessary) enhance tourism and resident biking. Although some have described the present bridge as scenic, I do not share that point of view. Thank you.

Name (Please Print) Debra Wigand
Street Address 12 Larrabee Farm Rd
City, State, Zip Brunswick ME 04011
Contact Info (Email or Phone) 207-729-0363

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
Public Meeting - Environmental Assessment
Mt Ararat High School Commons

March 28, 2018
6:00 pm

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Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at:
http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment: I WAS BORN & RAISED IN TOPSHAM OVER 70 yrs AGO AND I DON'T SEE ANYTHING HISTORIC ABOUT THE FRANK WOOD BRIDGE. I HAVE TRAVELED OVER IT BY FOOT, BICYCLE, MOTORCYCLE, AND AUTOMOBILE. IT'S TIME FOR A NEW BRIDGE. THE LONGER THIS GOES ON THE MORE EXPENSIVE IT WILL GET

(Use additional sheets if necessary)

Name (Please Print) JERRY LAMARRE
Street Address 10 MAPLE ST. EXT.
City, State, Zip TOPSHAM, ME. 04086
Contact Info (Email or Phone) 841-5143

From: cheryl king <inthegarden24@yahoo.com>
Sent: Monday, April 9, 2018 8:29 AM
To: Gardner, David
Subject: Subject: Public Comment Frank J Wood

To Whom It May Concern

I was present at the Public Meeting on March 28, 2018. I was expecting to hear about the Environmental Assessment, but that wasn't discussed, which I found curious.

I was raised in Brunswick. After graduating from high school I joined the military, where I had the opportunity to live in many places across the country and world. When I retired I returned to the Brunswick area because of all the towns and cities I'd lived - the Brunswick-Topsham area remained special. I appreciated the natural beauty and the quaint, small-town charm. There is a sense of yesteryear in Maine, which is part of its allure to my many relatives and friends who visit regularly.

Southern Maine is losing its quaintness to modern conveniences and Topsham will lose that if the Frank J Wood bridge is replaced with a cement overpass. There is nothing special about that in my mind.

Cheryl King
12 Walnut St
Topsham

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
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Mt Ararat High School Commons

March 28, 2018
6:00 pm

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David Gardner
Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at: http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment:
I ATTENDED THE MEETING COULD NOT HEAR SOME OF THE RESIDENTS. STAYED UNTIL THE END. THE STATE PRESENTATION WAS V. GOOD AND I COULD HEAR. I HAVE ONLY LIVED IN MAINE AND USED THE BRIDGE SINCE 1990 ALTHOUGH WE SUMMERED HERE AND OWNED PROPERTY SINCE 1980 AT MERE PT, BRUNS. - NOW LIVE AT THE HIGHLANDS IN TOPSHAM BUT SHOP MOSTLY IN BRUNSWICK + BANK IN BRUNSWICK SO USE THE RUSTY GREEN BRIDGE. - I'M IN MID 90'S AND MAY NOT BE AROUND TO SEE OR USE A NEW BRIDGE, BUT THAT IS WHAT I FAVOR. I CERTAINLY DID NOT MOVE TO MAINE OR BRUNSWICK BECAUSE OF IT. - MY ONE WORRY IS THAT I DO NOT HAVE A MENTAL PICTURE OF HOW THE APPROACHES AT EITHER END WILL BE CONSTRUCTED, HOW THEY WILL LOOK, HOW TRAFFIC WILL BE AFFECTED, FISH LADDER ENTRANCE TO FRONTEIR REST. PARKING, OTHER BUSINESS PARKING etc

AND THE HEIGHT OR RISE OF BRIDGE

(Use additional sheets if necessary)

Name (Please Print) MARGARET FISCHER

Street Address 13 COBURN LANE

City, State, Zip TOPSHAM, ME 04086

Contact Info (Email or Phone)

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
Public Meeting - Environmental Assessment
Mt Ararat High School Commons

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David Gardner
Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at:
http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at
david.gardner@maine.gov.

Comment: Dear Mr. Gardner;
Please Save the Historic "GREEN" FRANK J. WOOD BRIDGE WHICH SPANS THE LOCAL RIVER CONNECTING TWO HISTORIC MILLS. WE CONSIDER OUR WALKS, IN ALL SEASONS, ACROSS THE BRIDGE SACRED. THE PEDESTRIANS, LIKE OURSELVES, EXPERIENCE THE INCREDIBLY LIVELY LOWER WATERFALLS (WHICH WOULD BE OBSCURED BY THE NEW HWY. BRIDGE WHICH WOULD CURVE TOWARDS THE UPPER STREAM). WE KNOW THE FALLS + THE BIRDS + FISH + CHERISH THEM MORE THAN WE CAN EXPRESS, THE LOSS OF THIS VITAL PROXIMITY TO THE LOWER FALLS WOULD BE HEARTBREAKING FOR THOUSANDS OF LOCALS + TOURISTS. WE RECOMMEND OPTION #4 WHICH
* SAVES THE GREEN BRIDGE + ADDS ANOTHER WALKWAY / OR BIKEWAY, ON THE DOWNSTREAM SIDE - KEEPING THE METAL BARRIER BTWN PEDESTRIANS + TRAFFIC IS ESSENTIAL. WE FEEL SAFE WALKING AND EXPERIENCING the DYNAMISM OF THE LOWER ROCK FALLS NOW + BEG YOU TO SAVE OUR BELOVED, SPECIAL, HISTORIC MONUMENTAL BRIDGE. WE LOVE IT! SO MANY OF US! THANKS VERY MUCH, SUSAN WILLIAMS

(Use additional sheets if necessary)

Name (Please Print) SUSAN WILLIAMS
Street Address 14 ARBORETUM WAY
City, State, Zip HARPSWELL, ME 04079
Contact Info (Email or Phone) 207) 373-3995

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

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David Gardner
Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at:
http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment:

PLEASE KEEP PRESENT BRIDGE!
IT IS A PLACE! & MAKES THE RIVER FEEL AS A PLACE!
NEW NULLIFIES PLACE! JUST A SLICE OF HIWAY!

(Use additional sheets if necessary)

Name (Please Print) DAVID COLT
Street Address 14 ARBORETUM WAY
City, State, Zip HARPSWELL, ME 04079
Contact Info (Email or Phone) DAVIDCOLT@AOL.COM
207) 373-3992

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
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Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at:
http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment:
I appreciated the open forum in Topsham last week.

As a resident, supporter of local business and community, and a Maine taxpayer, I fully support the rebuild (new construction) option 2. I believe this is the best option for all involved and I appreciate the committee formed to save the bridge, but it's time is over.

(Use additional sheets if necessary)

Name (Please Print) Thomas Barter
Street Address 39 Bestwick Rd
City, State, Zip Brunswick ME 04011
Contact Info (Email or Phone) 207 751.0574

MaineDOT PROJECT NAME FRANK WOOD BRIDGE REPLACEMEN

NAME: JAMES HAMILTON PHONE: 207-841-1388

ADDRESS: 162 COLUMBIA AVE TOWN: BRUNSWICK

EMAIL: jimham1@gwi.net REPRESENTING: SELF

Do you want a MaineDOT representative to call you? YES ◯ NO ⊗

COMMENTS:

I FAVOR REPLACING THE BRIDGE WITH ~~[illegible]~~ ALTERNATE 2 ~~[illegible]~~

I am an avid cyclist, and crossing the current bridge is very dangerous,

I'm also concerned about the added cost and bridge shut-down involved with rehabilitation option.

From: Communications.MaineDOT@maine.gov
Sent: Monday, April 9, 2018 2:38 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/09/2018
Name: Mark Grandonico
Organization(if applicable): MidCoast Triathlon Club
Phone: 2072320232
Email: grandm@maine.rr.com

Topic:

Comments:
Good Afternoon, I see the public comment period is closing IRT the Frank J Wood bridge. The MidCoast Triathlon Club is based out of Brunswick with 100+ members in the immediate area. We fully support, in alignment with the Bicycle Coalition of Maine, REPLACEMENT of the bridge. The current design is simply not safe for bicyclists.

Thank You
Mark Grandonico
MidCoast Triathlon Club

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Monday, April 9, 2018 4:57 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/09/2018
Name: Richard Bernasconi
Organization(if applicable):
Phone: 617-481-0040
Email: rickbern@comcast.net

Topic:

Comments:
I live in Brunswick, Maine and I wish to comment on replacement versus rehabilitation of the Frank J Wood Bridge connecting Topsham and Brunswick Maine. I consider the current bridge to be an eye sore that detracts from the natural beauty of the Androscoggin River and its wooded banks. Even when the bridge was in a much less rusted, better state of maintenance, its heavy industrial metal beam construction obstructed and detracted from an otherwise bucolic view. The proposed replacement bridge has a much lower profile that would not interfere as much with the visual enjoyment of the river. The cost of the new bridge would be less than the rehabilitation of the old structure, would require less cost of maintenance and provide a longer life time of use. In my mind it is hard to see anything that would recommend retaining the old structure but the continuation of a tired and ugly tradition. I highly recommend the replacement of the bridge with a modern constructed alternative. T hank you.

If required, please respond as soon as possible.

From: Cynthia Howland <cbhowland@gmail.com>
Sent: Monday, April 9, 2018 5:17 PM
To: Gardner, David
Subject: Frank J. Wood Bridge

I strongly favor rehabilitation of the bridge because it is part of the cultural history of the mills in Brunswick and Topsham. Also, rehabilitation will do no harm to the fishway, the rocks below the dam, or to the marine/water fowl life of the river .

Thank you.

Cynthia Howland

From: CORNELIUS & DONNA WALSH <yanks23@comcast.net>
Sent: Monday, April 9, 2018 6:26 PM
To: Gardner, David
Subject: Green bridge

I would like to see the bridge restored. I think it fits Topsham and Brunswick small town not the design of the new bridge. Donna and Cornelius Walsh 73 Bridge Street Topsham,Maine 04086 Yanks23@comcast.net

From: Communications.MaineDOT@maine.gov
Sent: Monday, April 9, 2018 7:35 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/09/2018
Name: Linda L. Baker
Organization(if applicable): Topsham Resident
Phone: 207-729-8381
Email: Lbakerbasket@yahoo.com

Topic:

Comments:
I strongly support Option 2 for replacement of the Frank J. Wood Bridge. It is the only fiscally responsible choice. Thank you for the many hours of public information and input you have provided. You have done an outstanding job and, in my view, very fairly presented all options.

If required, please respond as soon as possible.

From: Hannah Judson <hjudson@hotmail.com>
Sent: Tuesday, April 10, 2018 3:09 AM
To: Gardner, David
Cc: chick76@me.com
Subject: Frank J. Wood Bridge needs to be preserved

Dear Mr. Gardner,
I wanted to let you know that I am concerned about the possible destruction of the Frank J. Wood Bridge. While I am for progress in general, I am also concerned that we take care of monuments that link present with past. This bridge has architectural merit, fits in with the landscape, speaks to the history of the river, the factory, and the towns it joins. Please do what you can to pursue restoration of the bridge and not tear it down.

Best,

Hannah Howland Judson

From: Cynthia Howland <cbhowland@gmail.com>
Sent: Monday, April 9, 2018 4:29 PM
To: Mary Alice Treworgy; Jane Frost; Genie Wheelwright; Louise Huntington; Kate Huntington; Katharine Watson; Wallace Pinfold; Hannah Judson; Ethan Howland; Jan&Liz Pierson
Subject: Fwd: MDOT email

Dear Friends,

Please send in your pro-Frank J. Wood Bridge comments no later than Wednesday. You don’t have to say much more than that you favor the rehabilitation of the FJW Bridge, but more is OK. Please cc Chick Carroll as per instructions from John Graham; he is a member of The Friends of the Frank J. Wood Bridge (John Graham is head of the group). Please forward the info to any friends anywhere who love bridges and keeping the character of a community intact.

Fervent thanks,

Cynthia

Begin forwarded message:

From: John Graham <John@johngrahamrealestate.com>
Subject: MDOT email
Date: April 9, 2018 at 12:16:56 PM EDT
To: "cbhowland@gmail.com" <cbhowland@gmail.com>
Cc: Ann And Chick <chick76@me.com>

Hi Cynthia,
Please send your comments to David Gardiner- David.Gardner@maine.gov and also cc Chick Carroll, am member of our group who is going to hand deliver them to make sure they get put in the record.. Chick’s email is: chick76@me.com.

Thanks,

John

John Graham
John Graham Real Estate
www.johngrahamrealestate.com
207-491-1660
10 Pleasant Street
Topsham, ME 04086

From: Kittredge, Joel
Sent: Tuesday, April 10, 2018 10:26 AM
To: Chamberlain, Kristen; Gardner, David; Martin, Cheryl (FHWA) (Cheryl.Martin@dot.gov)
Cc: Damren, Janet
Subject: FW: Frank J Wood bridge comment

fyi

-----Original Message-----
From: hedda steinhoff [mailto:hedda.s@gmail.com]
Sent: Tuesday, April 10, 2018 10:11 AM
To: Kittredge, Joel <Joel.C.Kittredge@maine.gov>
Subject: Frank J Wood bridge comment

I support the upstream bridge replacement between Topsham and Brunswick. I like that the proposed bridge design is bike friendly, but from a pedestrian's perspective I would not feel safe without a guardrail. I regularly cross the bridge with my son in his stroller, and having a barrier between us and both cars and bikes is essential for us to walk across with peace of mind. I hope you will consider protecting pedestrians as well as accommodating cyclists in your plan going forward.

Thank you,

Hedda Scribner
10 Hanson Drive
Topsham

From: Katharine Watson <kjwats@comcast.net>
Sent: Tuesday, April 10, 2018 12:10 PM
To: Gardner, David
Cc: "Chick Carroll chick76"@me.com
Subject: Frank J. Wood Bridge between Brunswick and Topsham

Dear David Gardner,

As a resident of Brunswick of 41 years, I am writing to plead that the decision be made to rehab rather than replace the Frank J. Wood Bridge which links the towns of Brunswick and Topsham. Human safety and vehicular convenience can be guaranteed through rehab as well as contemporary construction, but a new bridge would greatly impact if not destroy one of the major urban vistas of Maine. The new bridge would cut into the Androscoggin falls, changing the course of the water and altering the river's banks.

Please choose rehab rather than new construction.

Sincerely,

Katharine J. Watson, 10 Boody Street, Brunswick, ME 04011

From: John McKee <jmckee@bowdoin.edu>
Sent: Tuesday, April 10, 2018 1:00 PM
To: Gardner, David
Cc: John McKee
Subject: Comment on FJ Wood Bridge proposals

Mr. Gardner and others concerned:

As a resident of Brunswick for many decades, I've long admired the FJ Wood Bridge even while putting up with the frequent traffic jams at either end of the bridge.

I strongly support the option to rehabilitate the present structure. It does the job and it has historic value. And looking beyond the structure itself, it's clear that only those options maintaining the existing alignment make sense from an environmental or historic-preservation viewpoint.

In addition, I believe that any preference based largely on considerations of traffic flow and safety must be discounted. From that viewpoint – and short of a thorough redesign of the traffic pattern near each end of the bridge – none of the options proposed is clearly superior to the others.

In short, rehabilitation of the present bridge is the best of the proposed options.

Please include this statement in the public record on this matter.

Sincerely
John McKee
Brunswick, Maine

From: Communications.MaineDOT@maine.gov
Sent: Tuesday, April 10, 2018 1:05 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/10/2018
Name: Stephen Turner and Jo-Ann Turner
Organization(if applicable): retired citizens of Brunswick, Maine
Phone: 207-406-4375
Email: turnermailbox@comcast.net

Topic:

Comments:
We would like to see the FJW demolished and a new bridge of modern design replace it. The FJW is currently an eye sore and every time we use it we feel like we are driving through a junk yard. Any expert in steel construction can tell you that the specialized care the FJW would require (replacements and repair) represents prohibitive and problematic costs to the citizens of the State of Maine. Also, the FJW actually detracts from the historical beauty of nearby structures. The new, low profile proposed bridge would shift attention away from a rust pile to the great natural beauty of the river and its environs.

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Tuesday, April 10, 2018 1:52 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/10/2018
Name: Amanda Hughes
Organization(if applicable):
Phone: 2074001639
Email: atehughes@gmail.com

Topic:

Comments:
I would like to register my support for having a new bridge built to connect Topsham and Brunswick. I use the Frank J Wood Bridge on a daily basis, both as a driver and a pedestrian. I think the a new bridge would benefit our communities- by connecting trails and giving real consideration to cyclists. Both new options appeal to me, but Alternative #2 has a much more appealing timeline.

I did not realize until I read the EA draft, that the Frank Wood Bridge is a fracture critical structure. The proposal to add strength and a new sidewalk to the existing bridge seems like a patch job that may not even satisfy the folks who hope to keep the green bridge (presumably in its original historic state) and the other repair options don't address the underlying structural concerns.

I would feel much safer with a modern bridge that is designed for modern traffic concerns.

Thank you.

If required, please respond as soon as possible.

From: Wallace Pinfold <wgpinfold@gmail.com>
Sent: Wednesday, April 11, 2018 8:04 AM
To: Gardner, David
Subject: Frank J Wood bridge

Dear Sir:

I am strongly for the rehabilitation of the metal bridge between Brunswick and Topsham. The high-handed way in which MDOT has managed this whole business Is not the only thing that motivates this letter. I don’t trust your figures – – I don’t believe that rehabbing the present bridge will cost as much as you say, I don’t believe that the new bridge will cost as little. Also, I prefer the historic structure to any design you have proposed. Richard Nemrow’s letter to the Times Record yesterday , April 10, absent personal references, summarizes both my objections and preferences more articulatey than I can do myself.

Sincerely,
Wallace Pinfold
Brunswick

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 11, 2018 8:36 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/11/2018
Name: Peter Huntsman
Organization(if applicable): Self
Phone: 207-844-3655
Email: Peter.Huntsman@gmail.com

Topic:

Comments:
I am a retired construction lawyer from Connecticut, and was involved in a number of catastrophic failures over my career (the Hartford Civic Center collapse; Lâ€™Ambiance Plaza; 2 minor commercial buildings that failed as a result of shadow loading). I strongly support MDOT selecting the safest, most cost effective bridge. Respectfully, sentimentality has little to do with the safety of the motoring public. The failures of the Mianus River and Schoharie Creek bridges, the pedestrian bridge in florida, etc., remind us that safety is job #1.

If required, please respond as soon as possible.

April 9. 18

Dear David,

Do what's right - for all of us.

Build the New Bridge.

We, the Lisbon-Durham folks, have their new Bridge and love it!! Sidewalks, views E.T.C.

It's not fair to saddle Maine Tax-payers with preventable maintenance Costs and needless disruption of Business both in Brunswick and Topsham.

Friends of the Late Frank J Wood could erect a plaque dedicated to his memory or name the New Bridge.

Frank J Wood Memorial Bridge NO2

Take Care,

Do what's Right

We're with You

Noyes Lawrence

18 Sunset Av. Lisbon Falls. (86 YEARS YOUNG)

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
Public Meeting - Environmental Assessment
Mt Ararat High School Commons

March 28, 2018
6:00 pm

The Federal Highway Administration (FHWA) and the Maine Department of Transportation (MaineDOT) are accepting public comments and community input regarding the National Environmental Protection Act (NEPA) Environmental Assessment through April 11, 2018. This comment sheet can be mailed to the following address:

David Gardner
Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at: http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment:
My primary concerns are:
(1) Safety of pedestrians: I frequently walk the bridge & appreciate the steel barrier.
(2) Collisions: I have seen no evidence that there have been a great many accidents on the bridge.
(3) History: There is a reason why the Green Bridge is on the cover of Mills and Factories of New England. It's iconic!

(Use additional sheets if necessary)

Name (Please Print) Jane Crichton
Street Address 733 Mere Point Road
City, State, Zip Brunswick, ME 04011
Contact Info (Email or Phone) 207-729-3213

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
Public Meeting - Environmental Assessment
Mt Ararat High School Commons

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David Gardner
Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at: http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment: Please listen to the Voices that WANT TO CONSERVE the character OF the towns OF BRUNSWICK & TOPSHAM BY REHABILITATING THE HISTORIC & VERY INTERESTING "GREEN BRIDGE!" THE OPTION #4 BY MAINE DOT WOULD BE A VERY POSITIVE CHOICE. THAT WAY WE RETAIN THE HISTORIC BRIDGE AND GAIN AN ADDITIONAL PEDESTRIAN WALKWAY. THE PROPOSED NEW "HIGHWAY STYLE" RIVER CROSSING WOULD DESTROY THE CHERISHED VIEWS OF THOUSANDS OF LOCALS & TOURISTS OF THE LOWER ROCK WATERFALLS! DO YOU REALIZE HOW MUCH WE WOULD MISS THE WATERFALLS?? ALSO

(Use additional sheets if necessary) THE NEW HWY PROVIDES ZERO PROTECTION FOR PEDESTRIANS. THE "GREEN BRIDGE" PROTECTS US PEDESTRIANS W/ A METAL CAGE. YOU DON'T WANT A ROGUE DRIVER TO MAIME OR KILL PEOPLE OUT WALKING. Please OPTION #4.

Name (Please Print) SUSAN BOYD WILLIAMS
Street Address 14 ARBORETUM WAY
City, State, Zip HARPSWELL, ME 04079
Contact Info (Email or Phone) 207) 373-3995

Cheryl Martin April, 11 2018
Assistant Division Administrator
Federal Highway Administration – Maine Division
40 Western Ave
Augusta, ME 04330

David Gardiner
Maine DOT
16 State House Station
Augusta, ME 04333-0016

To whom it may concern,

Since early 2016 the community has been at odds with a small faction of town employees (civil servants) who are determined to destroy the Frank J Wood Bridge. The reasoning behind this is unclear.
I walk across the bridge regularly with my children and have never felt afraid, quite the opposite! The steel beams between the traffic and the sidewalk are comforting. I find there is little pedestrian traffic, has the MDOT done any research into pedestrian numbers? I doubt it.
Once the bridges deck is replaced bicyclists can have 5 foot bike lanes. The only thing stopping this is not the bridge's deck width but MDOT's refusal to shrink lane widths! All studies show 10 foot lane widths are preferable in an urban setting as this bridge most certainly is!

I want to say that I am relieved there are Federal Laws that protect historical structures… however it appears that MDOT decides which laws it wants to apply and once they are called out on it they 'cook the books'. It is quite obvious that this is what has been done in this case. Why the misleading information and dishonesty? If there really was a need for this new bridge I don't believe there would be cause for such behaviour. I also find it quite insulting to both towns that the best alternative you could come up with was a cheap highway bridge. Could MDOT not have taken some inspiration from other states? Such as MassDOT'S Whittier Bridge project?

Mr Gardiner, you signed the 2003 Historical Bridge Plan on the FJW. How can you now draft a 4f saying the opposite? Are you not a Civil Servant? As a resident of this state I expect you to keep to your word as I am sure many others do. I do not trust those who say one thing and then attempt to deliver another. I'd be interested to hear your reasoning behind this u-turn!
If funding is an issue, why not ask? Every time a transportation bond is placed on the ballot it passes overwhelmingly. All you are doing is wasting tax payers dollars on an alternative that in absolutely NO way fits its surroundings, and goes against every single study on traffic calming and urban street design I have read.

It is not too late to choose to rehabilitate this fantastic bridge. You are guardians to these historical structures and in every instance where it is possible to do so should be maintaining and preserving them. Please I implore you not to be short sighted in this matter. The long term benefits of the FJW Bridge in its picturesque surroundings far and above outweigh the short term gains of your proposed wide open ugly highway bridge. The reputation of the Agencies that you work for could be vastly improved by working with communities to preserve their historic structures as opposed to coming in with the demolition plan already in place. Save the Frank J Wood Bridge!

P. Asher

Top sham

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 11, 2018 10:27 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/11/2018
Name: Susan Z. White
Organization(if applicable):
Phone: 207-725-2707
Email: phinwhite@me.com

Topic:

Comments:
Susan Z. White
67 Bridge Street
Topsham, ME 04086

April 11, 2018

Mr. David Gardner
MDOT
Environmental Office
Augusta, ME

Dear Mr. Gardner:

I'm a store manager for a retailer located in the town of Brunswick, at the intersection of Pleasant Street and Maine St.

In Brunswick, Maine we spell our main street M-A-I-N-E. We're the only main street in the nation to do this and it differentiates us from all other main streets.

The Frank Wood Bridge also differentiates us from any other main street. This historic steel truss bridge is the town center as we lost our historic town hall during urban renewal in 1961. At that moment in time the bridge took over as the dominant and most historic structure in the town. It's always a point of reference, it's often the meeting place—see you at Green Bridge! It's on the cover of our phone book.

I speak with thousands of people each year from all over the world. Most are tourists and families looking at colleges. A recurring comment by many is what a scenic area the Frank Wood Bridge and mill buildings create. And when I tell them it is under threat they express outrage and then offer their hope that it can be saved. That is my hope too. Please save our historic bridge.

Thank you,
Susan

If required, please respond as soon as possible.

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 11, 2018 10:25 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

Categories: FJW

The following message was submitted from your MaineDOT website contact form .

Date: 04/11/2018
Name: James Phinney Baxter White
Organization(if applicable): Governor Baxter, LLC
Phone: 207-725-2707
Email: phin@governorbaxter.com

Topic:

Comments:
J. Phinney Baxter White
67 Bridge Street
Topsham, ME 04086

April 11, 2018

Mr. David Gardner
MDOT
Environmental Office
Augusta, ME

Dear Mr. Gardner:

Throughout the 106 the Maine DOT and Federal Highway have denied the Frank Wood Bridge status of being individually eligible for National Register listing. On October 25th, 2017 the MDOT requested concurrence from the State Historic Preservation Officer, Kirk Mohney on the subject of NR eligibility. The MDOT utilized an analysis by Kleinfelder where they determined the bridge was not significant to the extent of being recognized as individually eligible for NR listing. On November 16th, 2017 the SHPO responded to the MDOT with a finding of individual eligibility for the Frank Wood Bridge under criterion A for its history. Shortly after the finding by Mr. Mohney the MDOT and Federal Highway recognized the Frank Wood Bridge as being individually eligible for listing to the National Register of Historic Places.

I believe the Frank Wood Bridge will also be found to be National Register eligible under criterion C for its construction type. It may be the earliest surviving example in Maine to exhibit the use of rolled section members that substitute the built-up members used in previous designs. The significance of this bridge is that it captures the evolution of bridge technology at the peak of the Great Depression, with its use of rolled members as well as built-up members. This bridge has both types of members – thus exhibiting the elements which have defined steel bridge evolution over the last 150 years, which in turn illustrates an important theme in the history of the nation.

This significance may qualify the Frank Wood Bridge as a National Historic Landmark status. From the NHL guidelines: “A property with national significance helps us understand the history of the nation by illustrating the nationwide impact of events or persons associated with the property, its architectural type or style, or information potential. It must be of exceptional value in representing or illustrating an important theme in the history of the nation." The Frank Wood Bridge may be the quintessential example to illustrate this crossover technology during The Great Depression, 1929 to 1939.

This is a functioning historic bridge and already a landmark. There is no sound reasoning to replace it when it can be rehabilitated and continue to gain historic significance.

Thank you,
Phinney

If required, please respond as soon as possible.

Comments Enclosed re: Frank J Wood Bridge

April 11,2018

From:

Summer Street.

Charles Carroll
Ann Carroll
Josie Seymour
Allison Brigham
Maynard McCorkle
Paul Seaquist
James Mixon

Other Addresses

Steve Stern
Arlene Morris
James White
Eleanor Brown
Bronda Niese
Marilyn Hardy
John McKee
Cynthia Howland
Hannah Judson
Katharine Watson
Mary O'Brien
Ann Nemrow
Evan Duda
Frank Duda
Wallace Pinfold
Susan White

Mr. David Gardner, April 10, 2018
MDOT
Environmental Office
Via email

Comments re: Environmental Assessment and Draft Section 4(f) Evaluation
Frank J. Wood Bridge Project

Dear Mr Gardner,

My name is Charles Carroll, a resident of Summer Street, #24, in Topsham. I am also a member of the Friends of the Frank J. Wood Bridge, but my comments here are submitted as an individual and a resident of Summer Street.

The Environmental Assessment states on page 18 that the Preferred Alternative #2 would not "use"the Summer Street Historic District. If you mean by "use"the"potential environmental impacts" as required by NEPA, then nothing could be further from the truth! Alternative 2 will seriously impact the Summer Street Historic District, in several highly negative ways, and in no positive ones.

1.VIEWS
Presently, residents of Summer Street enjoy an extensive view down the river, and a view of the historic and handsome Penobscot Paper Mill (Bowdoin Mill Complex.) These views are made possible by the light and limited structure of the Frank J. Wood Bridge, through which viewing is very easy.

Neither the EA nor the draft 4(f) evaluation disclose the elevation information of the proposed Alternative #2 replacement bridge. Without this information we and all parties are being asked to reach conclusions based on incomplete information, or in some cases no information, information which has been intentionally withheld from public scrutiny.

Nevertheless, the Preliminary Design Report contained in Appendix 2 gives a hint of how one might calculate the ultimate height of the Alternative #2 bridge. Steel girders of at least 9 feet, or more, are called out in that Appendix. Because such girders are a solid barrier to water flow, the bottom of the girders would have to be at least at the elevation of the bottom chord of the existing bridge in order to be above flood waters. But, because the proposed location of the new bridge is upstream of the existing bridge, to locate it above flood height would require the bottom of the girders to be above the elevation of the bottom chord of the existing bridge.

The result will be a solid wall at least nine feet high, the bottom of which would be some distance above the bottom chord of the existing bridge. As a result, the deck of the replacement bridge would be something like 10-13 feet above the deck of the present bridge. The existing views from the Summer Street Historic District would be eliminated! I should also note that the views from both the Bowdoin Mill Complex and the Fort Andross Mill Complex will be seriously constricted. In addition, the expanse of the girders will become a nuisance attraction for graffiti, visible from Summer Street. Similar defacement is seen on so many similar girder supported bridges.

If I am incorrect in any of my conclusions about bridge height, the responsibility rests with MDOT for its intentional failure to provide elevation drawings or measurements. Further, MDOT has not provided information about the approaches, how the replacement bridge would tie into them, and what property acquisition(s) would be required.

2. NOISE
The existing bridge is flat and level, and is straight with no turns. No acceleration or deceleration is required. As a result of these factors, vehicle noise, from engine and tire noise, is kept to a minimum. None of these mitigating factors will be present in the proposed Alternative 2 bridge. It will have a fairly sharp turn, it will require climbing and descending, and will require turning, acceleration and deceleration, all increasing tire noise and engine noise. Finally, it will be considerably closer than the present bridge to the Summer Street historic residences. It is not possible to determine to what precise degree vehicle noise will be increased with the information presently available. But it is completely evident because of all these factors that there will be more, considerably more noise affecting the livability of the Summer Street neighborhood.

3. LIGHT
Because of the curve upriver of the proposed Alternative 2 replacement bridge, the houses in the Summer Street Historic District will experience

massive intrusion from headlights of vehicles traveling north on the bridge. The intrusion will come from thousands of headlights, especially in the winter, shining into the homes in the neighborhood. I realize the Design Advisory Committee has considered this factor, and that there has been discussion of some light baffles being installed. I am familiar with such attempts at light mitigation. Again and again those are broken off, so that they become ineffective and ugly. Observe, for example, the baffles on I 295 approaching Portland. In addition, they raise the height of the bridge, further restricting views.

4.THE NEIGHBORHOOD

The EA and the draft 4(f) Evaluation treat the several historic structures and complexes that cross and line the river banks as if somehow they were entirely separate. It is staggering that MDOT seems to fail to see that the various features are interdependent. In fact, the Fort Andross Mill Complex, the Frank J. Wood Bridge, the Summer Street Historic District, the Bowdoin Mill Complex, and the 250th Anniversary Park comprise a valuable and unique historic neighborhood, a neighborhood that is a teeming, thriving home for people; fish (including 3 endangered species or endangered populations;) large numbers of fishermen; a huge number of shops, businesses and restaurants employing hundreds of people in the 2 mill complexes; extensive bird life including several Bald Eagles, Peregrine Falcons, Ospreys, Blue Herons, and many other species;, an active fishway; a hydroelectric plant; a rare freshwater wetland; a variety of mammals, including beavers, fishers, and possums; and a historic neighborhood that contains 8 historic houses (not 6 as the EA and the 4(f) Evaluation state,) plus a converted carriage house. Please see Figure 1 on page 3 of the EA which shows the integrated nature of all these historic features of this lower Androscoggin neighborhood.

The River itself, and especially the lower falls (which would be covered from view by Alternative 2) have been the central feature of this iconic area for thousands of years of native and European settlement. Since 1932 the existing Frank J. Wood Bridge has been the uniting artery. Indeed the Frank J Wood Bridge has become a much loved and photographed icon. It shows up in many marketing pieces promoting the area; it is the featured cover photo of *Mills and Factories of New England,* copyrighted in 1988 by Dartmouth College. (In the photo, taken in the early 1980's, the bridge appears to be rust free.) The bridge is much admired by thousands of tourists who feel and often say that our state and community are so smart to have retained the bridge, that we value our historic legacy. To destroy it will diminish the appeal of the area to tourist traffic.

The EA and 4(f) draft evaluation divide up these historic and natural features as if they were completely separate. In fact, the entirety of all these features, as pictured on page 3 of the EA constitute an integrated whole. In recent decades the river itself has been extensively cleaned up from when is was considered one of the very most polluted in the United States—so bad that it became, thanks to Sen Edmund Muskie, the poster child for the Federal Clean Water Act. The result is that as it became cleaned up, tens of millions of dollars have been invested in rehabilitation, all within a few hundred feet, at the Fort Andross Mill Complex, the Summer Street Historic District, the Bowdoin Mill Complex, the 250th Anniversary Park, the Brunswick Hydroelectric Plant. Of these investments some, especially those in the Summer Street Historic District, will be negatively affected by the Alternative 2 proposed bridge. Property values on Summer Street will suffer as the result of the impact on views, from noise, and from headlights.

There are so many disappointments and factual inaccuracies in both the EA and the draft 4(f) Evaluation that I will leave it to additional respondents to address them, restricting this focus only upon the severe impact on the Summer Street Historic District.

But I do need to speak of the disappointment I feel at the present state of affairs. To speak frankly, I am staggered that of the four alternatives focused upon, (Alternatives 1-4) MDOT has chosen the most damaging, **<u>the very worst of the four.</u>** It has far greater impact upon historic and natural resources than any of the others. It has far greater impact upon the Summer Street Historic District. It's design, elevation, and alignment are radically incompatible with its surroundings.

And, sadly enough, it is highly disturbing to see an agency of the State of Maine, deliberately skew the evidence by, among others:

- Withholding elevation data that would allow the public to see the impact of the proposed bridge.
- Withholding data on connections to the bridge approaches and what changes they will necessitate, again preventing the public from seeing the full impact on their community.

- Deciding to adopt a non standard way of calculating Life Cycle Costs, in order to distort the economic conclusions.
- Choosing to present the existing FJW bridge in the worst possible light by selecting the least attractive photography of corrosion on the bridge, caused, of course, by inadequate maintenance by MDOT.(See paragraph 3 of attached email from MDOT to T.Y. Lin for clear evidence of intentional bias).

Throughout the country during the last 40 years, State Highway Departments(now called Depts. of Transportation) have become much more sensitive to the environments through which their urban arteries pass. In fact, in many states, DOT projects have often become the welcome catalysts for the preservation of local history and community integrity. In this case of the FJWB, is MDOT unwilling or unable to exhibit this same sensitivity? I sincerely hope not. It should not be too late to rethink the assumptions that resulted in this terribly misguided proposal and consequently in the present acrimonious disagreement.

Sincerely yours

Charles M. Carroll
24 Summer Street
Topsham, ME 04086

N.B. See email, next page, dated April 22, 2016 from Joel Kittredge (MDOT) to Norm Baker (T.Y. Lin).

From: [illegible]
To: [illegible]
Subject: [illegible]
Sent: [illegible]

Norm:

As discussed, please

- 1st slide: reduce font, insert date, and use the aerial rendering, view looking upstream as backdrop.
- 2nd slide, location map, remove.
- "Existing Bridge" slide, please look through images for the absolutely worst, ugliest, restricted most corroded, etc., and use that. → not done!
- Make an "Upstream Alternative—Advantages" slide
  - Include
    - Whatever we have had done in the past
    - Safety
    - Maintenance of traffic
    - Etc.
- Remove bridge drains from "Proposed Bridge Section" slide.
- See if getting rid of green frame color on "Existing Bridge Section slide "reduces" visual width.
- Need something to show the intersections and sidewalk connections.
- Get rid of the "Questions?" slide and use the aerial rendering, view looking upstream for the last slide to remain during questions.

Have a great weekend.

Thanks—Joel

From: Kitzmiller, Joel
To: "Norman Baker"
Subject: Monday's presentation
Date: Friday, April 20, 2018 11:36:51 AM

Norm:

As discussed, please

- **1st slide: reduce font, insert date, and use the aerial rendering, view looking upstream as backdrop.**
- **2nd slide, location map, remove.**
- **"Existing Bridge" slide, please look through images for the absolutely worst, ugliest, restricted most corroded, etc., and use that.** → not bad!
- **Make an "Upstream Alternative---Advantages" slide**
  - **Include**
    - **Whatever we have had done in the past**
    - **Safety**
    - **Maintenance of traffic**
    - **Etc.**
- **Remove bridge drains from "Proposed Bridge Section" slide.**
- **See if getting rid of green frame color on "Exisitng Bridge Section slide "reduces" visual width.**
- **Need something to show the intersections and sidewalk connections.**
- **Get rid of the "Questions?" slide and use the aerial rendering, view looking upstream for the last slide to remain during questions.**

Have a great weekend.

Thanks---Joel

Frank J. Wood Bridge

Dear Mr. Gardner,

I am writing as a resident of Summer Street in Topsham in support of the preservation of our historic Frank J. Wood bridge. For the Summer Street historic neighborhood, the proposed new bridge is devastating, not only historically but environmentally. It would disturb and negatively impact the fish, the birds, including our peregrine falcons who are there because of all the pigeons who spend their days on the superstructure of the bridge, the many bald eagles who feast on the rich fish life, who gather there by the lower falls where Merrymeeting Bay meets the Androscoggin River. The lower falls would be essentially wiped out by the proposed new bridge which would be built on them and over them. This is just a fraction of the wildlife that gathers there. There are ducks breeding here every spring, blue herons constantly fishing on the lower falls. There are beavers and possums, fishers, a freshwater wetland. It is a rare natural treasure right in the midst of the two towns, which many, many people walk or jog or cycle or amble through every day of the week. They walk across the bridge, usually pausing to marvel at the dramatic water flowing over the lower falls and then round Summer St. to join up with the river walk. Several years ago, I built an extensive meditation garden and labyrinth overlooking the bridge, the river and the majestic large rock which projects out into the Androscoggin, which just happens to be part of our property. I built it for all the community and and the many, many people who walk along Summer Street because the view seemed much too powerfully beautiful to belong to any one privately. I have always been sure it was originally a significant Native American site. We do know that the lower falls were a great source of fishing for Native Americans during fish runs and we know that, because fishing by European settlers is documented, and the original trading post was located there so as to trade fish and fur with the natives. The lower falls, unlike the more treacherous upper falls, was perfect fishing grounds and was abundantly plentiful with tens of thousands of fish.

There are so many people in the Topsham-Brunswick community, as well as many visitors from other parts of the country and other countries who quietly come and walk the labyrinth or sit in the meditation garden looking out at the river and the historic bridge enjoying "the urban wilderness" with historic mill buildings on either side. Many of those visitors have said how much they love the bridge and how lucky we are not to have torn it down in some rash moment of thoughtless modernization. In fact, Summer Street is the third side of a historic triangle with the iconic bridge tying them all together. Some days there have been as many as thirty young schoolchildren the teacher has brought from school, sitting there in the meditation garden quietly writing down their reflections on protecting the environment. Maybe thirty or more persons a day walk the labyrinth. Many leave me notes of thankfulness for the peaceful, natural haven in the midst of their hectic, busy lives. It is totally unthinkable to me and to the Summer St. neighborhood, that there could now be proposed such an unthinking, insensitive, aggressive 9', or greater, steel girder (an open invitation to graffiti) thrust headlong into this peaceful, extremely neighborly, valuable historic lower village.

The proposed new view would totally destroy the view Summer St. has, looking both at the handsome historic truss bridge itself, and/or being able to look through it at the architecturally stunning yellow Bowdoin Mill Complex which is visible because of the bridge's present open superstructure. We would instead be staring at solid steel beams some 830' long and 9'or more tall, and above that a bridge deck, the proposed structure now having been curved upstream so it feels as if it were invading the livability of our very homes. This isn't even taking into account the loss of the present open view down the river which would be blocked by many concrete piers. This overall loss is immeasurable and I have pointed it out personally to T.Y. Lin by bringing their architectural engineer here to see it. I have, as have many other residents of the neighborhood, brought it up adamantly to the Design Advisory Committee (at which meetings members of MDOT were always present) so it is APPALLING to me that MDOT could even say out loud or in writing that the proposed new bridge would have no adverse effect on the historic Summer St. neighborhood. It is a blatant denial of the facts, the figures and the outspoken grievous concerns of the residents

The proposed bridge not only aggressively wipes out the view and experience of the river, the lower falls and the historic unity of mill buildings, the 1932 truss bridge, and the historic lower village, but it brings the sounds and exhaust of some 19,000 cars, trucks and motorcycles that much closer to our homes, our living rooms, our bedrooms. This is an invasion of the first order. At the distant of the present bridge, it is just far enough away so as not to be a noise problem, with the possible exception of motorcycles during summer weekends!. Plus the fact that the Frank J. Wood bridge is straight and flat so there is no acceleration or deceleration which would be created due to the necessary new height of the proposed bridge. There is also no curvature creating the constant sound of turning tire noise. PLEASE, any and all of you reading this, consider that this was invading YOUR home, YOUR family and YOUR neighborhood........what would you be feeling?

Again and again, I have pleaded with the DAC about the horrible intrusion of vehicular lights, staccato-like piercing the dark and flashing unceasingly into our homes which is due to the proposed upstream curve of the new bridge. In the winter months it would be an unbearable burden with thousands of lights flashing into our homes starting at 4:30 in the afternoon. We would have to live behind black-out curtains like we did during the war. The DAC's proposal of baffles is ludicrous. They break; they are ugly; they are inefficient, and a poor attempt of MDOT at sidestepping an immense problematic factor of the proposed new bridge which so blatantly and negatively affects the historic Summer St. lower village neighborhood.

We beg you to reconsider this hasty proposed folly for many more reasons than I have even been able to list. We beg you to look at it from the long view and the inestimable value of such an historic and environmentally unique area to all aspects of a thriving community. What so many cities and towns would give to have such a unique feature in their landscape! How many irreplaceable structures have we foolishly torn down and replaced with generic concrete samenesses, only later to deeply regret it. We mustn't let that happen yet once again.

I cannot say adamantly enough, how DEVASTATING Alternative 2 would be for the historic neighborhood of Summer St. and our deep dismay at your not taking our grave concerns more seriously than you have so far.

Sincerely,
Ann Carroll

Ann Carroll

27 Summer Street
Topsham, ME 04086
April 10, 2018

Mr. David Gardner
MDOT
Environmental Office
Augusta, ME

Dear Mr. Gardner:

I am a concerned resident of Topsham writing to establish my opinion regarding the proposed construction of a new bridge to replace the Frank J. Wood Bridge. I have a clear view of this historic bridge from my home— from the windows inside and from the outside.

I have lived in the Brunswick/Topsham area for over 30 years. As a resident of Summer Street in Topsham now, my biggest concerns about new construction rather than refurbishing the bridge are the history of the bridge, the environment, and the beauty of the area. I do not see how your EA and the 106 took this into account and weighed all of the positive aspects that a local historic bridge does for the community. My understanding is that the bridge is now eligible for listing on the National Register of historic places due to the history involved. These stories will be lost forever if they are not preserved now.

Please reconsider the concerns of people who are passionate about these issues and put your energy into a solution that maintains the beauty of the river with no new construction.

Sincerely yours,
Josie L. Seymour
Josie Seymour
Josephine L. Seymour

MDOT

Re: Frank J. Wood Project April 10th, 2018

My name is Allison Brigham, and my husband, daughter and I live at 17 Summer Street in Tospham Maine. I am writing this letter in response to the call for public comment regarding the fate of the Frank J Wood Bridge. I am in support of rehabilitating the Frank J. Wood Bridge, and I am passionately against the proposed upstream alternative.

Allow me to begin this letter with a question; How is it possible to say that the new proposed upstream bridge will have no negative effect on the Summer Street Historical District, if there is not only no rendering of the proposed bridge from any Summer Street viewpoint, but also no definitive plan for elevation of the new bridge? As a tax paying, permanent resident of Tospham, I find it deeply insulting that our neighborhood; being the only residential neighborhood to abut the proposed alternative bridge seems to have been completely pushed aside during the design process. The negative effects of the proposed upstream alternative for the Summer Street Historical District are as follows: increased light pollution, increased noise pollution, increased air pollution and decreased quality of life. The car lights, sounds, and exhaust will be closer to our home and the bridge lights will be closer to our home. Our home has a completely unobstructed view of both the current bridge, as well as the location of the proposed upstream alternative. We will not be able to see through 12' I-sections, such as proposed in the upstream alternative. The new proposed bridge will obstruct our view of the falls, downstream from the bridge, the Bowdoin Mill, Anniversary Park and Fort Andross. Imagine for a moment; sitting on your front lawn, and having an unobstructed view of your surroundings thanks to the unobtrusive and narrow architecture of the Frank Wood Bridge. Being able to enjoy the river, the falls, and the surrounding history. Now, imagine suddenly having a completely obstructed view of the river, the falls, Fort Andross, the Bowdoin Mill and Anniversary Park, because of the intrusive, substantial design of a new concrete bridge. We will have a view of concrete and traffic. To state that relocating the placement of the bridge closer to our home, as well as widening the overall girth of the bridge will not increase various pollutions as mentioned above as well as decrease our quality of living is preposterous, and erroneous.

The lower falls region of the Androscoggin River, is the most beautiful and tranquil view from the current bridge. I have spent many hours in my years as a Tospham Resident, watching Eagles and osprey catch fish from these falls, and watching heron gracefully and peacefully move about and sunbathe from the rocks of the lower falls. By placing a bridge over the lower falls, we will be losing the most alluring and magical portion of this section of the Androscoggin River. No longer will visitors to Tospham and Brunswick be able to stop along the bridge and admire and photograph the natural splendor of the falls, and all of the wonderful sights they have to offer.

I feel safe on the Frank J Wood bridge. I drive over this bridge twice a day on my commute to and from work. In fact, I purposefully take the Brunswick exit off of 295 instead of the Tospham exit TO drive over the Frank J. Wood Bridge. I walk my dog over this bridge. I run over this bridge every morning on my daily run. I push a stroller or pull a wagon over this bridge every day, several times a day for various activities with our daughter. The design of the new proposed bridge not only lacks character and aesthetics, but most importantly and shockingly lacks a physical barrier between vehicle traffic, and pedestrian traffic and is completely inappropriate for pedestrian safety. Although the posted speed limit on Main Street is 25mph, the "open concept" and wider deck of the proposed bridge will certainly lead to vehicle speeding, and I will never feel safe using this bridge without a physical barrier between vehicles and the sidewalk.

We live in a historical neighborhood, surrounded by historical homes, and two historical mills. Simply put, the Frank J Wood bridge fits here. Replacing this bridge with a modern, concrete structure upstream seems wildly inappropriate and unfathomable. The proposed upstream alternative will change the entire feeling one gets when traveling between Topsham and Brunswick, when walking up Summer Street, or when glancing downstream from the Androscoggin River Walk. What the Frank J Wood Bridge lacks in upkeep and maintenance, it certainly does not lack in architectural beauty and historical wonder. We purchased our property on Summer Street 5 years ago, in part because of the Frank J Wood Bridge's history, safety, beauty, and noteworthy architecture. The Frank J. Wood bridge has become an iconic and integral contributor to the beauty, history, and splendor that all residents of Summer Street Historical District have come to appreciate and celebrate.

In summary, I am unable to support the MDOT proposed upstream alternative because of its negative effects on the Summer Street Historical District, our local environment, pedestrian safety, and our personal quality of life, and I fully support rehabilitation of the Frank J Wood Bridge.

Sincerely,

Allison

Allison Brigham

Maynard McCorkle

23 Summer Street, Topsham, ME 04086
Phone: 207 725 5392, E-Mail: mccorkle@gwi.net

Date: April 9, 2018
Mr. David Gardner

Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Dear Mr. Gardner:

My name is Maynard McCorkle. I live with my family at 23 Summer Street in Topsham, Maine in the Historic District that overlooks the Androscoggin River and currently has views of the Frank J. Wood Bridge, the Bowdoin Mill Complex and the Fort Andross Mill Complex. We have lived here on Summer Street for over 30 years and we love our views and our proximity to the river. I am writing as an individual, concerned resident of the area that will be impacted by the repair or replacement of the Frank J. Wood Bridge.

Regarding the Frank J. Wood Bridge, my family's preference would be to rehabilitate the existing bridge, but if that option is voted down, I would opt instead for replacing the existing bridge in the same "footprint" it occupies today. We have looked at the "Alternative 2" option that seems to be the leading option and we have some serious concerns about it. Our biggest concern with the Alternative 2 new bridge is the angle-of-entry of the Topsham-side of the new bridge as it would flow back into Maine Street in Topsham. The current angle-of-sight for drivers exiting and turning left (North) onto Main Street is *very* challenging. The cars coming over the current bridge are on top of you before you know it. If a new bridge's entry-angle is adjusted up-river at all toward the lower falls and if speeds on a wider, new bridge increase, it will be extremely dangerous for drivers exiting Summer Street and for pedestrians crossing Main Street at the Summer Street crosswalk. Turning drivers at Summer Street will not be able to see the cars coming off the new bridge at the adjusted angle and the speeding cars will be on top of turning drivers and cross-walkers in a very dangerous way.

The second concern about the Alternative 2 new bridge option is concerning how tall the bridge needs to be to deal with a 75-100-year flood. If the new bridge is built curving over the lower falls it will have to be built extremely high in the air. We have seen how high the river water can get. We witnessed the water lap the bottom of the Frank J. Wood Bridge in April of 1987 *and* flow-over the end of Summer Street. A new bridge curving over the lower falls that is tall enough to be above the water level of a 75-100-year flood will be way too tall and a real abomination when its over-tall structure is put into perspective with our small historic neighborhood and the natural beauty of the area.

The third concern is also related to our Historic neighborhood and the proposed Alternative 2 new bridge design. We are concerned about headlights from on-coming traffic in the Alternative 2 bridge option. We expect that it's exceedingly tall, curved design, rolling high over the lower falls will put shining headlights right into our front windows. We know it will be terrible for our home and we figure the headlight problem will also be terrible for almost everyone in our special little neighborhood. Thank you for you consideration in this matter.

Sincerely, Maynard McCorkle Maynard McCorkle

To: Mr. David Gardner,
After seeing the photos of the extent of the corrosion of some of the steel on the FWB, I can't help but think on who's watch did all this occur?" It's no surprise to anyone salt plus steel equals rust. Any steel exposed to the elements, let alone the heavy salt load of winter, is going to require some maintenance. Yet for some reason, the painting of the bridge seems not to have been a priority for quite a number of years. Back in 2006, Wyamyn Simpson did some work on the concrete supports under the bridge, and a couple of years ago, the expansion joints were replaced, but the basic issue of the corrosive effect of winter salt seems to have been overlooked completely. How is it that a piece of our transportation infrastructure can fall into this kind of disrepair with no one being accountable? We don't need a new bridge. We need preventative maintenance, plans and people who make sure they are carried out in a timely manner.

Paul Seaquist
9 Summer St.
Topsham, Me.

~~So~~ AFTER SEEING THE PHOTO'S OF THE EXTENT OF THE COROSSION OF SOME OF THE STEEL ON THE FWB I CANT HELP BUT THINK "ON WHO'S WATCH DID ALL THIS OCCUR?" ITS NO SUPPRIZE TO ANYONE SALT PLUS STEEL EQUILS RUST. ANY STEEL EXPOZED TO THE ELEMENTS, LET ALOWN THE HEAVY SALT LOAD OF WINTER IS GOING TO REQUIRE SOME MAINTINANCE. YET FOR SOME RESION THE PAINTING OF THIS BRIDGE ~~HAS~~ SEEMS NOT TO HAVE BEEN A PRIORITY FOR QUITE A NUMBER OF YEARS. BACK IN 2006 WYAMYN-SIMPSON DID SOME WORK ON THE CONCRETE SUPPORTS UNDER THE BRIDGE, AND A COUPLE OF YEARS AGO THE EXPANTION JOINTS WERE REPLACED, BUT THE BASIC ISSUE OF THE CROSSIVE EFECT OF WINTER SALT SEEMS TO HAVE BEEN OVER LOOKED COMPLETALY. HOW IS IT THAT A ~~STATE~~ ~~AN~~ PIECE OF OUR TRANSPORTATION INFRASTRUCTURE CAN FALL INTO THIS KIND OF DIS-REPAIR WITH NO ONE BEING ACCOUNTABLE? WE DONT NEED A NEW BRIDGE. WE NEED PREVENTITIVE MAINTNANCE PLAN'S AND PEOPLE WHO WILL MAKE SURE THEY ARE CARRIED OUT IN A TIMELY MANNOR.

295 Bunganuc Road
Brunswick, Maine 04011
March 26, 2018

Ms. Cheryl B. Martin
Assistant Division Administrator
U. S. Department of Transportation
Federal Highway Administration, Maine Division
40 Western Avenue, Room 614
Augusta, Maine 04330

Re: Frank J. Wood Bridge Project

Dear Ms. Martin:

As a consulting party as well as a commercial property owner within view of the Frank J. Wood Bridge, I am concerned that the involved state and federal officials have been biased in their assessment and have failed to openly consider the views of all consulting parties and the public during the 106 and 4(f) process required if federal funding is anticipated in the project. Additionally, the recent public meeting of March 28, 2018 regarding the environmental impact of the bridge alternatives was again a 50 minute biased presentation by the MDOT describing the poor condition of the Frank J Wood bridge with multiple images of rust and a deteriorated deck but without substantial discussion of the impact of the proposed new bridge.

In the National Historic Preservation Act of 1966 Congress established a Section 106 program requiring historic preservation The Maine Department of Transportation has a record of demolishing fifty bridges similar to the Warren through Truss bridges like the Frank J. Wood Bridge. They fail to provide appropriate maintenance and then suggest replacement for these bridges citing structural deficiency. In the case of the Frank J. Wood Bridge, the MDOT held a "stakeholders'" meeting on April 24, 2016 at which they announced their intent to demolish the historic bridge and replace it with a "modern" concrete highway bridge. This was just prior to a "public meeting" on April 27, 2016 where the plan was announced to the general public. The "stakeholders'" meeting was a carefully selected audience and did not include the general public nor were there consulting parties involved. It was at the public meeting that we learned the Bridge was set for demolition and not rehabilitation. If this sounds like an honest attempt at a Section 106 review with no public nor consulting party input into a historic bridge eligible for the National Register of Historic Places, then also consider the continued attempts at presenting a very biased view of the FJW bridge including but not limited to only showing an unpainted bridge, and not the potential rehabilitated historic structure in a similar scale to their proposed new concrete structure.

Throughout the 106 and 4(f) process consulting parties have had difficulty in obtaining information from the MDOT to allow individuals the opportunity to question their assumptions and actual estimates. It was only after they eventually realized they were not compliant with the 106 process, under pressure, they listed alternatives. The given alternatives continued to promote the replacement alternative with sub sequential meetings containing lengthy talks and images of a deteriorating bridge which is what would be expected based on the lack of maintenance by the MDOT.

The recent public March 28, 2018 meeting, announced as part of the 4(f) did not address environmental matters such as the Clean Water Act, the effect on endangered species including the existing fish ladder which will need replacement in a few years, nor other environmental concerns. How can the MDOT consider the possible impacts when they have an incomplete plan for the new proposed concrete bridge. During the recent public meeting they could not specify the elevation of the new bridge deck and have not been able to give specifics on the approaches to the proposed bridge which certainly are significant noting the it is possible that the new deck will have an elevation of 10 to 12 feet higher than the existing FJW bridge.

There has been restriction of public and consulting party input throughout the entire process, the last public meeting held on April 5, 2017, was at the last minute changed to the "open house format" which did not allow the public nor consulting parties to speak as a group. As a consulting party, I was almost prevented from presenting my points at a public meeting on March 28, 2018. Only after I threatened to walk out of the meeting was I offered the opportunity to speak. The format at all meetings was also biased with the MDOT facing the audience and allowed to use audiovisual aids while those with different factual information or different points of view could not use any audiovisual devices and could only talk with their backs to the audience while addressing the MDOT and Federal Highway officials.

If I were to assess the alternatives of replacement versus rehabilitation under the 106 and 4(f) process in a fair and unbiased way, I would consider historic significance which I believe is the primary mission of the Advisory Council on Historic Preservation and the 106 process. Other factors for consideration include the engineering structural and geometric functionality of the bridge in question as well as safety, bridge location, initial and life cycle costs, as well as was traffic volumes.

In considering historical significance, the Frank J. Wood Bridge is currently determined eligible for the National Register of Historic Places and provides a connecting link between the Historic Mills and downtown Historic Districts of Brunswick and Topsham. Everything possible should be done to preserve this historic asset.

From the engineering structural and geometric functionality point of view, it should be noted that the Bridge was built in conjunction with the Lewiston, Brunswick and Bath Electric Rail Line, which not only included passenger rail service but extremely heavy self propelled coal cars bringing coal from Bath to Bates College in Lewiston. The Bridge was, therefore, built wider, taller and heavier to accept the rail cars as well as vehicular traffic. The Bridge thus meets current standards for size and weight carrying capacity. The Bridge had a rating of 5 until recently downgraded, perhaps relating to the bias of the MDOT in it's attempt to remove the historic structure.

Safety, in my eyes, is not a factor. As a trained engineer, although not currently practicing, I believe that this 85 year old bridge was safe for 85 years without adequate and at times damaging maintenance. If rehabbed and maintained, this Bridge should be safe for an additional 85-100 years. In assessing needed ongoing maintenance, the State has never considered alternatives such as electronic surveillance or even a permanent catwalk allowing for easier and less costly inspection processes and maintenance. The MDOT seems to be on a track to replace all fracture critical bridges in Maine without considering the historical significance of these bridges. Historical bridges can and are being rehabilitated in other states so this is a faulty approach and seems to be in direct opposition to the Historic Preservation Act designated by the Federal Government. I am convinced that if the MDOT were fair in evaluating all alternatives and was concerned on fracture critical structures this rehabilitated bridge could have redundancy built into the deck during the rehabilitation process. This bridge could also be made safer for bicycle traffic by expanding the bike lanes to 5 feet and narrowing the roadway to 10 foot lanes. The National Association of Transportation Officials states that lanes of 10 feet are appropriate in urban areas and have a positive impact on street safety without impacting traffic operation. Why was this not considered?

Initial and life cycle costs are really hard to evaluate based on information provided by the MDOT. Their initial cost estimates are so varied and changeable during this process that accuracy is uncertain. Through private funding, a professional engineer's report questions the initial estimates and would suggest very little cost differential between replacement and rehabilitation. Remember a local group had to arrange for the report from an outside engineering firm as no engineers from the State of Maine would comment for fear of losing contracts from the MDOT. Even the Engineering Department from the University of Maine, where I obtained a BSCE, would not involve itself in projects conflicting with the MDOT. This is enough reason to mandate the MDOT pay for an alternative cost analysis from a firm with no financial ties to the MDOT and perhaps reimburse the private citizens who had to fund a non biased professional engineer, Not included in the MDOT's estimates are the approaches to the new replacement bridge and local design committee requests for enhancements to a new bridge which may create added expenses. The approaches to a new bridge would certainly be much more expensive than for the rehabilitation not to mention the necessary costs needed in taking land and structures for the approaches for the proposed new bridge.

Regarding maintenance costs, these numbers are uncertain since our painting expert states with today's modern paints repainting every 20 years would be unnecessary. I have not seen a concrete bridge without moderate maintenance, and there have recently been two concrete bridges needing replacement with only a 60 year lifespan not the 100 year lifespan the MDOT predicts. Additionally, who knows what will be in 50 years from now, not to mention 100 years from now. Surely traffic and usage will be different in the years to come, you may build a bridge or structure to last 500 years but will it have the same use or meet the needs 25 years from now?.

Bridge location appears to be optimum as was suggested by the original farmer for whom the Bridge was named, Frank J. Wood. There would be less disruption to the adjacent towns and the environmental impacts much less with rehabilitation. There should also be concern that the proposed replacement bridge in it's upstream location may potentially conflict with the fish ladder soon needing replacement. This may require additional costs for which the MDOT may be legally responsible for. This cost is not currently included in the estimated future costs for the new proposed bridge.

In summary, the Frank J Wood Bridge, a historic structure eligible for the National Register of Historic Places and an icon joining the historic mills and districts of Brunswick Topsham can be rehabilitated at a cost not markedly different from the new proposed concrete bridge and would have no adverse effect on this historic structure nor the adjacent historic districts. Although, it seems to me ,the current environmental assessment is totally inadequate as presented by the MDOT, I cannot imagine any alternative having less impact on the environment than the rehabilitated Frank J Wood bridge when compared to other proposed alternatives. The rehabilitation of the Frank J Wood bridge is therefore prudent and feasible thus should be considered the best of all alternatives under the Section 106 and 4(f) of the Historic Preservation Act.

Sincerely yours,

Steven H. Stern

CC: David Gardner, MDOT

From: alfred niese aniese@comcast.net
Subject: Fwd: Brunswick / Topsham Frank J. Wood bridge input
Date: Apr 9, 2018 at 6:13:38 PM
To: Ann Carroll anncarroll76@gmail.com

Begin forwarded message:

> **From:** Bronda Niese <bniese04@comcast.net>
> **Date:** April 8, 2018 6:52:21 AM EDT
> **To:** chick carroll <chickcarroll76@hotmail.com>
> **Subject:** **Fwd: Brunswick / Topsham Frank J. Wood bridge input**
>
> Begin forwarded message:
>
>> **From:** Bronda Niese <bniese04@comcast.net>
>> **Date:** April 5, 2018 9:49:45 AM EDT
>> **To:** Ann Carroll <anncarroll76@gmail.com>
>> **Subject:** **Brunswick / Topsham Frank J. Wood bridge input**
>>
>> To the Maine Department of Transportation:
>>
>> I write to express environmental concerns about constructing a replacement bridge connecting Brunswick and Topsham. Foremost would be my concern for the migrating fish that use the river to reach spawning grounds upriver. I would like to see every possible effort made to safeguard the fish populations as well as the birds that are drawn to this area during fish migration times.
>>
>> If and only if it is deemed impossible to save the existing Frank J.

Wood bridge, could a temporary bridge carry traffic until a new bridge is constructed in the exact location as the existing bridge? This would better preserve the striking aesthetic quality of the area. I am familiar with another situation in Maine where a temporary bridge was used during the repair phase. It was removed once the project was completed.

Thank you for considering my input.

Sincerely yours,

Bronda Niese

April 5, 2016

139 Indian Rest Rd
Harpswell, ME 04079

Mr. David Gardner,
MDOT
Environmental Office

Comments Re: Frank J. Wood Bridge Project

Dear Mr Gardner,

As a former resident of Topsham and present resident of Harpswell who constantly enjoys the view and use of the Green Bridge, I am appalled by the proposed plan to replace this beloved landmark structure. To destroy this historic bridge, which would have both aesthetic and environmental impacts on this precious area, would be a tragedy, especially when it is in my understanding possible to preserve it.

In our world today, where there is such blatant disregard in so many areas for environmental and wildlife preservation, I applaud our Maine community for taking a strong stand against this irresponsible and unnecessary action. May we be a model for others to follow!

Thank you for your attention.

Sincerely,
Marilyn Hardy

From: Marilyn Hardy
marilynhardy@cybermesa.com
Subject: Re: Draft letter to MDOT, 04102018
Date: Apr 8, 2018 at 5:44:26 PM
To: Charles Carroll
chick76@me.com

Hi Chick,
Here is a short letter to contribute to the cause. Thanks for all the work you are doing for this!!
Marilyn

Marilyn Hardy April 9, 2018

I am writing to say that as you make decisions about repairing or replacing the Green Bridge that connects Brunswick and Topsham, I feel strongly that you should consider the environmental impact of the project - particularly on the river and the fish ladder and the surrounding neighborhoods. Please assess and consider what the impact will be on the fish ladder - it is critical that that remain functioning for the health of fish populations. We must do projects in a way that respects and stewards our natural resources - so I want to hear about how this project will affect the river and the fish.

Thank you

Mary O'Brien
7 Bowdoin St.
Brunswick, ME 04011

Nature at Her Best.

I am not going to add to the plethora of comments regarding the pros and cons of replacement versus renewal of the Frank J. Woods bridge spanning the Androscoggin river, nor discuss the related costs, longevity and vehicular expediency that have been debated to death.

But have you given a moment to consider the experience of actually crossing the existing bridge and seeing raw nature in its wild and wooly state with water cascading down the dam in a furor of torrential fervor heading for the open sea; or the melt waters in Spring that provide a cascade of froth and mist that captures the sun's rays; or the more tranquil state of swirls and eddies with gulls lined up along the dam ridge waiting for there next meal; or even down stream viewing fishermen trolling in their small boats for shad and other species heading up to the place of their birth to spawn? The dam adds drama and beauty and contrast to the imposing mills on its shores and is a glimpse of Nature at her best.

Now, I ask you, what will you see from a bridge proposed to be sited significantly higher, twice the width of the existing bridge and curving east toward the dam? Your car is going to be 13' in from the edge of the new construction at a driving height of four feet. With the addition of a railing to protect pedestrians on the outer rim, what view can we expect to enjoy, especially with a new bridge designed to expedite traffic quickly?

It is the open structure of the existing bridge that gives drivers and walkers the real drama of crossing over a river. Isn't this experience far better than traversing the area on a 42' wide slab of concrete?

Ann Nemrow
Landscape Designer
April 7, 2018

Address: 14 Kent Circle,
Topsham, ME 04086
Tel: (207) 721-0890

To Whom It May Concern:

I am in support of restoring the Frank J. Wood Bridge. It is a beautiful and integral part of Topsham and Brunswick. As a resident of Topsham, the removal of the Frank J Wood Bridge would be devastating to the town. That piece of history is all that Topsham has left. Please choose to restore the bridge!

Frank Duda

To Whom It May Concern:

My name is Evan Duda and I am a Brunswick resident. I have tried adding my comment(s) to the MDOT website as directed by MDOT, but there is no place to comment. That adds further frustration that my voice is unwilling to be heard by the Maine DOT.

I am in FULL SUPPORT of having the Frank J. Wood Bridge rehabilitated. It is shameful to remove a structure that is eligible for the Maine's Register of Historic Places. That alone should be reason enough to make the decision to rehabilitate. This is an iconic bridge, visually and otherwise. The absence of it will alter the Topsham/Brunswick landscape forever. The current bridge tells the story of the two towns. Without it, the story is lost. That story is our history; the period truss bridge with mills on either side. A flat-deck bridge will dull the senses. The story and wonderment that the Frank J. Wood Bridge elicits as you spot its trusses will no longer be recognized, no longer spoke of, photographed, or fought for.

Please rehabilitate the Frank J. Wood Bridge.

Regards,

Evan Duda

to the existing fishway and the surrounding waterway. Has that been taken into consideration? It is imperative that it be considered, and the rebuilding of the present bridge should be the desired option.

Sincerely,

Eleanor Brown
7 Potter St.
Brunswick, ME

April 6, 2018

To Whom It May Concern,

I am writing in opposition to the building of a new bridge between Brunswick and Topsham to replace the present Frank J. Wood Bridge now in place. I feel strongly that the environmental impact would be enormous both

To whom it may concern: Mr. David Gardner,

I am writing in opposition to the building of a new bridge between Brunswick and Topsham to replace the present Frank J. Wood bridge now in place. I feel strongly that the environmental impact would be enormous both to the existing fishway and the surrounding waterway. Has that been taken into consideration? It is imperative that it be considered and the rebuilding of the present bridge should be the desire option.

Sincerely,

Eleanor Brown
7 Potter St.
Brunswick, Me.

J. Phinney Baxter White
67 Bridge Street
Topsham, ME 04086

April 11, 2018

Mr. David Gardner
MDOT
Environmental Office
Augusta, ME

Dear Mr. Gardner:

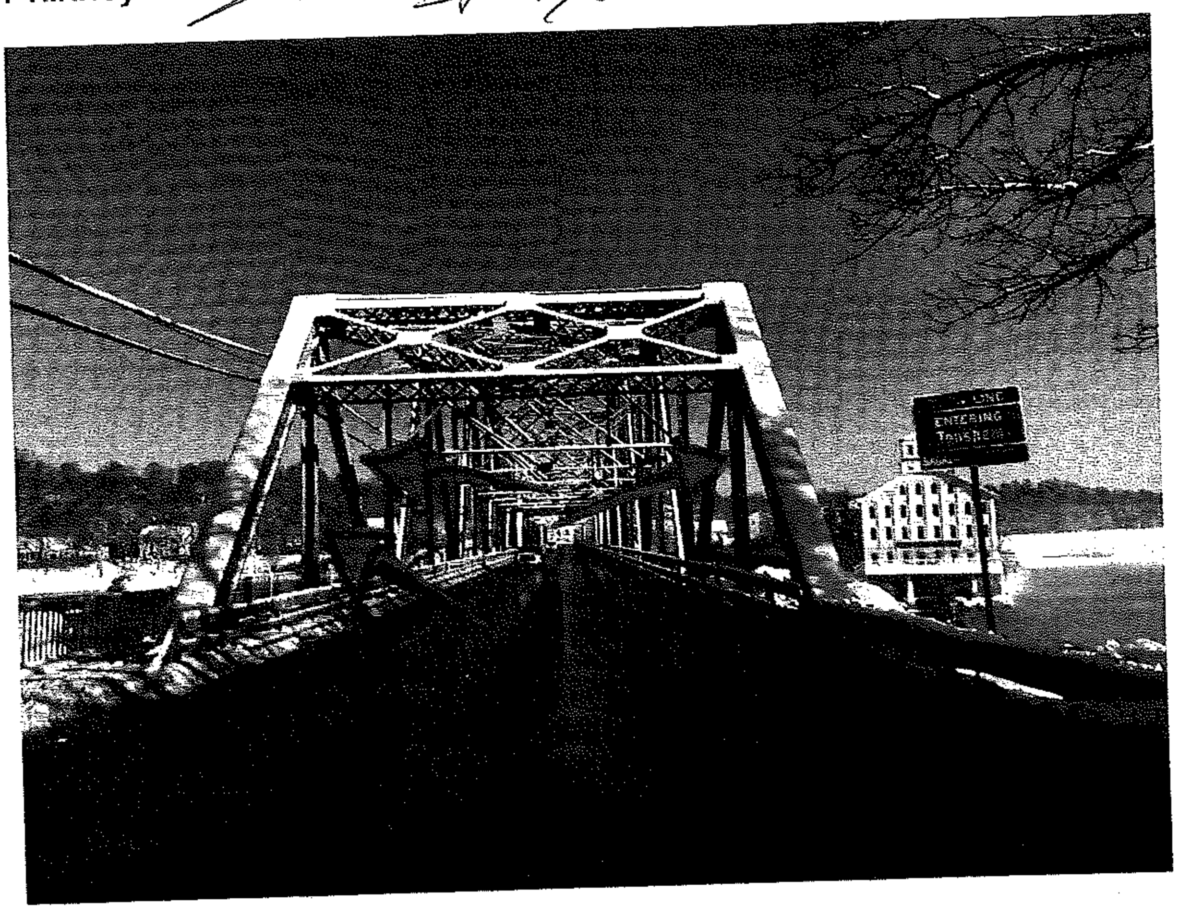
Throughout the 106 the Maine DOT and Federal Highway have denied the Frank Wood Bridge status of being individually eligible for National Register listing. On October 25th, 2017 the MDOT requested concurrence from the State Historic Preservation Officer, Kirk Mohney on the subject of NR eligibility. The MDOT utilized an analysis by Kleinfelder where they determined the bridge was not significant to the extent of being recognized as individually eligible for NR listing. On November 16th, 2017 the SHPO responded to the MDOT with a finding of individual eligibility for the Frank Wood Bridge under criterion A for its history. Shortly after the finding by Mr. Mohney the MDOT and Federal Highway recognized the Frank Wood Bridge as being individually eligible for listing to the National Register of Historic Places.

I believe the Frank Wood Bridge will also be found to be National Register eligible under criterion C for its construction type. It may be the earliest surviving example in Maine to exhibit the use of rolled section members that substitute the built-up members used in previous designs. The significance of this bridge is that it captures the **evolution** of bridge technology at the peak of the Great Depression, with its use of rolled members as well as built-up members. This bridge has both types of members – thus exhibiting the elements which have defined steel bridge evolution over the last 150 years, which in turn illustrates an important theme in the history of the nation.

This significance may qualify the Frank Wood Bridge as a National Historic Landmark status. From the NHL guidelines: "A property with national significance helps us understand the history of the nation by illustrating the nationwide impact of events or persons associated with the property, its architectural type or style, or information potential. It must be of exceptional value in representing or illustrating an important theme in the history of the nation." The Frank Wood Bridge may be the quintessential example to illustrate this crossover technology during The Great Depression, 1929 to 1939.

This is a functioning historic bridge and already a landmark. There is no sound reasoning to replace it when it can be rehabilitated and continue to gain historic significance.

Thank you,
Phinney



From: **James Mixon** mixj444@gmail.com
Subject: bridghe
Date: April 10, 2018 at 9:43 PM
To: Eleanor Leo quark2183@gmail.com

My name is James Mixon. I am 34 years old and have been a resident of Topsham my entire life. I am writing in support of rehabilitation to the Frank J. Wood Bridge, in order that we might preserve some of the only remaining history and charm in our town.

Growing up in Topsham, I've seen a lot of change. The Topsham Fair Mall has grown from a small strip mall with surrounding lands where my mother, father and I used to walk our dogs, to a bustling place of business filled with stop lights and traffic. The quaint town offices are gone, as is the old library, replaced with modern buildings that look like they came out of a catalog.

The river walk in Topsham, once known only to residents of the area, is now a paved and accessible bike/walking path advertised to the public, with ugly signs and bollards on Summer St. and more foot traffic behind the houses of those living on Bridge St.

The "lower village" was a poorly conceived idea that has done nothing to enhance the charm of the town. None of the businesses have any foot traffic, aside from Blueberries perhaps (and the Sea Dog which was already there) yet we have a massive parking lot behind them all that is 90% empty every day. Think of what a missed opportunity this was. What if the town had understood the charm of Topsham, and created a riverside park in place of the enormous brick business building that now sits there, driving visitors and tourists from Brunswick to enjoy a river view while getting food at the businesses nearby. What if the shops in the lower village were similar to those in Downtown Brunswick, where all the foot traffic in the area now is. What if the TOWN of Topsham understood the charm of Topsham like its citizens do?

It is for this reason that I am writing you to encourage you NOT to replace the Frank J. Wood Bridge, but to rehabilitate what we have now. It is the only remaining charming piece of Topsham history we have left.

I worked in Southern Connecticut on independent films when I was fresh out of college, and the amount of care those people put into preserving their towns is admirable. The Merrit Parkway still has the original stone bridges to serve as over passes. The Parkway itself is devoid of ugly guardrails, signage and other things to spoil the beauty of the area. It's one of the most enjoyable drives (despite bumper to bumper rush our traffic) I've ever been on.I believe Topsham could take a page out of their book on how to treat our town.

The Frank J. Wood Bridge sits above the Androscoggin River, not directly above the rapids, but below them slightly, where you can see them if you peer over the edge while walking. It offers not only a great view of the islands below, the dam and the rapids, but also is a picturesque reminder of old Maine when you look at it.

I currently live on Summer St, and the bridge is viewable right out my window, and was raised on Walnut Street, so the bridge has been a large part of my life. I was photographed below it as a child while fishing with my father, a photo that made the front page of the Times Record. The FRONT PAGE! Can anyone imagine these days a simple photo of a boy fishing with his father being front page news of the Times Record?

Do not mistake this as a yearning for nostalgia. I want to save the bridge because WE want to save the bridge. The residents of this town, clearly voicing their opinions at the last meeting at Mt. Ararat, understand the historical importance of this bridge, as well as the aesthetics it adds to the town. We don't want an ugly overpass like the new Durham Bridge in Lisbon. Who wants to come look at that?

The black bridge is gone, and if the Frank J. Wood bridge goes, what will Topsham be? A re-zoned town filled with chain stores that pushed out all the local businesses, while all the tourists and summer visitors spend all their time (and money) in Brunswick, where they can actually enjoy the scenery visitors spend all their time (and money) in Brunswick, where they can actually enjoy the scenery.

Topsham will have nothing left. The Topsham Fair Mall isn't beautiful, the Lower Village is a place to drive through on your way to the highway, the river walk can only handle so many people, and everyone will end up going to Brunswick to walk around Bowdoin and the downtown mall.

Please, reach out to other contractors to get estimates on preserving the bridge. Sometimes everything isn't always about money. This town has been my home, and I want it to continue to be a place that people love and want to visit. I can't count how many times I've seen people standing on the bridge taking pictures in the summer, sitting down by the river taking pictures of it, or just walking on it at night when it's warm out.

Other concerns have been voiced as well, about this bridge being safer for pedestrians as they are separated from the through traffic by the girders, and I'm sure other estimates could lend themselves to a financial argument as well -- but I'd like to appeal to you to preserve what is left of our town's history and beauty, because the Frank J. Wood Bridge is really all we have left.

Thank you

James Mixon

--

James Mixon

13 Main Street
Topsham, Maine 04086
March 18, 2018

Ms. Cheryl B. Martin
Assistant Division Administrator
Federal Highway Commission
Edmund S. Muskie Federal Building
40 Western Avenue, Room 614
Augusta, Maine 04330

Re: The Frank J. Wood Bridge

Dear Ms.Martin:

I own a historic commercial building that abuts the Frank J. Wood Bridge in Topsham because it is in the Village near two historic mills, the historic Bridge, and the Androscoggin.. MDOT wants to significantly alter the historic quality of the Village by demolishing the Bridge and replacing it with a nondescript, concrete highway forever changing the character of the Towns of Topsham and Brunswick.

My question is why did the MDOT fail to be objective in the Section 106 process? At the first public meeting in April 2016 MDOT presented the new bridge as the only option that made sense, completely ignoring our historic Bridge. The decision had already been made. Topsham and Brunswick were forming an Advisory Committee to design the new bridge before the completion of the Section 106. Many community people left the meeting frustrated by what appeared a flawed process.

After the meeting a group of community members from Topsham and Brunswick formed a non-profit corporation (The Friends of the Frank J. Wood Bridge)) and requested to be included as a party to the Section 106. The Friends have met on an almost monthly basis in an effort to be heard by the MDOT and the U. S. Highway Administration since April 2016, attended all meetings relating to the Bridge, hired an environmental lawyer, formed a Facebook page with over a 1,000 followers, signed petitions, written letters to MDOT, met with experts on historic bridges, and hired an engineering firm from Boston to do a feasibility and cost analysis of a rehabilitated Bridge. To say the least, it has been difficult for us to get answers to our many questions. An example of this is the last public meeting where the U. S. Highway Administration and MDOT changed the framework of the meeting process by breaking people into small groups so that many people were confused and upset and ended up walking away frustrated by not having a free flowing discussion that everyone could hear and participate in.

I still have questions about speed, elevation, and the position of the new bridge as it hits the abutments. Will all the concrete act as a back drop for graffiti? Won't the new bridge alter the quality of life for the historic Summer Street residents, cover up the lower falls, and forever damage that feeling one gets when crossing the Bridge...call it a sense of place?

And what about economic development? I have heard many people from across the country comment positively on the Bridge and how fortunate we are to have it in our community. Actors from the Maine State Music Theatre championed it on TV 207; the Bangor

Savings Bank proudly displays a photograph of the Bridge in its entry way; it's on the cover of the telephone book and in Bowdoin College literature; and painted and photographed by artists from around the world. Maine Preservation's 2017 List of Most Endangered Historic Structures puts it as number one. Do the research—states across the country are saving truss bridges because they have a calming affect on traffic and are good for tourism. I can guarantee most historians, artists, photographers, and Bridge enthusiasts (engineers included) will ignore the new bridge if it is ever built.

Please do the right thing and rehabilitate our Bridge so that future generations shall know what can happen when science and art come together to create an iconic structure: The Frank J. Wood Bridge.

Thank you for your consideration.

Sincerely yours,

Arlene Morris

Arlene Morris

cc: David Gardner
MDOT

Susan Z. White
67 Bridge Street
Topsham, ME 04086

April 11, 2018

Mr. David Gardner
MDOT
Environmental Office
Augusta, ME

Dear Mr. Gardner:

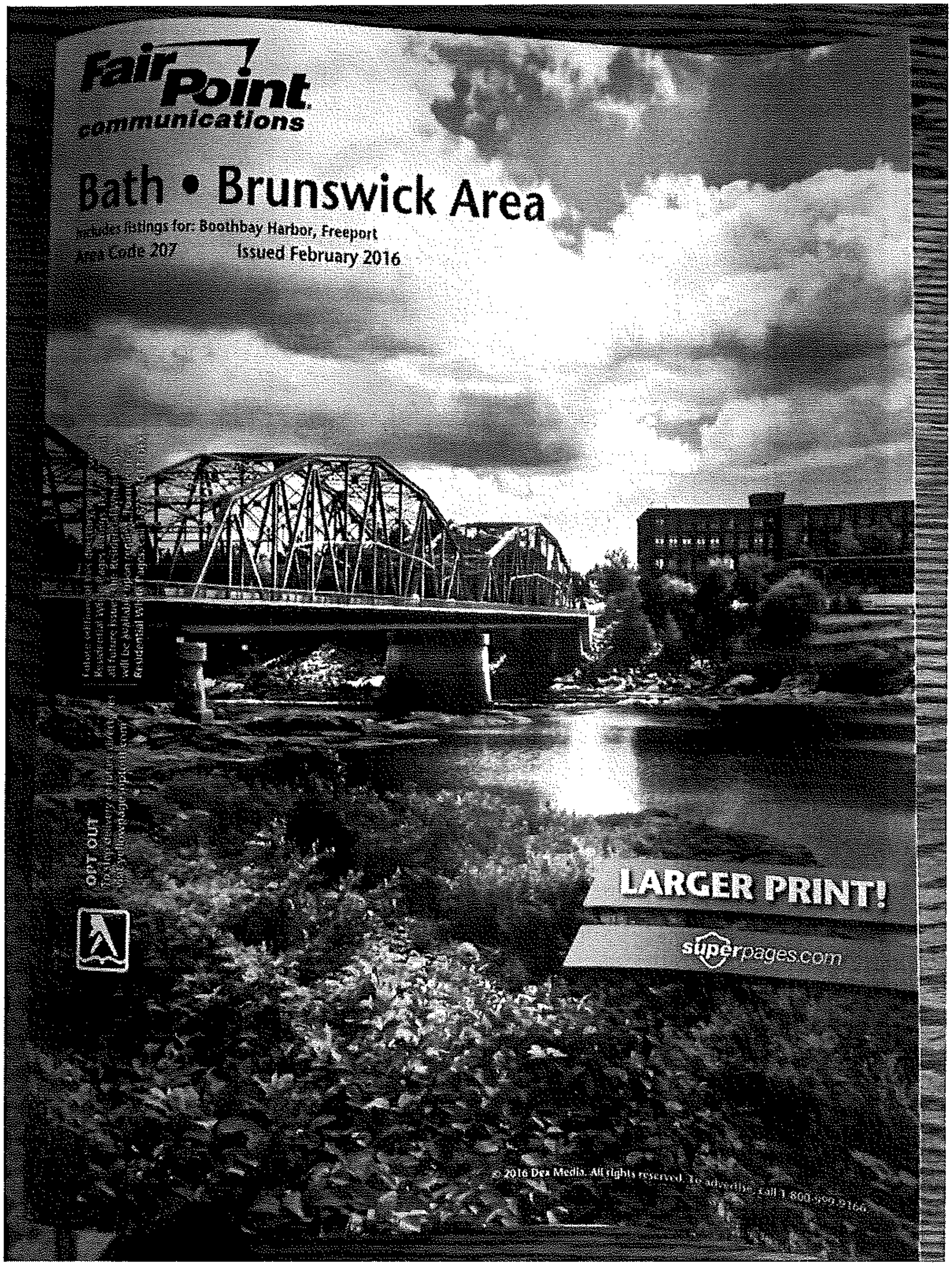
I'm a store manager for a retailer located in the town of Brunswick, at the intersection of Pleasant Street and Maine St.

In Brunswick, Maine we spell our main street M-A-I-N-E. We're the only main street in the nation to do this and it differentiates us from all other main streets.

The Frank Wood Bridge also differentiates us from any other main street. This historic steel truss bridge is the town center as we lost our historic town hall during urban renewal in 1961. At that moment in time the bridge took over as the dominant and most historic structure in the town. It's always a point of reference, it's often the meeting place—see you at Green Bridge! It's on the cover of our phone book.

I speak with thousands of people each year from all over the world. Most are tourists and families looking at colleges. A recurring comment by many is what a scenic area the Frank Wood Bridge and mill buildings create. And when I tell them it is under threat they express outrage and then offer their hope that it can be saved. That is my hope too. Please save our historic bridge.

Thank you,
Susan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From: Wallace Pinfold
wgpinfold@gmail.com
Subject: Frank J Wood bridge
Date: Apr 11, 2018 at 8:03:53 AM
To: David.Gardner@maine.gov
Bcc: chick76@me.com

Dear Sir:

I am strongly for the rehabilitation of the metal bridge between Brunswick and Topsham. The high-handed way in which MDOT has managed this whole business Is not the only thing that motivates this letter. I don't trust your figures – – I don't believe that rehabbing the present bridge will cost as much as you say, I don't believe that the new bridge will cost as little. Also, I prefer the historic structure to any design you have proposed. Richard Nemrow's letter to the Times Record yesterday , April 10, absent personal references, summarizes both my objections and preferences more articulatey than I can do myself.

Sincerely,
Wallace Pinfold
Brunswick

From: John McKee
jmckee@bowdoin.edu
Subject: Comment on FJ Wood Bridge proposals
Date: Apr 10, 2018 at 1:00:12 PM
To: David.Gardner@maine.gov
Cc: John McKee
jmckee@bowdoin.edu

Mr. Gardner and others concerned:

As a resident of Brunswick for many decades, I've long admired the FJ Wood Bridge even while putting up with the frequent traffic jams at either end of the bridge.

I strongly support the option to rehabilitate the present structure. It does the job and it has historic value.

And looking beyond the structure itself, it's clear that only those options maintaining the existing alignment make sense from an environmental or historic-preservation viewpoint.

In addition, I believe that any preference based largely on considerations of traffic flow and safety must be discounted. From that viewpoint – and short of a thorough redesign of the traffic pattern near each end of the bridge – none of the options proposed is clearly superior to the others.

In short, rehabilitation of the present bridge is the best of the proposed options.

Please include this statement in the public record on this matter.

Sincerely
John McKee
Brunswick, Maine

From: Katharine Watson
kjwats@comcast.net
Subject: Copy of letter about bridge
Date: Apr 10, 2018 at 12:14:54 PM
To: chick76@me.com

Dear Chick,

In response to Cynthia Howland who reviewed the message I have sent this to David Gardiner.

Dear David Gardner,

As a resident of Brunswick for 41 years, I am writing to plead that the decision be made to rehab rather than replace the Frank J. Wood Bridge which links the towns of Brunswick and Topsham. Human safety and vehicular convenience can be guaranteed through rehab as well as contemporary construction, but a new bridge would greatly impact if not destroy one of the major urban vistas of Maine. The new bridge would cut into the Androscoggin falls, changing the course of the water and altering the river's banks.

Please choose rehab rather than new construction.

Sincerely,

Katharine J. Watson, 10 Boody Street, Brunswick 04011

From: Cynthia Howland
cbhowland@gmail.com
Subject: Frank J. Wood Bridge
Date: Apr 9, 2018 at 5:16:49 PM
To: David.Gardner@maine.gov

I strongly favor rehabilitation of the bridge because it is part of the cultural history of the mills in Brunswick and Topsham. Also, rehabilitation will do no harm to the fishway, the rocks below the dam, or to the marine/water fowl life of the river .

Thank you.

Cynthia Howland

From: Hannah Judson
hjudson@hotmail.com
Subject: Frank J. Wood Bridge needs to be preserved
Date: Apr 10, 2018 at 3:08:56 AM
To: David.Gardner@maine.gov
Cc: chick76@me.com

Dear Mr. Gardner,

I wanted to let you know that I am concerned about the possible destruction of the Frank J. Wood Bridge. While I am for progress in general, I am also concerned that we take care of monuments that link present with past. This bridge has architectural merit, fits in with the landscape, speaks to the history of the river, the factory, and the towns it joins. Please do what you can to pursue restoration of the bridge and not tear it down.

Best,

Hannah Howland Judson

From: Cynthia Howland <cbhowland@gmail.com>
Sent: Monday, April 9, 2018 4:29 PM

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 11, 2018 11:18 AM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/11/2018
Name: Margo Knight
Organization(if applicable): 1954
Phone: 207-798-4600
Email: mknight@bates.edu

Topic:

Comments:
Re: Frank J. Wood Bridge
My name is Margo Knight. I am chair of the Brunswick Downtown Master Plan Implementation Committee and, as such, I am also a member of the Bridge Design Advisory Committee.

I am write today to add my voice to those in favor replacing the Frank J. Wood Bridge.

I agree with those who believe that the figures released by MDOT regarding rebuild and replace are enough to choose the rebuild option, however, replacing the bridge would bring economic and community benefits beyond the MDOT and FHWA dollars spent.

Eighteen years ago, my husband and I chose Brunswick as our home. We were impressed with Maine Street and the downtown which had a good variety of independent businesses – no nationwide chain stores or fast-food places. We were also impressed with the neighborhoods on either side of Maine Street. After living here and participating in town affairs, we have experienced how Brunswick values its history with the Village Review Zone, the recent designation of the Historic Business District, and the zoning ordinance rewrite. It’s obvious that Brunswick values its history.

There is a balance, however, to how one “values” history. The Frank Wood Bridge is a major artery between two thriving towns. The Wood bridge was built for a different age -- an age that was planning for trolleys. And we should commemorate that. But, there are no trolleys in Brunswick or Topsham’s plans today.

I believe that preserving the Wood Bridge would constrict the future of our two towns. I enjoy visiting places like Williamsburg and Sturbridge Village, where history is preserved and reenacted every day, but I don’t want to live in a place like that. We chose to live in a community where citizens are also actively planning for and looking to the future.

A new bridge would make it safer for cyclists, pedestrians, and drivers. Wide sidewalks on both sides with lookouts to stop and enjoy unobstructed views of the river would make it enjoyable for pedestrians -- even a destination. Cyclists would have bike lanes. And drivers would have their own lanes.

There are many ways that we can preserve the history of the Wood Bridge – and the history of the bridges that came before it – through interpretive and commemorative plaques at areas on the ends of a new bridge, like what has been done on the Penobscot Narrows bridge and others throughout the state. The Design Advisory Committee has recommended incorporating features that evoke the architectural details of the mills and the bridge.

Perhaps we should also commemorate the bridge's namesake, Frank J. Wood (1861-1935). A Topsham farmer and papermill worker at the Bowdoin Paper Co., he was very active in local civic affairs. He convinced the State Highway Commission to change its original plans for the bridge. Rather than build the new bridge on the site of an older bridge which connected with a narrow street running through the middle of the paper mill property (the State's original plan), Mr. Wood suggested that the bridge be re-routed around the mill. The State agreed after much public discussion.

This time, the State has done its homework and offered an option that is the right one the first time around.

So, let's commemorate Frank Wood's vision, the bridge and its history. But let's build a new bridge for today and the future.

Sincerely,
Margo Knight
Brunswick, ME

If required, please respond as soon as possible.

From: Barbara Proko <bjproko@gmail.com>
Sent: Wednesday, April 11, 2018 12:39 PM
To: Gardner, David
Subject: Frank W. Wood Bridge, Topsham

Please save our bridge! It is the centerpiece of this historic neighborhood in Topsham, and an important symbol of this Androscoggin River link between Topsham and Brunswick. Please consider all the research demonstrating that this bridge can be restored and upgraded for use for many years to come.

Thank you.

Barbara Proko
Bath, Maine

(former Topsham resident)

From: Beau Gros <f4phan2@gmail.com>
Sent: Wednesday, April 11, 2018 1:05 PM
To: Gardner, David
Subject: Save the Frank Woods Bridge

Hello,
I just wanted to add my name to the fine people who grew up in Maine and Brunswick specifically and would like to see the Frank Woods Bridge saved and restored. It is a shame that it has been allowed to deteriorate to its current condition in order to nudge the people of Midcoast Maine into accepting a replacement bridge which will have zero character compared to the Frank Woods.

Take a look at almost any postcard taken in the Brunswick area. You'll find that the vast majority of them have the Frank Woods as a backdrop. Save it and put aside this controversy. It's in everybody's best interest.
Thank you for your time and consideration.
Beau E. Gros

From: David Israel <disrael@bowdoin.edu>
Sent: Wednesday, April 11, 2018 1:34 PM
To: Gardner, David
Subject: Please save the Frank J. Wood Bridge.

It is part of the fabric of our community.
Knocking it down and replacing it with a bland design would stake a blow to the character of the towns it connects.
Thank you.
-D. Israel
Brunswick

From: Bonnie <seaside1388@gmail.com>
Sent: Wednesday, April 11, 2018 1:44 PM
To: Gardner, David
Subject: Save our Bridge

Let’s make the news and show other states how important it is to save historic places! As goes Maine so goes the nation! The Frank Woods Bridge is a beautiful site(even with all the rust) people love driving over it and admiring the view! With a new ugly bridge there will be no viewing of the falls ! Blocked now by cement ! No view of the river on the other side! Blocked by cement!
Please don’t ruin what is an area that people adore!
Please save our Bridge for future generations to love!
Thank you!
Bonnie Biedrzycki

From: Melissa Jones <melissajoneslmt@gmail.com>
Sent: Wednesday, April 11, 2018 1:50 PM
To: Gardner, David
Subject: Topsham Brunswick Bridge

Hi Mr. Gardner,
Please save our current Bridge!
Thank you,
Melissa Jones

Sent from my iPhone

Cheryl Martin April, 11 2018
Assistant Division Administrator
Federal Highway Administration – Maine Division
40 Western Ave
Augusta, ME 04330

CC: David Gardner, Maine DOT

Dear Ms. Martin:

I am directing my comments on the Frank J. Wood Bridge Project Environmental Assessment and draft 4(f) report to you, as representative of the lead federal agency on this project that is to be 80% funded by FHWA. Ultimate approval of the required environmental and historic reviews for this project rests with your agency.

I am a resident of Topsham and a board member of Friends of the Frank J. Wood Bridge. I am commenting here as a resident of Topsham. The Friends group is submitting comments separately.
I could write a dozen pages on why the Frank J. Wood Bridge should be preserved, but that is unnecessary. Federal 4(f) requirements establish that the eligible historic resource should be preserved. Multiple engineers have now determined it can be effectively rehabilitated to serve another 75-100 years, or more. The Friends are submitting two such determinations from independent engineers with extensive experience in historic bridge rehabilitation as comment on this EA and draft 4(f). MDOT's own consulting engineer has determined the bridge can be rehabilitated. There is no question of the feasibility of rehabilitating the bridge.

The question that will likely determine the fate of the Frank J. Wood Bridge is whether the long-term costs of rehabilitating and maintaining the structure are of an extraordinary magnitude more than the long-term costs of building and maintaining the proposed new bridge. The difference in cost between rehabilitating the historic bridge and building a new bridge are negligible. It is the projected cost of future maintenance of either bridge that MDOT is using to make a case for demolition and replacement. Both independent engineering analysis commissioned by the Friends show vastly lower costs for maintaining the historic bridge over the next 75-100 years than MDOT's projected costs. FHWA must judge the veracity of MDOT's methodology and conclusions on these costs.

In fact, FHWA must judge the veracity of all MDOT's work on this project from the beginning. Comments being submitted by the Friends include voluminous documentation that MDOT has sought to manipulate this process to arrive at a predetermined conclusion – demolition of the historic bridge. This is in line with their established pattern of behavior. They have demolished more than 50 historic through-truss bridges since 1999, approximately half of them eligible for or list on the National Register. The documents and correspondence received by the Friends through their FOIA request show a state agency out of control, bullying their own consultants into reversing their recommendations to agree with MDOT's predetermined outcome. In this case, a predetermined outcome that destroys an individually eligible resource and an eligible National Register district. Rather than relying on the experience of their consultants, MDOT is using them as patsies, creating the impression of independent analysis and recommendations while actually using these professionals as window dressing.

A particularly troubling aspect of MDOT's behavior on this project is their apparent pattern of promising benefits to local groups in exchange for support of their preferred alternative. Since the start of the public review process on this project, Nancy Randolph of the RiverWalk Committee has repeatedly stated in public, "We're going to get our park from this" as a reason to support the new bridge option. This occurred during DAC meetings with MDOT and TY Lin representatives present. These representatives did not dispute the claim.

On June 6, 2016, I was attending a Brunswick Town Council meeting as spokesperson for the Friends of the Frank J. Wood Bridge. The council was considering a resolution in support of a new bridge. Topsham economic development official John Shattuck asked me to step out of the room with him. Mr. Shattuck has been closely enmeshed in MDOT's efforts to suppress opposition to their plans, as the Friends' FOIA documents show. In the corridor outside the council chamber, Mr. Shattuck said, "I think we have something that will mitigate the removal of the Frank Wood Bridge for you. How about if we re-erect the disassembled old Main Street Bridge to Mill Island? Would that satisfy your group?" He was not specific about who "we" were, but it was apparent he was not speaking for the Town of Topsham – which has declined to take action to preserve that historic bridge for a number of years. My response to this offer intended to stop opposition to the demolition of the Frank J. Wood Bridge was to say we would love to see both historic bridges rehabbed.

These patterns of behavior by MDOT are not unique to the Frank J. Wood Bridge project, as recent reporting on the dispute between MDOT and the residents and Town of Wiscasset has shown clearly. There also, a FIOA request unearthed documentation of MDOT ordering the reversal of recommendations and conclusions in their own reports to arrive at a predetermined outcome. In that case, MDOT pulled federal funding from the project when it became clear it would never pass 4(f) review, after promising the Town its historic resources would be protected by that review. Unfortunately, there is mounting evidence that this is not an agency that can be trusted.

As the lead federal agency on the Frank J. Wood Bridge project, it is incumbent on FHWA to ensure applicable federal laws are followed for this project. It is your job to step in and say “no” when a state agency is out of control and manipulating the required federal reviews to arrive at a predetermined outcome. That moment is now.

Sincerely,

Scott T. Hanson

8 Pleasant Street
Topsham, ME 04086
s.t.hanson@comcast.net

From: Alexis Sullivan <alexis.sullivan@gmail.com>
Sent: Wednesday, April 11, 2018 1:57 PM
To: Gardner, David
Subject: The bridge

Dear David,

I feel strongly that the green bridge aka the Frank J Wood Bridge must remain standing as it is a historical landmark and quintessential part of the town. What the MDOT is proposing is absolutely hideous and will not encourage people like myself to move here from other places and continue to help topsham grow and thrive. I’m also appalled by the shady tactics of the MDOT that I have learned of from reading their actual words.

Unfortunately the townspeople have not been given the correct info. I will be outraged and sad to see the green bridge replaced by an overpass.

Alexis Sullivan
11 Perkins Street, topsham
Sent from my iPhone

From: William Carr Jr. <williamacarrjr@yahoo.com>
Sent: Wednesday, April 11, 2018 2:23 PM
To: Gardner, David
Subject: Bridge

"Please Save Our Bridge!" We aready have a new bridge right down the river. (Rt1 196 bypass)
Sent from Yahoo Mail on Android

233 West Main Street
Yarmouth, Maine 04096
207.847.3577
info@mainepreservation.org
mainepreservation.org

Our Heritage, Our Legacy

March 28, 2018

Thank you for the opportunity to comment on the Environmental Assessment for the Frank J. Wood Bridge.

Maine Preservation is based in Yarmouth and these comments are submitted on behalf of this Statewide non-profit member-based historic preservation organization. Our mission is to promote and preserve historic places, buildings, downtowns and neighborhoods, strengthening the cultural and economic vitality of Maine communities.

Maine Preservation supports substantial MDOT investment in this important crossing connecting Brunswick and Topsham. Given the weakened structure of the deck, we understand that whether a new bridge is built, this deck will have to be repaired in the short-term and other structural issues addressed.

Maine Preservation listed the Frank J. Wood Bridge as one of Maine's Most Endangered Places this past fall. Opened in 1932 as part the Workers Protection Administration's initiative to 'upgrade' America's transportation infrastructure, the 805-foot steel-truss bridge is one of the largest active Truss bridges in the state. Spanning the Androscoggin River, the bridge is bookended at either side of the river by rehabilitated historic mill complexes which house a variety of local businesses and services. While the deck is weakened, the overall truss system of the bridge remains very strong, as the bridge was built to not only carry cars and trucks but large inter-urban trolleys and coal trains that weighed more than 10 times the current weight of cars and trucks. So, the trusses and over-designed gusset plates were built far stronger than its current use requires. If painted, it would be back to the bright appearance that made it the subject of historic postcards of the area. Fortunately, recently developed bridge paints have a much longer lifetime than prior treatments, with touch-ups lasting up to 40 years.

The publicly announced plan by MDOT in May 2016 to demolish the Frank J. Wood Bridge and build a new concrete bridge upstream, over the falls of the Androscoggin River was made prior to the commencement of any of the legally required historic and environmental reviews intended to determine whether an historic structure should be preserved. Having initially maintained and announced that the bridge was not eligible for listing in the National Register of Historic Places, in January 2018 the bridge was in fact determined individually eligible for its significant association with regional interurban trolley lines. In addition, the bridge directly connects the two sides of the National Register-eligible Brunswick-Topsham Industrial Historic District, connecting two revitalized mill complexes.

Such adaptively used mills are key drivers for Maine's economic future. With the demise of traditional mills, 14 such buildings have been adaptively used across the state as part of more than half -a-billion dollars invested in Maine since 2008 using historic tax credits.

Maine's largest industry is tourism. Communities are recognizing that rehabilitation of their historic resources is a proven economic strategy and are benefitting from increased interest in their communities from visitors, new families and business investors. This is a proven trend throughout the country.

People and businesses are locating to these communities because of their historic character. Preservation is a crucial part of the economic future not only of this area, but the entire state. With tourism as our #1 industry, it is critical that we recognize both the positive social and economic impacts our historic assets have our community identity and on building a sustainable future. A study by the U.S. Travel Association showed that 78 percent of all U.S. leisure travelers participate in cultural and/or heritage activities. Heritage travelers typically stay 53 percent longer and spend 36 percent more money than other tourists. Thus, enhancing our historic assets brings rewards to local economies. Historic bridges are recognized as unique community assets throughout the country. And Brunswick has already lost one.

Since 1999, Maine has lost 47 historic Warren Through Truss bridges, 23 of them listed or eligible for the National Register of Historic Places. With so many bridges in Maine and a shortage of funds to repair and replace them, the question is whether Maine citizens are getting the full lifetime from our existing bridges. Vermont has found that rehabilitation is both financially feasible and advisable. Vermont assigns a 100-year expected lifetime to its existing bridges and a shorter lifetime to new bridges than Maine If 100 years is used, this changes the economic feasibility dramatically in favor of rehabilitation.

At present, whether or not the bridge is replaced, the deck – a component of all bridges that needs to be replaced periodically - needs critical maintenance. More substantial rehabilitation will be required within the next five years to address other structural issues, namely the deterioration of essential truss bars and floor beams. Five Alternatives have been put forward to address these issues, including both replacement and repair options ranging from $13 million to $17 million. The relative costs of rehab vs. new construction are very close. We urge selection of Alternative 3 or 4. Since the MDOT estimate for repair was done by a firm specializing in building new bridges, an estimate by an engineering firm that specializes in rehabilitating bridges would be more accurate. And if rehab is chosen more jobs will be created locally from repair than from purchasing new materials from elsewhere.

The Frank J. Wood Bridge is also wide enough to have two 10' travel lanes, two 5' bike lanes and a 5' sidewalk; the proposed new bridge is only 2' wider – or 6' per bike lane.

We share the great general concern that this bridge be fixed in a manner that lasts a long time. Given the level of public interest and concern, the significant loss of historic bridges in Maine and a clear and financially responsible reuse option for this historic bridge it is essential that MDOT accurately and fairly considers rehabilitation of this local landmark and chooses Alternative 3 or 4.

Respectfully submitted,

Greg Paxton

Greg Paxton
Executive Director

From: susan cooney <suecooneyinmaine@gmail.com>
Sent: Wednesday, April 11, 2018 3:58 PM
To: Gardner, David
Subject: Frank J. Wood Bridge

Save this Bridge!

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

APR 1 1 2018

Cheryl Martin
Assistant Division Administrator
Maine Division, Federal Highway Administration
Edmund S. Muskie Federal Building
40 Western Ave., Room 614
Augusta, Maine 04330

David Gardner
Coordination, Assessment and Permits Division Manager
Environmental Office
16 State House Station
Augusta, Maine 04333

Re: National Marine Fisheries Service's comments on the Environmental Assessment and draft Section 4(f) Evaluation for the proposed Frank J. Wood Bridge project.

Dear Ms. Martin and Mr. Gardner:

In February 2018, you released an Environmental Assessment (EA) pursuant to requirements of the National Environmental Policy Act, which analyzed potential environmental impacts of various alternatives for improvements being considered to the Frank J. Wood Bridge that spans the Androscoggin River on the Brunswick-Topsham town line in Maine. Below, we provide our comments on your EA.

We are dedicated to managing, conserving, and rebuilding populations of marine mammals and endangered and threatened marine and diadromous species in rivers, bays, estuaries and marine waters of the United States. Through management, conservation and recovery efforts, and public outreach and education under the Endangered Species Act (ESA), we strive to ensure the survival of the protected marine species in the Northeast United States for future generations. Federally listed Atlantic salmon, shortnose sturgeon, and Atlantic sturgeon are present in the proposed action area. Additionally, the action area is designated as critical habitat for the Gulf of Maine distinct population segment (GOM DPS) of Atlantic salmon and the GOM DPS of Atlantic sturgeon.

On March 30, 2018, we issued a Biological Opinion which concluded that your preferred alternative (identified as Alternative 2, a new 835 ft. bridge on a curved alignment upstream of the existing bridge) is likely to adversely affect, but not likely to adversely modify or destroy critical habitat designated for the Gulf of Maine distinct population segment (DPS) of Atlantic sturgeon. We also concluded that the proposed action may affect, but is not likely to adversely affect, the Gulf of Maine DPS of Atlantic sturgeon, endangered shortnose sturgeon, endangered

Gulf of Maine DPS of Atlantic salmon, or critical habitat designated for the Gulf of Maine DPS of Atlantic salmon.

In addition to ESA listed species, we are responsible for other diadromous species and marine, estuarine and coastal habitat systems. Our goal is to ensure the productivity and sustainability of fisheries and fishing communities through science-based decision making. Estuary and coastal riverine habitat systems, including rivers such as the Androscoggin River, provide an integral component of significant ecological functions for the larger marine environment. Estuaries and coastal rivers support many living marine resources. Species such as alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), American shad (*Alosa sapidissima*), sea lamprey (*Petromyzon marinus*), and American eel (*Anguilla rostrata*) rely on these coastal systems for refuge, spawning, rearing and nursery habitat.

All of the species listed above depend on the safe, timely, and effective up- and downstream passage of river barriers, such as hydroelectric dams to complete their life cycle. The existing Frank J. Wood Bridge is located immediately downstream of Brookfield White Pine Hydro, LLC's (Brookfield) Brunswick Hydroelectric Project (FERC License No. P-2284). Upstream fish passage at the Brunswick Hydroelectric Project (Brunswick Project) is provided via a vertical slot fishway, located adjacent to the project powerhouse on river left, looking upstream. On December 13, 2013, after formal consultation with us under the Endangered Species Act, the Federal Energy Regulatory Commission amended the license for the Brunswick Hydroelectric Project to include an Interim Species Protection Plan (ISPP). The ISPP included conditions that require Brookfield to study and adaptively manage up- and downstream passage at the Brunswick Project, in consultation with us, to protect migrating Atlantic salmon. The Brunswick Project is the first barrier to fish migration on the Androscoggin River. Given the scale of the Androscoggin upstream of the Brunswick Project (165 miles long, and a watershed of approximately 3,500 square miles), the importance of its fish passage efficacy on diadromous species and the ecosystems on which they depend cannot be understated.

We continue to have concerns related to both the effects of the preferred alternative on the efficacy of the existing fishway as well as the preferred alternative's close proximity to the Brunswick Project. On page 14 of your EA, you provide a brief analysis of the anticipated environmental effects of the preferred alternative on the Brunswick Project and fishway, wherein you state that the preferred alternative could potentially affect the fishway from shadowing and the location of the southerly piers, however, you provide no additional information describing those potential impacts. You indicate that you are continuing to conduct additional evaluation of potential effects to the fishway.

Your preferred alternative will include the placement of a bridge pier within 32 feet of the existing fishway and within the existing FERC project boundary. As described above, the ISPP included in the FERC license for the Brunswick Project dictates an adaptive approach to optimizing the safe, timely, and effective up- and downstream passage for Atlantic salmon. At other hydroelectric facilities in Maine, similar adaptive approaches have resulted in the civil modification of project facilities, including, but not limited to, the design and construction of new or alternate fish passage structures and facilities. Within the next six years, FERC will initiate relicensing proceedings for the Brunswick facility. Those proceedings could also result in the modification of structures at the Brunswick Project to increase passage efficacy for diadromous species other than Atlantic salmon. The placement of the bridge pier in close proximity to the Brunswick Project could considerably limit the type, scope, and scale of any potential future fishway modifications within the most promising location for such modifications, based upon our current understanding river flow and channel configuration at the site. These factors should be considered as you make a decision on bridge design and location.

Our Opinion concluded that the effects of sound, vibration, and shadows associated with the preferred alternative would not affect Atlantic salmon use of the upstream fishway. We note that our Opinion was developed using the best available information. On page 128 of the Opinion, we clearly indicate that there is no published literature on shadow effects as related to successful passage via an upstream fishway. Further, our Opinion only evaluated these potential project effects on the fishway efficacy for Atlantic salmon. Other species, such as American shad, are known to exhibit more particular behavioral avoidance characteristics to variables such as noise. The scarcity of available scientific literature makes it difficult to evaluate the magnitude of potential effects of the bridge on the behavior of a suite of diadromous species, and in turn, the effects on the efficacy of the fishway with any certainty. However, given the close proximity of the preferred alternative to the existing fishway, effects of the new bridge on use and efficacy of the fishway by all species (i.e., including river herring and American shad) should be carefully considered.

Given the uncertainty associated with the effects of your preferred alternative on the success of diadromous fish passage at the Brunswick Project, we are concerned about the potential results of implementing Alternative 2 including: the limitations that the preferred alternative would impose upon any future improvements to fish passage at that facility, and the importance of the availability of efficient fish passage at the Brunswick Project to the overall health and productivity of diadromous fish populations in the Androscoggin River. We believe that selection of one of the remaining alternatives would avoid these conflicts; however, should you proceed with your current preferred alternative, we recommend that you include provisions to monitor pre- and post- project passage effectiveness in order to determine the magnitude of the proposed project's effect on the diadromous fish community and the ecosystems to which they are associated and develop a plan to mitigate any documented impacts.

Thank you for the opportunity to comment. If you have any questions or need additional information, please contact Matt Buhyoff (Matt.Buhyoff@noaa.gov) or 207-866-4238.

Sincerely,

Julia E. Crocker

Julia E. Crocker
Endangered Fish Recovery Branch Chief
Protected Resources Division

From: amyreedrobinson@gmail.com
Sent: Wednesday, April 11, 2018 5:05 PM
To: Gardner, David
Subject: Bridge

Mr Gardner,
Please save the Frank J. Wood Bridge. It is such an icon for the area. There is too much “out with the old” lately. It is possible to save this beauty that connects the two towns. We already have the new by-pass and had to close the black bridge, I do not want to have to tear this one down as well.
Thank you for your consideration,
Amy Robinson
33 Mae Ln
Topsham

From: edda thiele <briggsthiele@yahoo.com>
Sent: Wednesday, April 11, 2018 5:28 PM
To: Gardner, David
Subject: the bridge

I am enthusiastically supportive of keeping and renovating the bridge in Topsham. I think it is vital to do so. Thank you, Edda

From: Nicole LePera <paxvolupia@icloud.com>
Sent: Wednesday, April 11, 2018 7:16 PM
To: Gardner, David
Subject: Save our bridge!

When I first came to Brunswick and Topsham, I can still remember my first ride across the bridge. I loved it so much, that I turned around and went back across. Then again. I loved it on first sight.

I found myself coming back to the area again and again, and I always found an excuse to go across it.

Several years later, in 2008, I moved here. I have been a happy resident of the area for ten years now, and I'm positive a lot of it has to do with that lovely green bridge.

Through the years, I have spent a lot of money (and my semi-wealthy boyfriend's money!) at the many restaurants and shops in the area.

If that bridge had not had such an effect on me, I probably would not be here. Those businesses would not have gotten my business. Multiply that times the hundreds, if not thousands, of folks whose stories are similar to mine. That's money lost.

Moreover, the new bridge design looks like an ugly overpass--a cheap construction--and putting such a monstrosity would put an ugly scar on the face of our towns. Do we really want to look like every other dull and boring small town in America? Ir do we want to hold onto our character, our history, the things that make us unique, the things that make us beautiful?

Should you decide to tear it down--and I think I speak for others in the town--I might just have to move away. Watching it fall is just gonna be too damn heartbreaking.

Sincerely,

Nicole LePera, Topsham resident

Sent from my iPhone

From: Charles Carroll <chick76@me.com>
Sent: Wednesday, April 11, 2018 8:23 PM
To: Gardner, David
Subject: Fwd: Green bridge

Chick

Begin forwarded message:
From: lynzie millard <lynziemillard@hotmail.com>
Date: April 11, 2018 at 7:50:59 PM EDT
To: "chick76@me.com" <chick76@me.com>
Subject: Green bridge
I grew up here in topsham. My children are growing up here, this is home. We live near the bypass and cant see the green bridge fitting in with a bypass look. We love the historical look and hope it stays that way. We want what is the best for the towns , however I cant see living here without the historic look of the bridge. It would be nice to have it restored and figure out a way for the paint not to wear so fast.
Thank you
Lynzie millard.
Get Outlook for Android

To Whom It May Concern,

I am writing on behalf of myself. I am writing on behalf of my children. I am writing on behalf of my town, and those who are desperately urging you to rescind your plan to tear down the historic Frank J. Wood Bridge. It is a part of our town's identity. Take that away and it just becomes another bridge. Another project. Another number on a spreadsheet. A tragic loss of community.

This bridge to me, means home. Its significance isn't merely a means of getting from point A to point B. It symbolizes the connection of two towns. Its image is used in sporting events, t-shirts, postcards. Google "Topsham, ME," or "Brunswick, ME," guess what comes up? Without this bridge, the towns lose a piece of their identity. These towns are so much more than a blip on a map, and that is what they will become if a new bridge is put in place. Main street would become a runway.

The construction of a new bridge would disrupt the wildlife that currently inhabits the area. Right on the Brunswick town line is the fish way, how would this impact fish migration? Though I imagine fish migration may be easily explained away, but is your conscious so easily explained away? What does that say of our leaders in Augusta, when the voices of the community are ignored by people who are elected by the people but with this demonstration of ignorance, certainly not for the people?

You do not know how I am and you do not know my children or my community, but seem to think you know what's better for me. I am telling you, you are incorrect.

If you are truly working in my best interest, then please take a moment to read this, close your eyes and imaging what my life is like and what I am asking of you are elected leaders.

The bridge is a monument of our community. It brings people, schools, and towns together. It has meaning and value. It is historical and it is ours, not yours.

If, again, as elected leaders your would like to also support fiscal responsibility, please do not ignore the economic befit of rehabilitation versus new construction. As you are aware, it is fiscally more responsible to repair the Frank J. Wood Bridge than build something new.

So, this is your moment. As a leader, as an elected official and as a supporter, I ask that you do the right thing. It is on you to make the right decision and choice. If you ignore us, you are making a conscious choice to communicate that we are not important or what we say is not important enough.

Respectfully,
Jill, Bailey and Ben
Summer Street
Topsham, Maine

From: Cathy Hanscom <stjohngirl98@gmail.com>
Sent: Wednesday, April 11, 2018 10:30 PM
To: Gardner, David

As a resident of topsham for most of my life I passionately support keeping and repairing the existing Frank Woods Bridge. My mom walked across the bridge pregnant with me during a hurricane. I marched across it in girl scouts memorial days past and my daughter in marching band. It holds historical as well as sentimental value for many residents of Brunswick and Topsham. Too many pieces of Maine's history have been eliminated. Please save our bridge!
Sincerely, Cathleen Hanscom

From: Dale Dorr <dkdorr@gmail.com>
Sent: Wednesday, April 11, 2018 11:01 PM
To: Cheryl.martin@dot.gov; Gardner, David
Subject: Frank J. Wood bridge

Ms. Martin/Mr. Gardner:
This is one more late and perhaps the last public comment on the fate of the Frank J. Wood bridge in Brunswick. In short, I and nearly all of my friends/acquaintances in Brunswick and Topsham fully support the upstream replacement option for a new bridge. As with many development/construction projects, the naysayers tend to make a lot more public noise than supporters because of their passion for a small consideration - in this case, the historical value of that old rusted, hulk of a bridge. As a practical matter (which hopefully controls the decision), there are abundant solid reasons for full replacement over repair - initial costs, on-going maintenance costs, business disruption costs and major safety and functionality improvements.
This is all measured against the very questionable historical value of saving the existing bridge. I traveled the current bridge twice a day for 25 years for my job and am all too familiar with its shortcomings. I also am a bicyclist who sometimes crosses that bridge and I guarantee you that it is always an adventure for both the biker and the vehicle drivers. I realize that you have many hoops to jump through as part of any transportation project but hope that ultimately the new, upstream bridge will be constructed. Good luck and let's hope that there will be no legal challenges to the correct decision.
Sincerely,
Dale Dorr

Sent from my iPad

From: Cathy Hanscom <stjohngirl98@gmail.com>
Sent: Wednesday, April 11, 2018 10:30 PM
To: Gardner, David

As a resident of topsham for most of my life I passionately support keeping and repairing the existing Frank Woods Bridge. My mom walked across the bridge pregnant with me during a hurricane. I marched across it in girl scouts memorial days past and my daughter in marching band. It holds historical as well as sentimental value for many residents of Brunswick and Topsham. Too many pieces of Maine's history have been eliminated. Please save our bridge!
Sincerely, Cathleen Hanscom

From: Communications.MaineDOT@maine.gov
Sent: Wednesday, April 11, 2018 11:12 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

The following message was submitted from your MaineDOT website contact form .

Date: 04/11/2018
Name: Douglas C. Bennett
Organization(if applicable): Mr.
Phone: 2077219575
Email: Dougb@earlham.edu

Topic:

Comments:
Comments on the Frank J. Wood Project
Submitted by Douglas Bennett, 53 Elm Street, Topsham ME April 11, 2018

I have appreciated the patient, thorough, and fair process that MDOT and FHWA have used in weighing the various options for the current Frank J. Wood Bridge.

With all the evidence and supporting material in view, I believe reasonable people can only conclude the following:

1. The bridge is and must be a vital connection between the town centers of Brunswick and Topsham. It needs to serve all users well: motorists, cyclists, and pedestrians. Whatever is done with regard to the bridge (repair or replacement) must be done with the least possible disruption now and in the future to those seeking to cross the river.

2. Replacement on the upstream alignment has been shown to be the least expensive option in terms of construction costs. It is also the least expensive option in terms of ongoing maintenance costs.

3. Replacement on the upstream alignment is the one that would cause the least disruption during construction. It is also the option that will cause the least disruption in terms of ongoing maintenance because it will require much less maintenance.

3. Replacement on the upstream alignment would produce a bridge that serves equally well the needs of motorists, cyclists and pedestrians. A new bridge will especially serve better the needs of cyclists and also pedestrians. A new bridge will be safer for cyclists and pedestrians.

4. There is no appreciable difference among the options in terms of harm to the natural environment.

5. While the current bridge is eligible for listing on the national historic register, neither town has sought to have it so listed, even though both have created historic districts at either end of the bridge. The bridge is not appropriately historic with regard to either of those historic districts: not with regard to the mills at either end nor with regard to the houses at either end, especially the historic houses on the Topsham end.

6. Replacement on the upstream alignment will allow beautiful views of the river at either bridge end and from the bridge itself, views much superior to what would be possible with a renovation of the current bridge. A replacement bridge will also connect better with current and prospective walking

trails.

7. While there are supporters of both renovation and replacement, the weight and number of supporters is greater on the replacement option. Cyclists strongly prefer it. Business groups strongly support it. The ‘Friends of the Frank J. Wood Bridge’ are simply not truthful in posturing that there is greater popular support for renovation.

In sum, there is simply no reason to prefer a renovation option to a replacement.

In choosing to build a new bridge on the upstream alignment, I hope and expect MDOT and FHWA will follow the advice and guidance of the Design Advisory Committee created by the two towns, whose report has already been submitted.

If required, please respond as soon as possible.

From: Renee Badershall <serendipity128@hotmail.com>
Sent: Thursday, April 12, 2018 4:14 AM
To: Gardner, David
Subject: Bridge

Please save our bridge! Thanks. ??

Sent from my Verizon LG Smartphone

Brookfield

Brookfield Renewable
150 Main Street
Lewiston, ME 04240

Tel 207.755.5600
Fax 207.755.5655
www.brookfieldrenewable.com

April 11, 2018

David Gardner
Coordination, Assessment and Permits Division Manager
Maine DOT Environmental Office

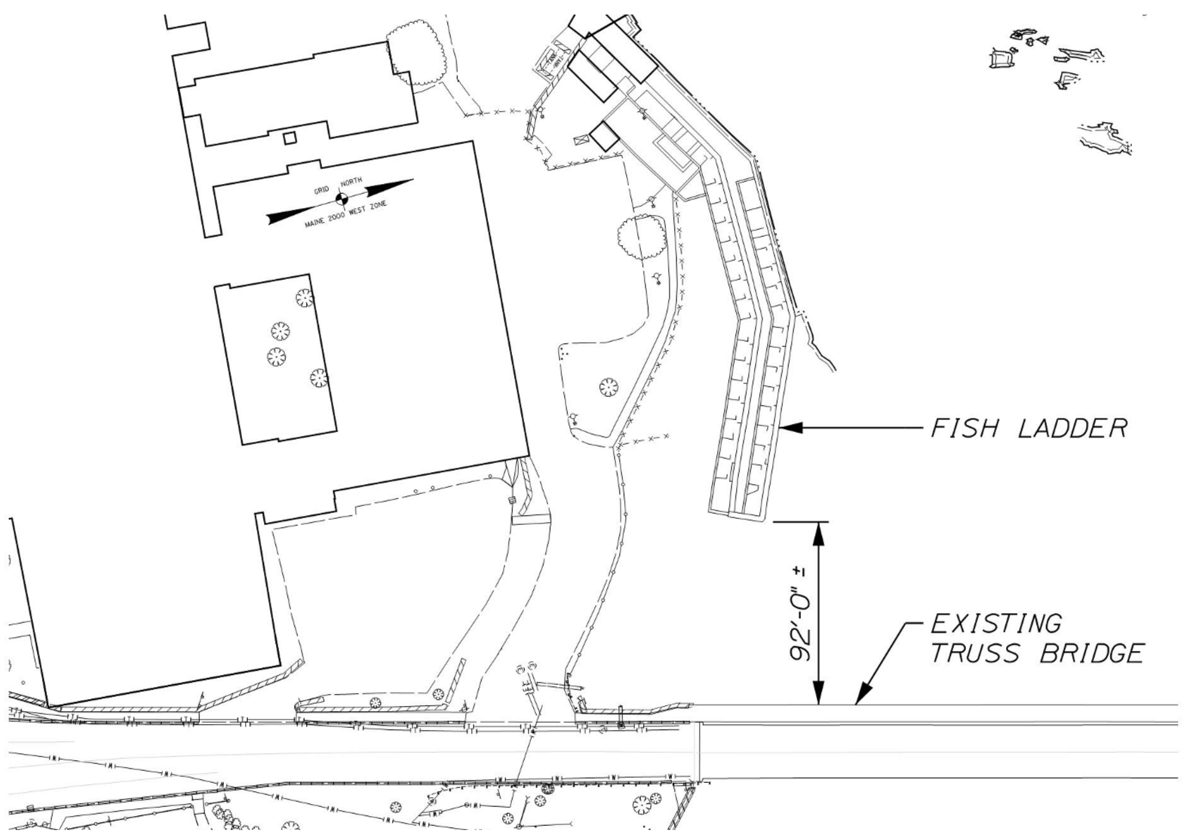
RE: Environmental Assessment for the Frank J. Wood Bridge (#2016)

Dear Mr. Gardner

On April 3, 2018, The Federal Highway Administration, Maine Division (FHWA) and the Maine Department of Transportation (Maine DOT) distributed the Frank J. Wood Bridge Environmental Assessment (EA) for public inspection and agency comment in accordance with 23 CFR §771.

Brookfield White Pine Hydro (BWPH), owner and operator of the Brunswick Project (FERC No. 2284), comments follow.

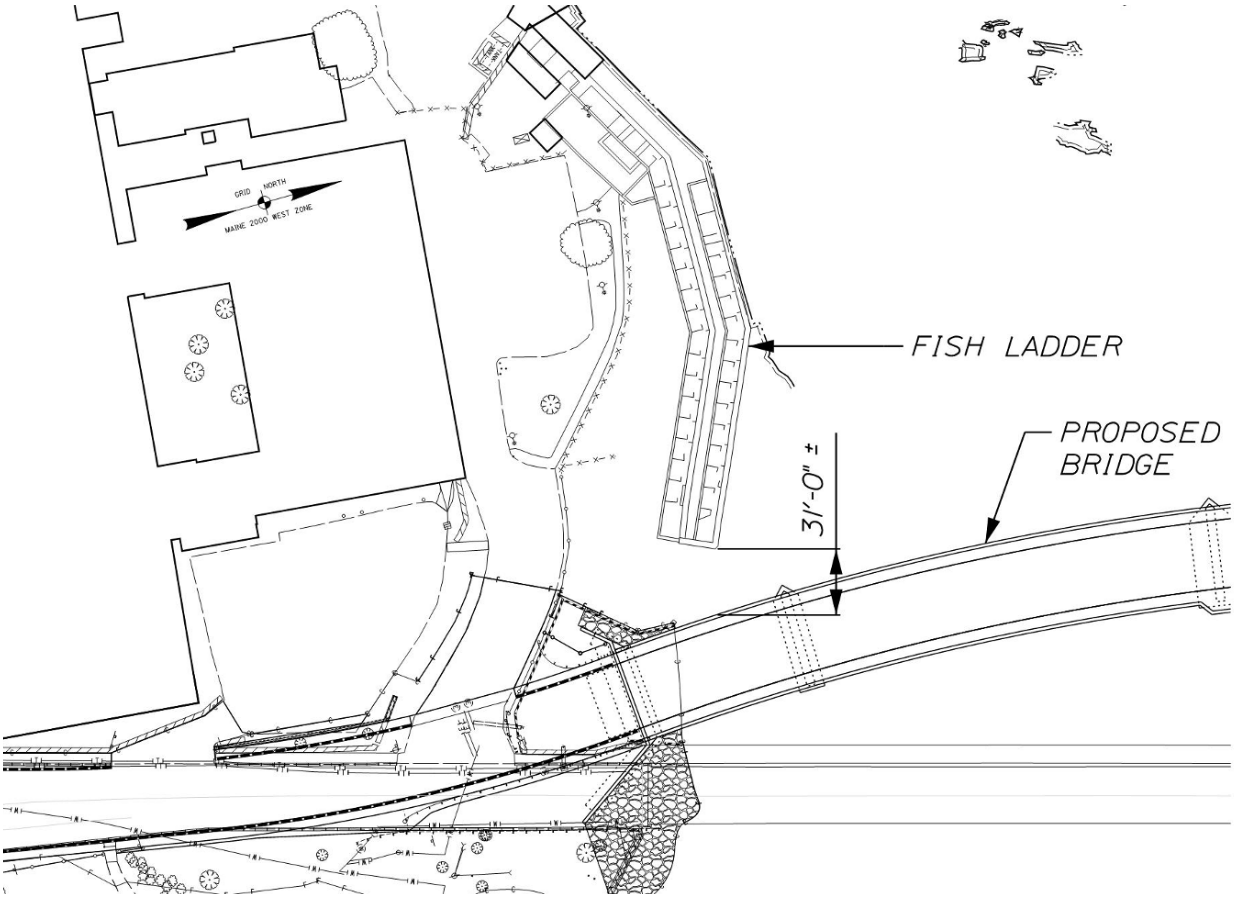
The Frank J. Wood Bridge replacement preferred alternative (Alternative 2), as proposed, is located immediately adjacent to BWPH's Brunswick Dam, which includes a fish passage facility (Fishway). Currently, the Frank J. Wood Bridge passes just over 90 feet to the south of the Facility. The proposed bridge reconstruction and realignment would bring the bridge to within just over 30 feet of the Fishway.



Brookfield

Brookfield Renewable
150 Main Street
Lewiston, ME 04240

Tel 207.755.5600
Fax 207.755.5655
www.brookfieldrenewable.com



BWPH's concerns

BWPH is very concerned that the noise, vibration, and shadowing from the realigned bridge will, given its proximity to the Fishway, have negative lasting effects on upstream fish passage for American shad, Alewife, and blueback herring into the future. Each of these is discussed below.

EA status

Throughout the scoping process of the EA, BWPH raised the above noted concerns as well as potential impacts to the hydraulics of the tailrace channel. To that end, Maine DOT conducted a shadow modeling study and moved a pier in the conceptual design of Alternative 2.

While BWPH appreciates the efforts of Maine DOT to address our concerns, the EA only includes an analysis of construction activity effects on endangered Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon and the presence of bridge structures in critical habitat for Atlantic salmon and sturgeon.

BWPH is, in addition to the foregoing, concerned about the impact of the bridge structures on the performance of the existing fishway, as well as impacts to American shad and river herring migration, which are not considered in the EA. In fact, the EAs analysis of impacts to the fishway (other than construction) is essentially limited to the following paragraph:

> *A hydropower dam operated by Brookfield Renewable Energy Partners (Brookfield) is located about 500 feet upstream of the existing Frank J. Wood Bridge. Brookfield owns and operates the dam under a license from FERC. No impacts to the Brookfield dam are anticipated for Alternatives 1, 2, 3 or 4. Upstream fish passage at the dam occurs via a vertical slot fish way, which provides passage for important anadromous species. All alternatives would have temporary effects to the fish species utilizing the fish way during construction due to installation of the temporary bridge or temporary trestles. Alternative 2 (the Preferred Alternative) has the potential to affect the fish way permanently indirectly from shadowing and location of the southerly piers. Additional evaluation of potential effects to the fish way is being conducted. Pier locations will be evaluated during final design to minimize impacts. Alternatives 1, 3 and 4 would not have permanent impacts to the fish way.*

While Maine DOT acknowledges that the shadow study revealed a potential permanent effect on the Fishway, that effect is not adequately analyzed for the breadth of species that utilize the fishway. As well, BWPH's other concerns regarding the long-term effects on the Fishway given the increases in noise and vibration that will result with the relocation of the bridge are notably absent.

Maine DOT states in the above paragraph that additional evaluation of potential effects is being conducted, but does not otherwise specify what these effects are.

The National Marine Fisheries Service (NMFS) Biological Opinion (BiOp) does analyze the effects of noise and vibration on Atlantic salmon passage however that analysis does not consider American shad or river herring.

Issue analysis

<u>Noise/Vibrations</u>

The EA makes no assessment of noise or vibration of Alternative 2 on the performance of the Fishway. Although the NMFS BiOp does include an analysis of noise and vibration, this analysis is brief, does not rely on the collection of baseline or comparative data, references Alternative 2 as being only “slightly closer to the fishway than the existing abutment”, and only considers possible effects to Atlantic salmon.

Although advancements in construction technology over the past several years have created a quieter, less impacted sub-surface environment, the new bridge will be a mere 32 feet from the Fishway, compared to over 90 feet in its current alignment. Considering the vehicle traffic and activity taking place on the new bridge, and the American shad's sensitivity to such factors, it will likely impact the American shad's upstream migration through the Fishway. BWPH requests a comparative evaluation of noise and vibration be conducted to determine the impact of Alternative 2.

Brookfield Renewable
150 Main Street
Lewiston, ME 04240

Tel 207.755.5600
Fax 207.755.5655
www.brookfieldrenewable.com

Shadowing

The shadow study conducted by Maine DOT indicated an increase of approximately 1 hour of additional shadowing on the turning pool of the Fishway and an increase in the overall prevalence of dynamic shadows (moving, flickered shadowing caused by traffic movement) from approximately 1.5 hours per day to approximately 3 hours per day. This information, while provided to Brookfield under separate cover, is absent the EA. However, Section 7.7.2 of the NMFS BiOp provides the following discussion:

> *Although it is understood that the presence of shadows can affect fish behavior (Schilt 2007), there is no published literature on shadow effects as related to successful passage via an upstream fishway.*
>
> *Maine DOT's design consultant estimated the duration of shadowing from the existing structure at approximately 1 hour per day of static shadow (resulting from the bridge superstructure) and a few minutes per day of dynamic shadowing (resulting from passing traffic). Dependent on the model month the shadows from the existing structure are present between the hours of approximately 0700 to 0945. Maine DOT's design consultant predicted shadowing from the new bridge alignment would increase the duration of static shadowing to 2.25 hours per day and of dynamic shadowing to 1.5-2 hours per day. The timing of shadowing predicted for the proposed alignment was between 0645 and 0945.*

As with the assessment of noise and vibration, Maine DOT does not provide quantification or discussion of the effects of shadow on the Fishway, only acknowledging the potential. Although not fully understood to what extent the increase in dynamic shadowing may have on American shad ascending the Brunswick fishway after completion of the proposed new bridge, it will likely negatively impact fish behavior in and around the Fishway.

We appreciate the opportunity to comment on Maine DOT's EA for the Frank J. Wood Bridge and trust our comments will be considered. If you have any additional questions, please contact me at 207-755-5606 or by email at: Kelly.maloney@brookfieldrenewable.com.

Sincerely,

Kelly Maloney

Kelly Maloney
Manager, Compliance - Northeast

From: Louise Rosen <mainerosen@gmail.com>
Sent: Thursday, April 12, 2018 8:57 AM
To: Gardner, David
Subject: Frank Wood Bridge

Hello Mr. Gardner

This bridge is an important feature of the Brunswick-Topsham cityscape that deserves preservation. It makes a vital contribution to the important sense of place widely recognized by economic development specialists as key to successful ongoing invigoration of post-industrial downtowns. It is part of local history. It is attractive - featured in nearly all the pr photos that represent the two towns!

And, it is possible to make modifications that will bring the bridge successfully into the 21st century.

Please consider these points.

Thank you.

Louise Rosen
16 High Street
Brunswick, ME 04011

MaineDOT

Comment Sheet
Brunswick-Topsham, Frank J. Wood Bridge, MaineDOT WIN 22603.00
National Environmental Policy Act

Frank J. Wood Bridge
Public Meeting - Environmental Assessment
Mt Ararat High School Commons

March 28, 2018
6:00 pm

The Federal Highway Administration (FHWA) and the Maine Department of Transportation (MaineDOT) are accepting public comments and community input regarding the National Environmental Protection Act (NEPA) Environmental Assessment through April 11, 2018. This comment sheet can be mailed to the following address:

David Gardner
Maine Department of Transportation
Environmental Office
16 State House Station
Augusta, ME 04333

Public comment can also be submitted via MaineDOT's web page at: http://www.maine.gov/mdot/env/frankjwood/ or directly to David Gardner at david.gardner@maine.gov.

Comment: I'm glad I went to the meeting at Topsham High School! ~~I was~~ I completely support taking down the old bridge and building new. Cost is the biggest factor in my decision but when I saw details of the erosion on the current bridge.. it's time for it to go.

I support an "open" bridge where we can enjoy the views of the river, and the lower cost of construction.

& I would like to see some kind of decorative element to the new bridge.

(Use additional sheets if necessary)

Name (Please Print) Donnalee La Rose
Street Address 162 Columbia Ave
City, State, Zip Brunswick ME 04011
Contact Info (Email or Phone) donnalee.larose@gmail.com

From: Communications.MaineDOT@maine.gov
Sent: Thursday, April 12, 2018 3:38 PM
To: Gardner, David
Subject: Frank J. Wood Project Comment

Categories: FJW

The following message was submitted from your MaineDOT website contact form .

Date: 04/12/2018
Name: Linda & Harold Christensen
Organization(if applicable):
Phone: 207-798-3964
Email: lindaw.christensen@gmail.com

Topic:

Comments:
Based on our delayed look at the Forecaster, we've apparently missed your yesterday deadline. But, just in case, this older (and somewhat ailing) Brunswick couple would be very happy to see you replace the "Erector Set" bridge with the artist's rendition that would allow a view of the beautiful buildings & water when approaching & driving over it!!! Our fingers are crossed! -Linda Christensen, 13 Locust Ln, Brunswick

----

If required, please respond as soon as possible.

From: A Weymouth <aweymo@yahoo.com>
Sent: Thursday, April 12, 2018 11:17 AM
To: Gardner, David
Subject: Topsham

Categories: FJW

Save our bridge !

Please

Sent from my iPhone

STEPHEN F. HINCHMAN
ATTORNEY AT LAW

April 11, 2018

Cheryl Martin
Assistant Division Administrator
Federal Highway Administration – Maine Division ("FHWA")
40 Western Ave
Augusta, ME 04330

David Gardiner
Maine Dep't of Transportation ("MDOT")
16 State House Station
Augusta, ME 04333-0016

RE: Supplemental Comments, Environmental Assessment Frank J. Wood Bridge, STP-2260(300)

Dear Ms. Martin and Mr. Gardiner:

On behalf of the Friends of the Frank J. Woods Bridge ("Friends"), please accept these comments supplementing the Friends other submissions in response to the above referenced Environmental Assessment regarding the Frank J. Wood Bridge improvement project.

I. FRIENDS OF THE FRANK J. WOOD BRIDGE.

The Friends of the Frank J Wood Bridge is a Maine non-profit corporation dedicated to the preservation of the historic Frank J. Wood Bridge between Brunswick and Topsham, Maine. The board and membership of the Friends is made up of residents and business owners of both towns who feel strongly that preservation of the bridge is important to the identity, economy, and quality of life of our communities. The Friends members use the bridge and are concerned that the proposed action will significantly affect their uses, interests and businesses.

The Friends are concerned that FHWA and MDOT are failing to meet their requirements under the National Environmental Policy Act ("NEPA") by segmenting the Section 106 and 4F analyses from the direct, indirect and cumulative analyses required under the Endangered Species Act review and consultations, Essential Fish Habitat review, FERC relicensing issues related to fish passage failures, Clean Water Act requirements under sections 401 and 404, and the analysis of impacts based on the (as yet not-) final design and cost of each alternatives.

II. BACKGROUND ON NEPA.

The purpose of NEPA is twofold: to ensure agencies consider the environmental impacts of their proposed actions early in the decision-making process and to alert the public to the environmental impacts of proposed agency action. As the Supreme Court noted in *Winter v. Natural Resources Defense Council*, the purpose of NEPA's environmental impact statement requirement is to ensure that "important [environmental] effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast," that "an agency has indeed considered environmental concerns", and to "provide[] a springboard for public comment… [and] afford[] other affected governmental bodies notice of the expected consequences and the opportunity to plan and implement corrective measures in a timely manner." *Id*. 129 S. Ct. 365, 389–90 (2008) (internal quotation marks and citations omitted). By requiring the consideration of environmental impacts early in the agency decision-making process, NEPA ensures that agencies are aware of the environmental impacts of an action before they have committed to that action. Further, by announcing the environmental impacts of a proposed action early in the agency decision-making process, the public is able to act on that information through the administrative process before a decision is made.

NEPA's purpose is achieved through its Environmental Impact Statement (EIS) requirement. NEPA requires the preparation of an EIS for any proposed major federal action that will "significantly affect[] the quality of the human environment." 42 U.S.C.A. § 4332(C). An agency must follow the Council on Environmental Quality's (CEQ) regulations to determine if an action they are proposing will trigger NEPA's EIS requirement by having a significant effect on the environment. 40 C.F.R. § 1500 et seq. The CEQ regulations require the preparation of an Environmental Assessment (EA) to make this determination. To be useful in making a decision about whether or not an EIS should be prepared, EAs are required to have the same "scope" as the potential EIS. Id. § 1508.9(b).

An agency is arbitrary and capricious in fulfilling its NEPA procedural obligation if that agency fails to take a "hard look" at the environmental consequences of the action it is proposing. *US v. Coalition for Buzzards Bay*, 644 F. 3d 26, 31 (1st Cir. 2011). An agency takes a hard look when it identifies information that allows both the agency and the public to evaluate the environmental impacts of the proposed action. Segmenting a proposed action into many smaller actions for NEPA review can defeat NEPA's dual purposes by minimizing the perceived environmental impacts of the action. The Council on Environmental Quality (CEQ) regulations prevent segmentation through mandating the combined analysis of smaller actions that are part of a larger proposed action, and proposed actions that are "connected," "similar," and/or have "cumulative impacts." 40 C.F.R. § 1508.25.

Segmentation minimizes the environmental consequences of a larger proposed action by dividing it into several proposals for analysis in separate NEPA statements. Thus, segmentation defeats NEPA's dual purpose of requiring agencies to consider environmental impacts and disseminating information about environmental impacts to the public. This division of the analysis allows agencies to avoid confronting the totality of the environmental impacts of their actions, and the piecemealed presentation of the information prevents the public from having a complete understanding of the action's environmental impacts. *Sierra Club v. Marsh*, 769 F. 2d 868, 881 (1st Cir. 1985).

To prevent segmentation, the CEQ regulations define the required "scope" of analysis for NEPA statements. The regulations require that a NEPA statement analyze the entirety, rather than a segment, of proposed single actions. Further, the regulations require a single combined analysis for proposed actions that are "similar," "cumulative," 40 C.F.R. § 1508.25. A cumulative environmental impact is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." *Id*. § 1508.25(a)(1)(ii).

III. Discussion

The EA violates the above provisions in a number of ways. For example, the EA was released prior to and without the Essential Fish Habitat ("EFH") Consultation with NOAA Fisheries (due to start January 2018), lacks a final EFH Assessment Report, EFH determination and EFH conservation recommendations. (EA at 11). This is, *per se*, impermissible segmentation. All impacts of a single action must be addressed together in a single NEPA document. 40 C.F.R. §§ 1500.5(g), 1502.25. Further, it is especially problematic because the EA notes that the preferred alternative has the potential to cause permanent impacts on the upstream fish passage at the Brunswick Dam operated by Brookfield Renewable Energy Partners ("Brookfield") and that the fish passage issue is still under evaluation. (EA at 14.) The EA appears to suggest that this concern will be evaluated and resolved during the "final design process."

That is not how NEPA works. The totality of the potential environmental impacts, including indirect, cumulative and reasonably foreseeable future effects, must be analyzed and disclosed to the public and to agency decision makers NOW, before the die is cast and it becomes too late to implement corrective measures. *Winter v. Natural Resources Defense Council*," 129 S. Ct. 389. The problem is especially acute in this case because the annual data collected by Maine Department of Marine Resources conclusively indicates that the Brunswick fish passage is failing to effectively pass shad and the dam owner and state and federal wildlife agencies have all acknowledged that corrective action will be necessary at the next relicensing proceeding (which the EA notes but impermissibly fails to adequately analyze – see EA at 21, 27).

Alternative 2, however, could limit or foreclose opportunities to fix the fish passage problem – by taking away land available for modifications, by fundamentally altering the river's hydrology and currents, by blocking areas with new piers, and by shading. (*Id*. at 21.) Until and unless these issues are fully analyzed and disclosed to the public and to other agencies in the NEPA process, no action that would irretrievably commit resources or foreclose alternatives can occur. 40 C.F.R. § 1500.1(b); *Sierra Club v. Marsh*, 769 F. 2d 889. Likewise, the issue must be addressed now because the fish passage question has the potential to fundamentally change the final bridge location, design and cost, which would then change all other aspects of the analysis.

Second, the EA makes the same mistake with respect to the failure to analyze impacts under the Clean Water Act – which it attempts to defer to a future application to the Army Corps of Engineers based on the final selected design. (EA at 12). As an initial matter, the NEPA document must be based on the final design. Publishing the EA prior to developing a final design (and final cost) is premature. Second, even if this were the final design, while FHWA may be correct that the CWA § 404 permit is typically obtained after completion of NEPA, it is wrong to defer the discussion of impacts under § 404 to a future application to the Army Corps of Engineers. That would force two different NEPA analyses of the same project, which is unlawful. All impacts of a single action must be addressed together in a single NEPA document. 40 C.F.R. §§ 1500.5(g), 1502.25.

A third area of concern is the failure of the EA to fairly and fully disclose and analyze visual impact concerns related to the preferred alternative. (In addition to the Section 106 and 4 f review process, aesthetic and visual impacts are also subject to state permitting pursuant to 35 M.R.S.A. § 480-D(1); 06-096 C.M.R. Ch. 315). For example, the EA does not include a profile view of Alternative 2. Indeed, based on the administrative record, it appears the agency intentionally directed consultants not to publicly disclose elevations, making it impossible to determine the height of the proposed alternative above the river or the thickness of the bridge inclusive of the steel support beams, bridge deck and sidewalks, and rails. Without a visual portrayal or the technical cross-sectional information, it is impossible for the public or agencies to assess potential visual impacts as they relate to Section 106 and 4f properties, or to other criteria including the cumulative overall aesthetic impact. For instance, the public, including members of the Friends, have repeatedly asked how the proposed alternative would affect the view of the Androscoggin River falls and the historic sites on each side of the river. A new bridge that is 10 to 15-feet thick (1 and ½ stories) would have major visual impacts and such impacts must be fully disclosed – not intentionally hidden from public review.

Likewise, the administrative record indicates that the sponsoring agencies may have also attempted to impact public opinion by selecting images that portray the current bridge and current conditions in the worst possible light while spending significant sums on renderings to portray the preferred alternative in the best possible light. Another example would be the graphic at the public hearing comparing the width of vehicle, bicycle and pedestrian lanes for alternatives 2 and 3, which used different scales for each resulting in a skewed presentation. These actions are quite disappointing and violate both the spirit and the letter of the law.

IV. Conclusion

In light of the violations of NEPA noted above and in the Friends other submissions, the EA must be withdrawn and redone correctly.

Sincerely,

Stephen F. Hinchman

Stephen F. Hinchman, Esq., counsel for
Friends of the Frank J. Wood Bridge

Friends of the Frank J. Wood Bridge

Cheryl Martin April 11, 2018
Assistant Division Administrator
Federal Highway Administration – Maine Division
40 Western Ave
Augusta, ME 04330

David Gardiner
Maine DOT
16 State House Station
Augusta, ME 04333-0016

RE: Comments of EA and Draft 4f

Dear Ms. Martin and Mr. Gardiner,

The Friends of the Frank J. Wood Bridge (Friends) would like to formally submit our questions, comments, and concerns on the Frank J Wood Bridge Environmental Assessment and 4f Draft. We also request that all our comments and supporting documentation be included in the formal record for review by FHWA and it be included with the review that is sent to the National Park Service.

We are deeply concerned that the following issues have not been adequately examined or answered during the Section 106 consultation or the Environmental Assessment (EA).

The elevation of the preferred Alternative 2 (new bridge) has not been made public, including clear renderings of the view from each of the adjoining historic neighborhoods to clearly illustrate the visual impact of the proposed bridge. This includes approach renderings that show just how much higher each new approach will be, particularly the Topsham side where photos of the 1936 flood show the water flowing over the existing roadway. It is not possible to fully assess the visual impact the proposed new bridge would have on the multiple historic resources and districts in the immediate vicinity without clearly defining the bottom and top elevations of the new bridge and providing renderings from all sides. Depending on the outcome, this could adversely impact the eligible Summer Street historic district which is less than fifty feet from recent MDOT core borings for the approach to the proposed new bridge. The Friends have requested answers to questions about the proposed elevation multiple times during the Section 106 consultation but have yet to receive any answers.

The methodology used in arriving at the estimated costs and future costs of the Alternatives considered are also of grave concern to us. The use of service life costs for estimating future costs rather than the industry standard of life cycle costs, the using of worst-case scenarios for rehabilitation and best-case scenarios for the new bridge combined with the rounding up of figures for rehabilitation and down for the new bridge, create a strong appearance of favoring the new bridge alternative.

We also feel that all reasonable alternatives were not adequately studied. There are other rehab options that were not included, and ways to reduce future maintenance and inspection costs that were not considered. The Friends have attached an independent engineering report commissioned and paid for by our group that outlines several different options. Importantly one of which makes the bridge non-fracture-critical. The report was independently peer reviewed by a second engineer with extensive bridge rehabilitation experience who has also outlined several inconsistencies and questionable assumptions in the work by MDOT and TY Lin (attached).

The EA appears to be premature. There are several sections that are not complete, including Section 7 and Section 404. The absence of Section 7 is of grave concern to us because it deals with endangered fish species, of which three are known to travel and spawn beneath the bridge. It is one of the last known places Wild Atlantic Salmon enter the rivers of Maine. The existing fish ladder upstream of the historic bridge is known to not function properly and concerns were raised by NOAA about the proposed new bridge's shadowing effect on the ladder and encroachment on the ability to remedy the issues. The EA does not address this major concern. A negative impact on the already malfunctioning fish ladder (a likely outcome of a new bridge) could add millions or tens of millions to the cost of the bridge and could permanently impact the future of the endangered species in the whole Androscoggin River watershed.

The Friends contend the process has been biased from the beginning. To truly understand the extent of this we submitted a Freedom of Information Request to MDOT for related documents and correspondence. These documents have made the scope and breath of the bias very clear and is supported by attached documents. The list is long. To better lay out the scope and give an understanding to parties reviewing this project at the Federal level, we believe that a timeline of events may be most beneficial to comprehending and have attached the same.

Please see the following attachments:

Timeline of Events
4f Response/Rider
Friends' Independent Engineering Report
Supporting Documentation

We sincerely thank you for your consideration and time. We feel it is not too late to reverse course and chose one of the alternatives that rehabilitates our community's historic landmark bridge and allows it to continue serving its intended purpose for another century or more. Lastly we request that the public comment period be extended till the questions raised are answered, and made available for further comment, in the intended nature of an EA.

Sincerely,

John Graham
President
Friends of the Frank J. Wood Bridge
10 Pleasant Street
Topsham, ME 04086
207-491-1660

Section 4f Rider- Friends of the Frank J Wood Bridge (Friends)[1]

In 2003 Members of MDOT and the State Historic Preservation Officer signed a Historic Bridge Management Plan which stated that it was **"prudent and feasible to preserve the [Frank J. Wood] bridge in its current usage and that it has preservation potential."** (emphasis added)[2]

"…MaineDOT does ***not anticipate adequate*** funding (State and Federal assistance) to maintain the current condition of the bridge network and certainly does ***not anticipate*** funding (State and Federal assistance) to improve overall condition." (emphasis added).[3]

THE QUESTION

Does Section 4f preclude FHWA from approving the destruction of not one but two protected 4f protected properties, (the bridge itself and the Brunswick Topsham Industrial District), in order to reduce the "anticipated" future budget short falls of a State Agency?[4] Future monetary short falls that are out of the Agencies control as they are set by future legislative bodies. Further, speculative judgements are not permissible, as transportation benefits have not been substantiated to outweigh protecting the historic bridge and district.

FRIENDS' CONTENTION

As rehabilitating the bridge is Feasible, Prudent and preserves the bridge and industrial district FHWA, MAY NOT approve another alternative that destroys them.

FHWA may not approve MDOT's request if there is a feasible and prudent alternative to preserve the bridge and the eligible historic industrial district.[5] In determining whether such an alternative exists, FHWA is instructed by law to decide in favor of

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[1] The Friends of the Frank J Wood Bridge(Friends), State of Maine 501c Not for Profit- advocating to preserve the bridge-and a recognized Consulting Party to Section 106

[2] The MDOT employee who wrote the 4f Draft is David Gardiner, a signer of the 2003 Document See attachment 1.

[3] Quoted in Draft 4f from Keeping Our Bridges Safe (KOBS) 2007, updated 2014 Maine MDOT

[4] Maine Department of Transportation(MDOT)

[5] 23 CFR 774.3(a)

preserving the 4f properties[6] and search for alternatives that avoid using them.[7] In addition FHWA is instructed to accept an alternative to preserve the 4f property as long as that alternative does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting the Section 4f property(ies).[8]

An alternative is "feasible" if it can be built as a matter of sound engineering judgement[9]. The fact that MDOT, TY Lin's and the Friends' Engineering Report, all state that the bridge can be rehabilitated without difficulty establishes rehabilitation is feasible. To quote TY Lin's Preliminary Design Report on the bridge: *"Once all of the listed repairs are completed, the structure will meet all current design strength requirements. All repairs would be completed using modern design standards and construction practices to help them last as long as possible"*[10] The question is whether it is prudent.

The regulations list six ways that an alternative may not be "prudent" Only one of these is argued to apply in this case. It is: "it results in additional construction, maintenance, or operational costs of extraordinary magnitude".[11]

According to MDOT's analysis of alternatives, as agreed by the Section 106 Consulting Parties and listed in the Summary of Alternatives,[12] ***all*** the alternatives, including the two rehabilitation alternatives meet the Purpose and Need Statement. Thus, there is no benefit to destroying the 4f properties for transportation, community bicycle or pedestrian needs.

The rehabilitation alternatives are only ruled out by MDOT's method of calculating future costs, not by rehab/construction costs, and not by generally accepted methods of calculating life cycle costs. Using MDOT and Ty Lin's estimates their matrix show:

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[6] "The Federal Registry at column 3/Vol.73, No.49/Wednesday, March 12, 2008/ Rules and Regulations 13391

[7] 23 CFR 774.3(a)

[8] Federal Registry at column 3/Vol. 73 No. 49/Wednesday, March 12, 2008/ Rules and Regulations 13391

[9] 23 CFR 774.17 (Definitions; Feasible and prudent avoidance alternatives (2))

[10] Preliminary Design Report/ Frank J. Wood #2016, STP-2260(300)x WIN 22603.00 MDOT-Bridge Program. August 4, 2017. Page 19.

[11] 23 CFR 774.17 (Definitions; Feasible and prudent avoidance alternatives (3-iv)

[12] Frank J. Wood Bridge/Summary of Alternatives, T.Y. Lin International(TY Lin), March 10, 2017

the preferred Alternative 2 is estimated to cost 13 million dollars[13]. Alternative 3 Rehabilitation is estimated to be 11 Million dollars.

FISH LADDER

The preferred Alternative 2 encroaches into the approach to a fish ladder and increases shadowing as NOAA points out in a letter to MDOT. Brookfield, the owner of the dam and the party responsible for maintaining and replacing the fish ladder, has stated that they will not be responsible for correcting the problem if MDOT moves the bridge to its Alternative 2 location. It is not known to the Friends if the space will even exist to properly fix or replace the fish ladder if Alternative 2 is chosen. This liability has not been fully explored, and no cost for it has been estimated or included in the Alternative 2 estimate. This has the very real potential of adding millions of dollars to the actual cost of Alternative 2.

COST COMPARISONS

The costs associated with Alternative 2 and Alternative 4 are 11 and 13 Million with an additional 4 Million tacked on to both 3 and 4 for a temporary bridge,[14] bringing the totals up to 15 Million and 17 Million. The cost once traffic control is subtracted from the total cost are 2 Million less than Alternative 2 for Alternative 3 and Equal for Alternative 4. Neither of the rehabilitation alternatives rise even close to a reasonable definition of "extraordinary magnitude," one being less expensive.

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[13] Alternative 2's price estimate is for a very basic "low cost" bridge. MDOT has met over a dozen times with la committee of local supporters of the new bridge appointed by the two towns. The Design Advisory Committee (DAC) which has made recommendations that have not been included in the cost of comparable alternatives. The suggestions include widening the bridge and other ad ons that will increase the 13 Million estimate by over a million, shrinking the percentage gap to less than seven percent, compared with rehabilitation, with the temporary bridge included.
The preferred alternative 2 encroaches a fish ladder and increases shadowing as NOAA points out in a letter to MDOT. Brookfield, the party responsible for maintaining and replacing the fish ladder, has stated that they will not be responsible for correcting the problem if MDOT moves the bridge any closer. It is not known if the space will even exist to properly fix or replace the fish ladder if alternative 2 is chosen. This liability has not been fully explored and no cost is associated with it. This has the very real potential of adding millions, if not tens of millions, on to the real cost of Alternative 2. See attachment 2

[14] Initial estimates had no temporary bridge included as there is a bypass bridge less than a mile upstream. The temporary bridge was added in a continued attempt to balloon the cost of rehabilitation. MDOT recently built the Sarah Long Bridge in Kittery which carries Route 1 and has an estimated daily traffic count of 16,000 and did not provide a temporary bridge even though it was shut down for over two years. The towns of Brunswick and Topsham also showed willingness to have a complete shut down early in the planning. See attachment 3.

Therefore, these must be considered prudent. Including the temporary bridge Alternative 3 is less than 15% more expensive then the preferred Alternative 2.[15] The value of preserving the two 4f properties vastly outweighs this increase and does not this meet the mandated description of "extraordinary magnitude." MDOT does not argue or try to make the case that the initial construction or rehabilitation costs outweigh the importance of protecting the 4f properties.

REASONING OUT OF AGENCIES CONTROL

The foundation of MDOT's argument for destroying the 4f properties and choosing Alternative 2 is its claim that future inspections and maintenance costs of maintaining the 4f property are vastly greater for the historic bridge than maintaining a new bridge. No one is arguing that maintaining a historic structure will be less expensive than a new structure. However, if MDOT's argument held water, nearly all 4f properties would be destroyed. MDOT has no control over the size of its budget years from now but is making permanent decisions about historic properties based on guesses about future funding availability.
To assume it will not have enough money is simply speculative. and should be rejected out of hand. As stated in the draft 4f "MaineDOT ***does not anticipate adequate*** funding (State and Federal assistance) to maintain the current condition of the bridge network." "Does not anticipate" is not a sufficient reason to destroy a 4f property, let alone two such properties. The Maine Legislature and the Federal government set future budgets. Furthermore, MDOT has done no research or proven that there are no alternatives to reduce the cost of future inspections as suggested in writing by the Friends[16] during Section 106 and also recommended in the KOBS report. It is fact that future funding is out of MDOT's control. There are strong possibilities that other means of funding future maintenance costs through new legislation may become available. Other states have charged their Turnpike Authorities with the fiscal responsibility of preserving their Historic Bridges.

In addition, the engineering firm (Ty Lin) hired has not shown in its promotional material that it has the experience required to adequately examine all the rehab options that would limit the need for costly future maintenance, including the possibility of an alternative that would make the bridge non-fracture-critical. TY Lin also lacked experience in the Section 106 Process.[17]

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[15] Original TY Lin estimates showed rehabilitating the bridge was the most cost-effective option in November of 2015, estimating an additional 30 years of life for less than 8 million. See attachment 4.

[16] See Attachment 5- Letter from the Friends to FHWA

[17] See Attachment 6.

Most importantly, the maintenance plan and schedule of maintenance used to compute the costs are wildly out of line with MDOT's past maintenance record.[18] The reasoning given to destroy the 4f properties is the assumed cost of future maintenance. If the amount of future maintenance included in the Life Cycle Cost Analysis[19], had been in place for the last 50 years the bridge would not be structure deficient. There is no reason to believe MDOT's projected excellent maintenance of the bridge, however desirable such care would be, is anything by a means to justify demolition of the bridge. Maintenance over the last 50 years shows a more realistic glimpse of what MDOT would do. The fact is that MDOT cannot confirm when the Frank J. Wood Bridge was last fully painted. A work sheet that goes back to 1972 show that it has not been completely painted in 50 years. Yet MDOT would have us believe they will paint it two and half times over the next 50 years. The same with the deck replacement, according to the promised future maintenance cycle the deck should have been replaced in 2012. This represents roughly 36% of the future predicted maintenance costs. It is easy for the responsible agency to rule out preserving a 4f property by claiming a "Cadillac" plan of future maintenance will cost more than its future budgets will allow. The fact remains that the past maintenance records show vastly less money has been spent on the bridge and thus the current conditions of the bridge. A balance needs to be addressed to preserve the 4f property. The agency in charge of the 4f property cannot be allowed to neglect it and then use that neglect as a reason to destroy it.[20]

The majority of the "proof" MDOT relies on comes from Keeping Our Bridges Safe (KOBS), published on November 26, 2007. The much-quoted report that is used to justify the lack of funding, if read independently comes to a drastically different conclusion. It clearly states that preserving bridges is less expensive then replacing them. At the time the decision was made to replace the FJW the bridge was rated in the category of Fair to Good which the report calls for rehabilitation. To quote the conclusion of the report (emphasis added):

> "In summary, there are only two ways to protect public safety over the long term: Repair/replace poor bridges and ***preserve fair bridges before they become poor***, OR continue to close bridges when their condition results in an unacceptable factor of safety. With over 2,000 bridges in fair or poor condition, Maine's economy cannot afford to have the highway network become unconnected, nor can we allow unsafe bridges to stay open. Without ***a balanced, sustainable bridge work plan***, load postings and closures will be the only "safety net" left.

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[18] See- Attachment 7- Maintenance Record Frank J Wood Bridge #2016

[19] Estimated total cost over the service life of bridge-http://www.maine.gov/mdot/env/documents/fjwepr/FJWoodCostsoverServiceLifeMatrix3Alts.pdf

[20] Ibid-Footnote #12

> Recommendations:
> -Increase capital bridge funding by $50 to $60 million per year (from approximately $70 million per year today), to between $120 to $130 million per year
> - Continue reviewing MaineDOT's current bridge-related programming to ensure that bridge safety remains adequately considered.
> - ***Enhance bridge preservation actions to increase average bridge service life.***"

It continues with a list of recommendations titled: Section 8 Summary of Recommendations, in which it further discusses the potential of improved safety and *reduction of costs for future inspections:*

> "9) Monitor and evaluate the research into new technologies and techniques for inspection and evaluation of connectors and fracture critical members and implement them, if appropriate."[21]

The Draft 4f and the Preliminary Design Report (PDR) continually emphasize the high cost of inspections and the need to lease special equipment. This cost is already a part of MDOT's budget and is not disappearing if MDOT no longer inspect the FJWB biannually. The past and current budgets also do not correlate with what the future inspection costs are projected to be. The report further explains in Appendix D: "The Bridge Inspection Program has five full-time and two part-time bridge inspectors, a full-time manager of the underwater dive team, 20 part-time underwater inspectors, and an under-bridge crane to gain access to difficult-to-reach components. The inspection program is managed by a professional engineer."[22]

To take this a step further, the 2018 Budget for Bridge Inspections State-wide is 4.5 million dollars. The report says MDOT is responsible for 2,722 bridges in the State. If half of those get inspected every year the average cost of inspecting a bridge is $3,307. If you just take the 1260 bridges that are older than 50 years and divide half of them (biannually inspected) into the 4.5 million dollars you get $7,258. This does not even count for the other 731 bridges that are newer than 50 years that need to be inspected this year. The future inspection costs quoted in the draft 4f do not even remotely correlate with the actual MDOT bridge inspection budget.[23]

To further stress the point of the practicality of rehabilitation the KOBS report includes two appendices. Appendix E states that it costs half as much per square foot

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[21] Ibid-Footnote #1 KOBS Report 2009

[22] Ibid-Footnote #1 KOBS Report 2009 Appendix D

[23] Maine DOT Work Plan/ Calendar Years 2018-2019-2020-http://maine.gov/mdot/projects/workplan/docs/2018/MaineDOTWork_Plan_2018_2019_2020.pdf

as to preserve a bridge as it does to replace a bridge ($300 vs $600 per square foot). Appendix G lists the maintenance that will keep a bridge in good service condition, all of which apply to the FJW Bridge. MDOT seems to be hand picking information out of the Keep Our Bridges Safe Report and not following its suggestions and conclusions. MDOT fails to follow what the report suggests is actually in its control and instead uses the report as an excuse for why they won't have the funding in the future: funding which is not in their control but up to future Legislatures.

LIFE CYCLE COSTS

As stated on page 24 of the Environmental Assessment, MDOT has used a method known as Service Life Costs for calculating costs for the next 75 years for Alternatives 3 and 4 and 100 years for Alternative 2. This method is not the method mandated by FHWA, known as Life Cycle Costs. The two different methods arrive at radically different results and conclusions. The method used by MDOT is chosen to support its preference for Alternative 2, despite the requirement of FHWA to utilize Life Cycle Cost.

There is a naive assumption that unless an agency has extra cash reserves to invest and therefore experience growth of the reserves, the use of Life Cycle Costs is inapplicable. This is completely inaccurate. Life Cycle Costing has been used by State and federal agencies for over 50 years. Few, if any such agencies have, or are allowed by law to have substantial cash reserves for long term investments. In fact, the underlying assumption is that since the source of future revenues is federal and state taxes, the effects of inflation will increase those tax revenues in the same way that investing a sum of cash reserves would do. Inasmuch, for example, as the principal source for Federal Highway funds is the sales tax on gasoline and other fuels, and inasmuch as the price of fuel generally reflects or even exceeds inflation, the funds available in the future for Highway and bridge construction reflect approximately the same growth as invested funds might.

The Life Cycle Cost method reduces all future costs and revenues to present day dollars so that comparisons between uses and projects may be made on a comparable and consistent basis. MDOT has chosen to use a different system on this project to favor the Alternative 2 it prefers, instead of the method required by FHWA. When the required costing system, Life Cycle Cost, is used the cost differences between alternatives cited by MDOT virtually disappear.

CONCLUSION

The applicable regulations provide that FHWA may approve the use of 4f property only by going through a two step process: finding that there is no feasible and prudent alternative to doing so, and then choosing the alternative that does the least overall harm. In this matter there is a feasible and prudent alternative- both Alternative 3 and 4, and FHWA may not therefore approve the removal of the bridge. If FHWA were to conclude otherwise, the requirement that it approve only the alternative that does the least over all harm would still require it to select one of the alternative(s) that preserves the bridge and the district in its entirety.

Frank J. Wood Bridge Timeline 2015-present (April 2018).

2003
Members **MDOT and the State Historic Preservation Officer concluded in a Historic Bridge Management Plan that it was "prudent and feasible to preserve the [Frank J. Wood] bridge in its current usage and that it has preservation potential."** The report outlines steps that needed to take place in order to maintain the bridge. Several of these steps were subsequently completed while several others were not, leading to its continued deterioration 15 years later. David Gardiner, MDOT's current Environmental Office signed this document. (Attachment 1)[1]

February 25, 2015
MDOT holds a project kick off meeting at Topsham's Library where members of the public attend and express support for preserving the bridge. "As I said, the PDR [Preliminary Design Report], we're thinking we'd have recommendations about fall. At that point DOT will be back with T.Y. Lin and we will present those recommendations in a forum just like this" (page 33 lines 17-21 Joel Kittredge taken from public minutes. page 9, line 14-20 Public Meeting 2/25/2015).

November 15, 2015
Email between Joel Kitteridge and Norman Baker, TY Lin's project lead, in which Baker states that "a 30-year rehab is the most cost effective alternative" and includes a Fatigue Analysis that concludes fatigue is not a concern. (Attachment 1)

March 21, 2016
Bruce Van Note (former MDOT employee and Topsham resident) to Joel Kittredge, email discussing how to suppress public comment and participation. (Attachment 1)

April 20, 2016
John Shattuck (Topsham economic development official) to Kittredge, email "… is a bit odd, as reporter seems to think that the various options are still being actively considered…"

April 21, 2016
Email forwarded from Rich Rodner, Topsham Town Manager, to Ted Talbot, Jeff Folsom and Wayne Frankhauser (all of MDOT) about the recently started Friends of the Frank J Wood Bridge Facebook page, "To correct the record it was started by Penninah Graham not Scott Hanson." This was the beginning of MDOT surveilling the Friends' Facebook page, even assigning an employee the task. The purpose of this was not to be helpful to the group of concerned citizens and try to anticipate their questions and

[1] Attachments are organized by Month(s) and contain pertinent information

concerns, but to actively dispute those concerns and brainstorm ways to discourage the public expressions of pro-rehab opinions.

April 22, 2016
John Shattuck to Joel Kitteridge, email complaining about an email from John Graham asking that the Topsham Historic District Review Committee be named as a 106 Consulting Party.

April 22, 2016
Email between Joel Kittredge and Norman Baker clearly outlining how to present the bridge in the worst possible light and the new bridge in the best. Falsifying both alternatives to meet their objective. (Attachment 1)

Late April, 2016
MDOT held a series of public meetings at which they declared that the decision had been made to build a new bridge, before the Preliminary Design Report draft was completed or historic and environmental reviews begun. Instead of information, analysis, and recommandations, a sales pitch for a new bridge was presented. The slideshow lacked details, real numbers, and was a broad overview of their conclusion. A projected two-year road closure and rusty pictures of the historic bridge were used to rule out the preservation options. Ty Lin publicly raised fatigue concerns that they had concluded were not a concern in an analysis discussed in the November 25, 2015 email cited above. Norm Baker, TY Lin, project manager also falsely stated that the bridge's superstructure was a 4, when in fact at the time it was a 5. FWHA policy calls for rehabilitation of a 5 and replacement of a 4.

Late April, 2016
The April 25, 2016 Public Meeting did not go as MDOT planned. **The majority of the feedback was in favor of rehabilitation,** and there was very little support for the proposed new design, even among those who preferred a new bridge. **The primary support for the new bridge came from a small group of town officials and a former MDOT employee who had been in direct communication with MDOT for months prior to the meetings and were involved in planning the roll out and suppression of any opposing view.**

Late April, 2016
The project's Purpose and Need Statement stated: "Brunswick 22603.00 - Preliminary Engineering for Future Improvement: Frank J. Wood Bridge #2016 on the Brunswick-Topsham town line, carrying Rte 201 over the Androscoggin River." This was sent to tribal leaders and other agencies asking for their input at the start of the Section 106 consultation process.

Late April, 2016
The Bridge is **NOT** functional obsolete and was **NOT** structural deficient at this time while there were 205 other bridges in Maine that were structurally deficient. The Frank J. Wood Bridge had a Federal Sufficiency of 51.4.

Late April, 2016
Friends of the Frank J. Wood Bridge was organized shortly after the last Public Meeting by residents of Topsham and Brunswick who felt rehabilitation has not been seriously considered as an option and believed it should be. Registered as a non-profit organization in the state of Maine, we have continued in our efforts to have rehabilitation seriously considered for nearly two years. Our Facebook page has close to 1200 followers who support rehabilitation of the bridge, nearly all local residents.

May 02,2016
Joel Kittredge to John Shattuck, stating Upper Management of MDOT has approved Kittredge to be point of contact to Towns and asking for list of 15 members of a Design Advisory Committee to propose aesthetic "enhancements" for the proposed new bridge and naming Bruce Van Note (former MDOT employee) as chair. MDOT also asks to review draft resolution language a full month before the towns' governing bodies see it. This is well before either the Brunswick Town Council or Topsham Selectman had been informed of the plan (Attachment 1).

June 2, 2016
Town of Topsham Selectman vote in favor support of the new bridge and for forming a committee to help in its design, based on questionable information from the town's economic development officer, John Shattuck. From Town of Topsham selectmen's meeting Minutes, emphasis added, "John Shattuck noted that MDOT has clearly communicated that it has completed its engineering and safety assessment of the Frank J. Wood Bridge and that it intends to proceed with its recommendation to replace the existing bridge. They have presented renderings of the preliminary bridge design recommendations but have indicated that these design recommendations are not final. *They have informed the Towns of Topsham and Brunswick that it would be helpful for them to work with a joint Design Advisory Committee* (DAC) which would be appointed by both towns and that they (MDOT) would be receptive to input and suggestions from that committee. Brunswick will act on their resolutions at a meeting on June 6." Although MDOT later publicly claimed to have had no role in setting up the DAC, it was presented to the Selectman of Topsham as a request from MDOT. Joel Kittredge was in attendance and did not correct the record. Nine people spoke in favor of rehab and three in favor of the new bridge.

August 2016
In early August Brunswick Council hears comments from both sides and takes no action. Mid August, without notice the DAC committee is submitted to the agenda last minute and passes. All individuals appointed to the DAC were community members supporting a new bridge. The **chair of the committee was a former MDOT employee** and was chosen to chair the committee before the committee was even approved by the towns. MDOT stated in Section 106 Meetings that this committee was not "their" committee and they did not create it, "the towns" did. Documents obtained through a FOIA request show otherwise, as does the language presented in the Town's minutes to each board.

July 11, 2016- 1st of three 106 Meetings- MDOT's consultant laid out the alternatives and their historic consultant described the Area of Potential Effect (APE) she had determined and her initial determinations of eligibility. The Friends pointed out that there was no mention of the existing National Register historic districts beyond the mills on each side of the river and the fact that the bridge links these districts and the mills into a continuous historic context that extends for several miles from one town into the other. The Friends requested that the APE be expanded to include these existing NR districts, as removal of the bridge would likely have an adverse effect on them. MDOT subsequently rejected this request. It was stated by MDOT and FHWA that they intended to use a Categorical Exclusion for dealing with the 4(f) and environmental reviews, which the Friends challenged.

August 3, 2016
MDOT announce latest bridge inspection requires them to Post the bridge for 25 tons and prepares a report that says the deck needs work and outlines a five-year fix estimated at eight hundred thousand dollars.

August 15, 2016
Letter from Friends Attorney Steve Hinchman to FHWA and MDOT outlaying concerns about Alternatives and Categorical Exclusion. (Public Record)

August 17, 2016
Second Section 106 review meeting in Brunswick. Key points from the meeting:

- This meeting saw the attendance of more, and higher ranking, officials from the Maine Department of Transportation (MDOT), as well as the Director of the Maine SHPO.
- MaryAnn Naber, of the Advisory Council on Historic Preservation (ACHP) in Washington, DC, called in and participated in the meeting.
- Representatives from MDOT reported on the recent bridge inspection and 25 ton posting of the bridge the same week.

- The take-away is that the bridge deck needs replacing as already called for in the Rehabilitation Plans.
- MDOT's historic consultant reports that the bridge is part of an eligible historic district including the mills on either side of the river (Cabot/For Andros and Pejepscot/Bowdoin).
- It is possible the loss of the bridge would affect this determination of eligibility.
- The Friends express that it is important that any question of individual eligibility for Cabot Mill be studied and answered prior to a decision being made on possible demolition of the bridge as eligibility for listing on the National Register is a requirement for the use of state and federal historic tax credits for rehabilitation. The Bowdoin/Pejepscot mill is already individually listed on the National Register and would be unaffected for use of historic tax credits by demolition of the bridge.
- Friends pointed out that the proposed industrial district could not include the hydroelectric dam as the existing structure was built in 1980. The district was therefore, three parts, two mills with the bridge being the sole connector. Making the adverse effect greater if the bridge is removed.

It is notable that in this meeting and in the press release and public statements from MDOT related to the posting of the bridge, they are no longer stating that MDOT is recommending a new bridge be built and are being careful to state that no decision has been made. They are now saying that a decision won't be made until 2018, when all of the reviews are completed, and all of the alternatives have been considered. MDOT Bridge Engineers publicly state it is feasible to replace the Frank J. Wood Bridge's deck and add 75 more years of life to bridge.

August 17, 2016

After the Section 106 meeting, Cheryl Martin (FHWA), verbally tells several members of Friends it is "premature" for MDOT to participate in DAC. A statement from MDOT's attorney clearly says MDOT had no involvement in the DAC formation, but emails obtained through a Freedom of Information request show the contrary. A "Federal definitions to Final Design and Preliminary Design" also obtained from the Freedom of Information Request shows a copy highlighted by MDOT, in which it states that FHWA has the power to say certain activities should not proceed until the NEPA is complete. Of the six reasons given to not proceed, five of them directly relate to the DAC formation and attendance. For the record, these meetings where widely reported on with photos showing both MDOT and representatives of TY Lin in attendance. Over the following year, MDOT staff and their consulting engineer from TY Lin attended all meetings of the DAC and provided numerous renderings of possible bridge "enhancements" considered by the committee and other materials. Clearly, thousands of dollars and countless hours where was spent by MDOT in support of this effort to focus public attention on a new bridge long before the required historic and environmental reviews were completed, or even started in most cases.

September 1, 2016
Friends Receive Response from MDOT to Attorney Steve Hinchman's August 3rd, letter (Attachment 1). Note- see May 2, 2015 emails showing MDOT **did** participate in the DAC formation in direct contrast to letter claiming they did not.

October 27, 2016
Third 106 Consulting Meeting. In the November 2016 meeting MDOT introduced the revised Purpose and Need Statement. The revised statement was drafted in an unsuccessful attempt to disqualify one or both of the rehabilitation alternatives. In the end all alternatives were deemed to meet the Purpose and Need. Even so, in the PDR and EA MDOT tried to characterize the rehab alternatives as "partially meets" but Federal Highway ruled that all the alternatives met the requirements. No evidence has been provided to show otherwise. Repeated requests for a proper pedestrian study were made by the Friends. None has been undertaken. The latest numbers MDOT has are from 2006, where in a 12-hour period on a sunny June day 197 people crossed Cabot Street, the nearest side street to the bridge. The Fort Andros (Cabot) Mill complex, which contains professional offices, retail stores, a flea market, artist studios, and several restaurants is between Cabot Street and the bridge. There is no documentation for how many people were walking to or from the Mill Building and not to or from the bridge (Appendix 1).

November 2016
Repairs done to deck to gain five more years of posted life. The cost came in at just under $200,000 compared to the quoted $800,000, or 25% of MDOT's estimate.

November 23, 2016
The Friends and John Graham, as an individual, submit comments and concerns to the Determination of Effects. (See EA Appendix 6)

December 05, 2016
Email from Mary Ann Naber (ACHP) to Cassie Chase(FHWA) outlining concerns with the 106 Process and the lack of a qualified engineer's report to look into rehabilitation options and true costs.

January 20, 2017
Meeting Minutes with Brookfield/FERC concerns. "Brookfield [owner of adjacent hydro-electric dam] will not assume the high risk level ($$$) associated with having to do future improvements to fishway as a result of our bridge…"

February 2017
MDOT submitted their Findings of Effect Report to SHPO seeking concurrence on their determinations of eligibility and conclusions about adverse effects. The report included fourteen letters in support of replacement and **omitted nearly 150 letters they had received in support of rehabilitation**. These letters were only entered into the record because the Friends had copies and submitted them to SHPO with their comments on the report, along with 180 signatures on a petition circulated locally in support of rehabilitation.

February 23, 2017
Bernard Lown Peace Bridge, Lewiston- Kick off meeting and power point. Please note this bridge had the same Federal Efficiency rating as the FJW did at time of kick off, but is treated drastically different, with renderings of the bridge rehabilitated and no scare tactics about its fracture critical nature, even though the bridge had a severe failing. Also attached is the Final PDR for this bridge. The initial 30-year costs that favor rehabilitating this bridge where very similar to the conclusions made by TY Lin initially on the FJW. See November 15th 2015 above. Rehabilitation work started on this bridge March 2018!

February 27, 2017
The Friends submit their comments to SHPO and identified numerous errors and omissions regarding historical fact in MDOT's report and challenged several of the conclusions. SHPO subsequently required MDOT to do additional research and revise their report to address concerns raised by the Friends.

March 03, 2017
MATRIX OF ALTERNATIVES INVESTIGATED. Note all alternatives meet Purpose and Need Statement.

March 29, 2017
Maine Historic Preservation Commission (SHPO) issues letter of Concurrence, finding an eligible industrial historic district that includes the bridge and two mill complexes as contributing resources and an eligible residential historic district along Summer Street in Topsham (the Findings of Effect were revised in January 2018, when the bridge was determined to be individually eligible).

April 5, 2017
Public "Open House" on project hosted by FHWA at which MDOT outlines alternatives but does not allow the Public to speak or correct many of the misconceptions from previous misstatements that remain in the public's mind as fact. Clear bias was again shown in the powerpoint presentation by presenting the worst case for the existing bridge and the best case for a replacement. The public was shown gloomy pictures of

Maine Department of Transportation	**BRIDGE # 2016, FRANK J. WOOD (ANDROSCOG)**
Historic Bridge Management Plan	**BRUNSWICK**
12/1/2003	**Section I A - B**

I. GENERAL INFORMATION

A. LOCATION/IDENTIFICATION

Bridge Number: 2016 Bridge Name: FRANK J. WOOD (ANDROSCOG)

Town: BRUNSWICK County: CUMBERLAND Division: ROCKLAND

Feature Carried/Feature Under: US 201 OVER ANDROSCOGGIN RIVER

Owner: MDOT Custodian: MDOT

Co-Owner: NOT APPLICABLE Co-Custodian: NOT APPLICABLE

B. STRUCTURAL INFORMATION

Main Span Type: THRU TRUSS Design: WARREN

Year Built: 1932 Years Altered/Rebuilt:

Total Number of Spans: 3 Overall Length: 815 ft (248.4 m)

Total of Type in Pre-1956 State Population: 44 Total Eligible: 22

Description of Superstructure:

3 span, 815'-long, riveted, Warren with verticals thru truss bridge with two, 310'-long spans and one, 175'-long span on the north end. Polygonal upper chords. Diagonals are rolled section. Concrete-filled steel grid deck. Cantilevered sidewalk on west side.

Description of Substructure:

Concrete abutments and piers. South abutment incorporates portions of the stone abutment from previous bridge.

Maine Department of Transportation
Historic Bridge Management Plan
12/1/2003

BRIDGE # 2016, FRANK J. WOOD (ANDROSCOG)
BRUNSWICK
Section I C - F

C. CLASSIFICATION OF SERVICE

Type Service on Bridge: Highway - pedestrian   Open, Posted, or Closed: Open

On National Highway System: On

Roadway Functional Classification: Other Principal Arterial

Number of Lanes On: 2   Direction of Traffic: 2 way traffic

ADT: 19140   % Truck: 4.0   Date ADT: 2000

D. GEOMETRIC INFORMATION

Bridge Roadway Width (c to c): 30 ft (9.1 m)   Approach Travelway Width: 30 ft (9.1 m)

Approach Roadway Shoulder Width Left: 0 ft (m)

Approach Roadway Shoulder Width Right: 0 ft (m)

Is Bridge Roadway as Wide or Wider Than Approaches?
Bridge roadway is as wide as approach roadway.

Sidewalk Width Left: 5 ft (1.5 m)   Sidewalk Width Right: 0.7 ft (0.2 m)

Vertical Clearance on Bridge: 15 ft. 8 in.   Approach Alignment: Equal to present desirable criteria.

Crash Data:
Two accidents reported for 1999-2001 period. One was due to stopped traffic on the bridge; other is not attributable to any bridge characteristic.

For Underpasses Only:

Number of Lanes Under: Total Horizontal Clearance: ft.

ADT Under: Vertical Clearance Under: 15 ft. 8 in.

E. SAFETY FEATURES

Bridge Railing: 2 rail high steel channel & angle railings inside trusses. Metal pile with bar fill at sidewalk.

Transition Railing: Acceptable transition railing is provided.

Approach Guide Rail: Acceptable metal beam rail is provided.

F. HYDRAULICS

Waterway Adequacy: Bridge deck and roadway approaches are above flood water elevations. (High water)

Scour Critical: Fndtn stable- not calcul scour cond.

Channel Condition: Good.

Maine Department of Transportation
Historic Bridge Management Plan
12/1/2003

BRIDGE # 2016, FRANK J. WOOD (ANDROSCOG)
BRUNSWICK
Section I G, Section II and Section III

G. TINIS SUFFICIENCY and LOAD RATING

Date of TINIS Report: JUNE 2002 Sufficiency Rating: 44.5

Structural Evaluation: 4 (Meets Minimum Tolerable Limit)

Superstructure Condition: 6 (Satisfactory) Deck Condition: 6 (Satisfactory)

Substructure Condition: 4 (Poor)

Load Rating: Type: HS loading Inventory: 24 T (HS) Operating: 40 T (HS)

Summary of Structural Deficiencies:

-South abutment significant spalling around east bearing.
-Spalling at pier bridge seats.
-Section loss of floorbeam webs.
-Spalling of sidewalk concrete.
-Deterioration of deck concrete at fascia.
-Sidewalk rail failed.

Reasons for Low Sufficiency Rating:

-Poor substructure condition.
-Inventory rating is not adequate.
-According to federal guidelines, ADT considered high for roadway width.
-Deck geometry and structural evaluation appraised at 4, meeting minimum tolerable limit.

II. CONFORMANCE WITH STANDARDS

	Actual	Required	Adequate (Y/N)
Load Rating (Inventory)	24 T (HS)	36 T (HS) (1)	No
Bridge Roadway Width	30 ft	30 ft (2)	Yes
Number of Lanes	2	2	Yes
Alignment/Sight Distance	-	-	Yes
Geometric Adequacy	-	-	Yes

Conformance Comments:

(1) The bridge carries a US route, HS 20 36 ton inventory rating is required.
(2) According to AASHTO, "A Policy on Geometric Design of Highways and Streets, 2001," p.485, the bridge roadway should equal the curb to curb width of the approach roadway.

III. PROJECT PLANNING

Is Bridge in 6 Yr. Work Plan?: Yes BTIP Candidate: No

Year of Plan: 2002-03 Project #: 19977 P.I. Number:

Plan Comments:

IV. HISTORICAL SIGNIFICANCE

Total of Type in Pre-1956 State Population: 44   Total Eligible: 22

Historical Rank: Average

Summary of Significance:

The 1932, riveted, Warren thru truss is not individually significant. It is a later example of a common bridge type, and it has no innovative or distinctive details. It is, however, located in a National Register-eligible textile mill historic district in Brunswick-Topsham. Since the bridge is located within the historic district, was built within its period of significance, and is complete, it is a contributing resource to the industrial historic district. The bridge carried a street railway at one time.

The bridge is judged to have average preservation priority because an example of a common bridge type and is located in a non-transportation related historic district.

Proximity to Identified Cultural Resources:

Historic Sites:	Located completely within NR-eligible historic district.
Archaeological Resources:	None known.
Other 4(f) Resources:	None known.

Maine Department of Transportation **Historic Bridge Management Plan**	**BRIDGE # 2016, FRANK J. WOOD (ANDROSCOG)** **BRUNSWICK**
12/1/2003	**Section V and Section VI**

V. SUMMARY OF PRESERVATION POTENTIAL

Is it prudent and feasible to preserve bridge for its current usage? Yes

Does the bridge have any preservation potential, including alternate use? Yes

Summary of Preservation Potential:

According to current guidelines and available information, the bridge is adequate in superstructure condition (2003 inspection), roadway width, vertical clearance, sight lines, and approach alignments. The bridge is not adequate in substructure condition and load capacity. The substructure condition is rated poor (4), and a poor rating may require further study to determine if there are prudent options to strengthen the bridge. The substructure has areas of significant deterioration including large spalls, scaling and cracking below the truss bearings at north abutment and north pier. MDOT rates the bridge at 24 tons inventory rating for HS truck loading and 36 ton HS20 is required. The rating calculations show that the flooring system members control the rating and that all truss members are adequate for HS20 loading. A structural analysis utilizing modern techniques is necessary to accurately assess the inventory load rating. The results of the analysis will determine the extent of member strengthening or replacement that will be required.

Since it is the flooring system that is controlling the lower-than-desired inventory load capacity, the rating can be increased to the desired level using conventional methods such as member replacement or reinforcement and/or dead load reduction. The information available in the bridge inspection reports may not fully represent the ability of the substructure to be repaired. Unless there is additional information that indicates the concrete inside the substructure units is in a state of advanced deterioration, it is anticipated that the substructure can be repaired using standard techniques. That work will not have an adverse effect on the bridge. Because the deficiencies can be addressed without an adverse effect, the average preservation priority bridge is determined to have preservation potential. It is feasible and prudent to rehabilitate it for its current usage.

No build:	This option will not address the deteriorated substructure or the low inventory rating. It is not prudent.
Rehab without adverse effect:	It appears that the deficient load capacity and substructure condition can be improved using conventional methods without adversely affecting the bridge. This option is prudent and feasible. One significant drawback, however, is that repairs/replacement of floor system members cannot be done under live load. Therefore the bridge will have to be closed to traffic while the work is done. Based on the high ADT, it is unlikely that the bridge can be closed for a long duration. Managing traffic and the limitation of working on the bridge without live load may add substantially to the cost of the rehabilitation.
Bypass/historic bridge left in place:	There is development at the quadrants, and the bridge is a contributor to a NR eligible historic district. A parallel bridge is not prudent. A new crossing beyond the historic district could be considered. It is not possible to determine a location for a new bridge without a complete traffic study of the area. This bridge could be left in place.
Other:	Relocation of the existing bridge as three single spans or in other arrangements could be considered for this bridge. The roadway width provided may prove to be a good solution for local road bridges in other areas. Generally the cost of relocating a large truss is costly. Additionally, its removal from the historic district will have an adverse effect on the district. This is not a prudent option.

VI. PRESERVATION RECOMMENDATION

-Consider structural analysis to determine HS20 inventory load rating.
-Repair bridge seats at piers and abutments.
-Repair other areas of substructure concrete deterioration.
-Repair sidewalk concrete.
-Repair deck concrete at fascias.

-Repair bridge rail.
-Paint steel as necessary.

Committee Recommendation:

The committee determined that it is prudent and feasible to preserve the bridge for its current usage and that it has preservation potential.

Date/Committee:

8/26/2003 – David Gardner, Rhonda Poirier, James Tukey, P.E., Everett Barnard, P.E., Maine DOT; Kirk Mohney, MHPC.

FEDOCS —

PDF TO JOEL —

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

JUN - 2 2017

Joel Kittredge
Maine Department of Transportation
Bridge Program
16 State House Station
Augusta, ME 04333

WIN 22603.00

Re: NOAA Fisheries' comments on the analysis of alternatives for the proposed Frank J. Wood Bridge project.

Dear Mr. Kitteredge:

On Wednesday, April 5, you held a public meeting in Brunswick, Maine regarding alternatives for improvements being considered to the Frank J. Wood Bridge that spans the Androscoggin River on the Brunswick-Topsham town line in Maine.

In your March 10, 2017, analysis of alternatives, you identified five potential alternatives as follows:

1. A new 800 ft. bridge on the existing alignment;
2. A new 835 ft. bridge on a curved alignment upstream of the existing bridge;
3. Rehabilitation of the existing bridge;
4. Rehabilitation of the existing bridge, including the addition of a sidewalk; and,
5. A new 800ft bridge on a parallel alignment downstream of the existing bridge.

The summary of alternatives document dismissed alternatives 5 due to water rise/flood concerns.

A number of federally-listed species occur in the Androscoggin River near the bridge site. This includes the endangered Gulf of Maine distinct population segment (DPS) of Atlantic salmon, endangered shortnose sturgeon, and the Gulf of Maine DPS of Atlantic sturgeon. Additionally, the project area is designated as critical habitat for Atlantic salmon. This portion of the river is also used for spawning and rearing of shortnose and Atlantic sturgeon. On June 3, 2016, the main stem of the Androscoggin River from the Brunswick Dam downstream approximately 10 kilometers to where the river discharges to Merrymeeting Bay was proposed for designation as critical habitat for Atlantic sturgeon (81 FR 35701). The final rule is expected in July 2017. More information on these species can be found on our webpage (https://www.greateratlantic.fisheries.noaa.gov/protected/index.html).

The existing Frank J. Wood Bridge is located immediately downstream of Brookfield White Pine Hydro, LLC's Brunswick Hydroelectric Project (FERC License No. P-2284). Upstream fish passage at the Brunswick Hydroelectric Project is provided via a vertical slot fishway, located adjacent to the project powerhouse on river left, looking upstream. On December 13, 2013, after

formal ESA consultation with us, the Federal Energy Regulatory Commission amended the license for the Brunswick Hydroelectric Project to include an Interim Species Protection Plan (ISPP). The ISPP included conditions that require Brookfield to study and adaptively manage up- and downstream passage at the Brunswick Project, in consultation with us, to protect migrating Atlantic salmon.

We expect that a consultation, pursuant to section 7 of the ESA, will be required given that any of the proposed alternatives may affect ESA listed species and designated critical habitat. More information on the section 7 process can be found at https://www.greateratlantic.fisheries.noaa.gov/protected/section7/index.html.

Based on the currently available information, we highlight the following issues for your consideration as you determine the preferred alternative:

1. Alternatives 1, 2, and 5, would involve construction of a new bridge. The effects of bridge design considerations, including, but not limited to, effects on shade, sound, and to river hydraulics due to pier design, placement, and orientation, could negatively impact the functionality of the existing fishway at the Brunswick Dam.

2. We understand that at this stage, the design renderings for each of the alternatives are preliminary. However, the preliminary design for alternative 2, included in your *Summary of Alternatives* (a curved alignment upstream of the existing bridge) would have bridge project structures, such as piers, within closer proximity to the Brunswick Dam, including the existing fishway, than the other alternatives under consideration. As such, the potential impacts upon the function of the existing fishway would likely be more significant. Furthermore, the design and placement of bridge piers under this alternative could significantly restrict future options for infrastructural improvements to enhance fish passage at the Brunswick Project for endangered salmon and other diadromous species, should information gathered under the ISPP indicate such improvements are necessary.

3. Because the proposed bridge replacement and rehabilitation alternatives involve in-water work, we are concerned about the effects of driving piles, adding fill, vessel traffic, and elevated turbidity for the new bridge, as well as the effects of the old bridge demolition, on listed species in the river. Whereas Atlantic salmon primarily use the lower Androscoggin for migration, Atlantic sturgeon and shortnose sturgeon have been documented spawning over the hard bottom- rubble substrate directly downstream of the dam. The consideration of alternatives should take into account potential temporary and permanent impacts to these species and their habitats.

4. We are also concerned about the duration of the project and its potential impact to the behaviors of listed species. Atlantic salmon migrate upstream though the project area in May, June, and July. Shortnose sturgeon spawn in the project area in April and June, and Atlantic sturgeon spawn in the same area in June and July. While Atlantic salmon and both anticipated sturgeon species are iteroparous, sturgeon are a long lived species that do not spawn annually and the loss of a spawning cohort can be highly detrimental to the species recovery and survival. Any aborted migration or deferred spawning by Atlantic

salmon has a deleterious effect on the species ability to develop into a self-sustaining population.

Essential Fish Habitat and Fish and Wildlife Coordination Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act (FWCA) requires federal agencies to consult with one another on projects such as this. Insofar as a project involves Essential Fish Habitat (EFH), as this project does, this process is guided by the requirements of our EFH regulation at 50 CFR 600.920, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure.

The Androscoggin River and the Merrymeeting Bay are identified as EFH for Atlantic salmon. In addition to the federally-listed species discussed above, the area supports a number of other diadromous species including alewife, blueback herring, rainbow smelt, American shad, sea lamprey, American eel, and striped bass, and the Habitat Conservation Division consults under the Fish and Wildlife Coordination Act for these species. Many of these species are reported to pass through the fishway of the dam to reach upstream spawning or juvenile development habitat. In addition, some of these species serve as prey for federally-managed species, and are therefore considered a component of EFH. Lastly, a number of federally-managed species occur within the tidal waters downstream of the dam and may occur within the proximity of the proposed project, including winter flounder and windowpane flounder, bluefish, Atlantic mackerel, red hake, and white hake.

An EFH assessment that includes the effects of the various bridge alternatives being considered should be prepared for the proposed project, including evaluations of any temporary and permanent fish habitat impacts, especially potential alteration to habitats effecting migration for diadromous fish. In addition, the assessment should address adverse effects to fish species from underwater noise, turbidity, and other construction activities, as well as potential bridge shading and demolition activities.

Thank you for the opportunity to comment on the proposed alternatives; we look forward to continuing to work with you as the project moves forward. If you have any questions or need additional information regarding the Endangered Species Act, please contact Matt Buhyoff (Matt.Buhyoff@noaa.gov) at 207-866-4238 or Max Tritt (Max.Tritt@noaa.gov) at 207-866-3756. For questions or information regarding EFH or Fish and Wildlife Coordination Act consultations, please contact Michael Johnson (mike.r.johnson@noaa.gov) at 978-281-9130.

Sincerely,

Mark Murray-Brown

Mark Murray-Brown
Section 7 Coordinator
for Protected Resources

H:\Section 7 Team\Section 7\Non-Fisheries\FHWA_State DOTs\TA Letters\FHWA\Brunswick Bridge

CC: MTritt, MBuhyoff, ZJyllka, MJohnson

FJW/BROOKFIELD DISCUSSION 1-20-17

Meeting Minutes

- Brookfield / FERC concerns and issues
  - Facility relicensing coming up----starts in 2019---5 year process.
    - 5 year process does not fit with the condition of the existing structure's need for replacement by 2020+/-.
    - Will the facility even be relicensed?
  - Outside of fishway discussion, proposed replacement project will result in a simple filing of change of use within Brookfield's project boundaries.
  - Little concern with FERC – will not need separate NEPA
    - Send PDR or engineers document to Brookfiled/FERC when permitting is close to complete.
    - Looks like little impact. No need for separately appointed consultant review.
    - 90 days FERC approval from time of PDR submission?
  - Fishway concerns
    - Determine if the "performance" suffers. Performance applies to the effect on fish behavioral aspects----as-is existing vs. proposed.
    - How to address? How has this been done at other locations? Kristen to work with Brookfield and agencies to come up with testing regimen.
    - Section 7 will dictate further evaluation of performance.
    - If performance suffers, how to address? There is a lack of real estate to make improvements. Could result in a multi-million dollar fix. Who pays and who is liable?
    - Attaining or maintaining fishway performance will be a business decision. Brookfield will not assume the high risk level ($$$) associated with having to do future improvements to the fishway as a result of our bridge installation affecting performance.
    - Is it possible to do a lift by the powerhouse?
    - Where exactly is the concrete wall/patch that was cast in the vicinity of proposed pier #3. This was cast to push the fish toward the fishway? Need to locate. Action Item---Joel/Chris to forward pictures.
    - Will need to know what the temporary trestles look like and sit for Section 7.
    - "Flicker" (light, strobe), light/dark concerns for fish in the turning pool, and long term "vibrations and noise" are a concern for all species. How to model the sun? Need analysis to prove future condition is equal to or less than today's baseline.
    - Will joint noise at abutment #1 be an issue for the fish? Why not measure similar joint noise?

From:	Mike R Johnson - NOAA Federal
To:	Chamberlain, Kristen
Cc:	Ham, Eric; Boyden, Sarah; max.tritt@noaa.gov; matt.buhyoff@noaa.gov; dan.tierney@noaa.gov; donald.dow@noaa.gov; Maloney, Kelly; zachary.jylkka@noaa.gov; Richter, Robert; Gardner, David; Kittredge, Joel; Norman Baker; martin, cheryl; cassandra.chase@dot.gov; Frankhauser Jr, Wayne
Subject:	Re: FJW Fishway Follow-Up
Date:	Tuesday, August 01, 2017 2:24:22 PM

Kristen,

During the conference call yesterday ME DOT presented several alternative bridge alignments north of the existing bridge. Perhaps this was discussed during the first few minutes of the meeting while I was trying to call in, but I'm wondering about the bridge alignment alternatives south of the existing bridge and why they have been rejected. I recall during a site meeting last year that a southern alignment was a consideration. From a fishery perspective, all the alignments north of the existing bridge increase the potential adverse affects to species migrating through the fish ladder, and alignments south of the existing bridge would appear to reduce those impacts. As part of the EFH assessment, please include those other bridge alternatives not included in yesterday's conference call, as well as a discussion about why they have been rejected for further consideration.

Thanks,

Mike

On Wed, Jul 19, 2017 at 2:53 PM, Chamberlain, Kristen <Kristen.Chamberlain@maine.gov> wrote:

Hi-

I hope you are all are having a great summer! Since we met at the beginning of June regarding potential impacts from the Frank J. Wood Bridge project, you likely heard that MaineDOT/FHWA have formally announced that the preferred alternative is replacement on the upstream alignment and that we are preparing an Environmental Assessment (EA). At the same time, we are preparing to initiate consultation with NMFS on the preferred alternative. The interaction between the bridge project, Endangered Species, EFH, and impacts to Brookfield and the fishway are important pieces of the EA and MaineDOT's decision making process.

MaineDOT and TYLIN have done some follow up on a couple of items raised at the June 1st meeting. TYLIN has evaluated some alternative span arrangements for the upstream alternative that we would like to share and get feedback from both Brookfield and NMFS. TYLIN has also refined the shadow analysis to consider the internal shadow effect of the fish way itself. I'll be sending some material to review shortly, but at this time I'd like to try to schedule a phone call/meeting to explain where we are at and hear your thoughts.

Could you please indicate your availability in the Doodle Poll at this link:

https://doodle.com/poll/8rrwae2in8ua3pty

Thank you!

Kristen Chamberlain
Bridge, Multi Modal and Traffic Team Leader
Environmental Office
Maine Department of Transportation
(207) 557-5089

To: Norman Baker <norman.baker@tylin.com>
Subject: PHASE 2---FJW

Norm:

Please submit a draft proposal for Phase 2 scope/tasks with spreadsheet, but no hours or fee, for our favorite project.

Please anticipate a November and December 2018, PS&E and ADV, respectively, allowing time for Brookfield to shake-out. But, please plan for flexibility to accelerate to a June 2018 PS&E if the Brookfield obstacle(s) are *easily* surmounted.

Thanks---Joel

(207) 624-3101 Fax

--
Michael R. Johnson
U.S. Department of Commerce
NOAA Fisheries
Greater Atlantic Regional Fisheries Office
(formerly, Northeast Regional Office)
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YouTube	www.youtube.com/usnoaafisheriesgov

From: John Shattuck
To: Kittredge, Joel
Cc: Soucie, Timothy; Norman Baker; Folsom, Jeff; Frankhauser Jr, Wayne
Subject: Re: TOPSHAM-BRUNSWICK FRANK J WOOD BRIDGE 22603.00 TRAFFIC CONTROL
Date: Friday, March 06, 2015 12:00:42 PM

JOEL: Thanks - I'll look forward to talking with you and your team when you think it would be productive. In the meantime, I'm already working with my municipal colleagues in Brunswick to build a consensus in support of closure - no doubt there will be challenges but, so far, we're optimistic. John

On Fri, Mar 6, 2015 at 8:32 AM, Kittredge, Joel <Joel.C.Kittredge@maine.gov> wrote:

> **John:**
>
> **Thanks for your meeting follow-up and suggestion. A number of people on the Topsham side have also expressed willingness to consider the closure approach and that is a good sign. As we advance further into design we will have adequate information to evaluate all options including closure. We certainly will be reaching out to the municipalities and stakeholders for further discussion as we move toward the selected course of action for the structure and traffic control.**
>
> **Thanks again for your interest in this complex project and we look forward to working with you.**
>
> **Joel**
>
> **207-624-3550**
>
> **From:** John Shattuck [mailto:shattuck.office@gmail.com]
> **Sent:** Thursday, March 05, 2015 1:04 PM
> **To:** Kittredge, Joel
> **Subject:** Wood Bridge project
>
> JOEL: This will follow up on our brief conversation after your well-received Wood Bridge presentation in Topsham last WED 02-25. When your schedule permits, I'd be grateful for an opportunity to talk with you in more detail about the project - specifically, to explore the possibility of local support for a closure to enable a quicker, less expensive and higher quality outcome for the project. Thanks, John

--

John Shattuck
Director, Economic & Community Development
Town of Topsham
Certified Business Friendly Community
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Office: (207) 373-5097
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Topsham because: http://youtu.be/Y_luU6wJMOU

Per 1 MRSA § 402(3), correspondence to/from municipal officers/officials (with limited exceptions) is a public record and available for review by any interested party.

--

John Shattuck
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Per 1 MRSA § 402(3), correspondence to/from municipal officers/officials (with limited exceptions) is a public record and available for review by any interested party.

Brunswick-Topsham, F.J. Wood Bridge
JN: 411813.00

By: RMH
Date: 11/13/2015
Check:
Date:

Life Cycle Cost Analysis

Assumptions:

Replacement Bridge Design Life = L =	75 years			
Discount Rate = D =	4 %			
Remaining Useful Life of Existing Bridge = RL =	**20 years**	**26 years**	**30 years**	**38 years**
Annual Inspection Cost for Existing Truss Bridge = TI =	$ 60,000			
Annual Inspection Cost for Replacement Bridge = RI =	$ 600			
Annual Maintenance Cost for Existing Truss Bridge (Fatigue Repairs) = TM =	$ 30,000			

Estimated Construction Cost of Alternates:

Bridge Rehabilitation Construction Cost (Alt 3) = R3 =	$ 7,700,000
Bridge Rehabilitation Construction Cost (Alt 4) = R4 =	$ 9,630,000
Low Cost Bridge Replacement Construction Cost (Alt 2) = R2 =	$ 12,990,000

Differential Present Values:

Deferred Bridge Replacement Cost = $R2/(1+D/100)^{RL}$ = DBC =	$ 5,928,000	$ 4,685,000	$ 4,005,000	$ 2,926,000
Residual Value of Replacement Bridge at Year 75 = $R2*(RL/L)/(1+D/100)^{L}$ = RVR =	$ 183,000	$ 238,000	$ 274,000	$ 347,000
Differential Bridge Inspection Cost = $(TI-RI)*RL/(1+D/100)^{RL}$ = DBI =	$ 542,000	$ 557,000	$ 549,000	$ 509,000
Differential Bridge Maintenance Cost = $TM*RL/(1+D/100)^{RL}$ = DBM =	$ 274,000	$ 281,000	$ 277,000	$ 257,000

Bridge Rehabilitation (Alt 3) Net Present Value in Comparison to Low Cost Alternate 3:

Net Present Value of Bridge Rehabilitation = R3+DBC-RVR+DBI+DBM =	**$ 14,260,000**	**$ 12,990,000**	**$ 12,260,000**	**$ 11,050,000**

Bridge Rehabilitation (Alt 4) Net Present Value in Comparison to Low Cost Alternate 3:

Net Present Value of Bridge Rehabilitation = R4+DBC-RVR+DBI+DBM =	**$ 16,190,000**	**$ 14,920,000**	**$ 14,190,000**	**$ 12,980,000**

TYLININTERNATIONAL
engineers | planners | scientists

To: Joel Kittredge, MaineDOT
From: Rick Hebert

Date: November 13, 2015

Address:
CC: File

Re: Brunswick-Topsham, WIN # 022603.00, F.J. Wood Bridge – Progress Fatigue Evaluation

---

MEMORANDUM

Background Information:
The F.J. Wood Bridge is a three span 812 ft. steel truss bridge that carries U.S. Route 201 / SR 24 over the Androscoggin River between the towns of Brunswick and Topsham. The superstructure consists of six uniquely designed and detailed overhead trusses. The upstream side trusses carry a cantilevered sidewalk in addition to the roadway. The pier and truss supports between Spans 1 and 2 (southerly most spans) is skewed 15 degrees. The Span 1 and 2 trusses vary in span length between 305.5' and 316.5'. Span 3 trusses span 176 ft. The existing truss bridge was constructed in 1931. Major bridge rehabilitation efforts were completed in 2006 and 2015. The 2006 bridge rehabilitation included new bridge rails, sidewalk concrete, wearing surface, and repairs to bridge joints and substructures. The 2015 rehabilitation included new bridge joints. The existing configuration of the deck of the truss varies from the original 1931 design plans. The 1931 plans show a variable depth bare concrete deck with an accommodation for rail traffic in the center of the bridge. The existing bridge structural deck configuration consists of concrete filled steel bridge deck supported on shallow (6" deep) transverse steel I-beams spaced on 2 ft. centers welded to the top of the truss floor framing stringers. The date of the installation of the existing bridge deck system or any deck modifications is unknown.

A detailed routine and fracture critical inspection was recently completed in 2013. The Bridge Inspection Report provides and documents the condition of the major bridge components (deck, trusses, bearings, piers, abutments, etc.) and also identified several welded fatigue sensitive details (FSD) in fracture critical members (FCMs). The following truss elements were documented to be FCMs:

- Truss diagonals and verticals subject to tension (11 of 19 members in each Span 1 and Span 2 truss and 8 of 15 members in each Span 3 truss).
- Bottom chord of the trusses (10 members in each Span 1 and Span 2 truss and 8 members in each Span 3 truss).
- Transverse floor beams (11 members in each Span 1 and Span 2 truss and 9 members in each Span 3 truss).

A summary of the inspection reported FSD-FCMs are as follows:

- Plates welded to truss diagonals and verticals at the sidewalk level
- End floor beams with welded partial depth or full depth stiffeners

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- Sidewalk cantilever bracket welded full height to truss bottom chord/end diagonal connection gusset plate at Span 1 node L0.

In addition to these welded FSD-FCMs, the clip angle connections of the floor beams to the truss and the truss gusset plate connections are a non-welded FSD-FCM. It is not uncommon for clip angles to crack and require replacement in bridges of this age.

The original scope of services to be provided by T.Y. Lin International (TYLI) for the development of the preliminary design and Preliminary Design Report for the F.J. Wood Bridge includes investigation of rehabilitation and replacement alternatives. A detailed engineering evaluation of the FSD-FCMs was not included in the original scope of services to be provided by TYLI as mutually agreed upon with the MaineDOT due to the significant engineering effort required. The need for these added services would be determined as the project was further developed and as the direction of the project became better defined.

Based on the development of replacement alternatives and a review of condition and load rating improvements needed for the truss bridge rehabilitation, it was determined that a rehabilitation alternative may be competitive with a replacement alternative. As a result, the MaineDOT requested TYLI to conduct a limited review of FSD-FCMs that may be critical to the viability of the rehabilitation alternative. It was determined through qualitative analysis that replacement of the end floor beams to remove these FSD-FCMs would not adversely impact the viability of the rehabilitation alternative due to the limited number of members involved. It was further qualitatively determined that a detailed evaluation of the truss diagonals and verticals, connection gusset plate at Span 1 node L0, and gusset plates would require extensive engineering effort. The floor beam connections to the truss could be evaluated for a modest engineering effort, and if strengthening or replacement was determined to be warranted based on a fatigue analysis, then this work would have a significant influence on the cost competitiveness of the truss rehabilitation alternate. MaineDOT directed TYLI to perform a limited fatigue evaluation that included the connection of the floor beam to the truss, and the summary of the study and findings are included herein.

Assumptions & Methodology:
The remaining fatigue life calculations for the Floor beam to truss connections have remaining fatigue lives that are in the range of the bridge's useful life.

Since the Charpy V-notch toughness is assumed at 1/2 the current Standard requirements AASHTO procedures cannot be used. The estimated remaining fatigue life for Clip Angles was calculated using procedures outlined on pages 311 - 312 in Barson and Rolfe (1987). The analysis is based on a number of assumptions including estimates of Charpy V-notch toughness, past and future number of stress cycles, degree of partial restraint provided by the connection and resulting live load stress range, and maximum initial flaw size.

Charpy notch toughness (CVN) is a measure of a material's resistance to fatigue and fracture in the presence of a flaw. Since the 1970's AASHTO has required all bridge non-fracture critical steels be certified to 15 ft-lbs at three temperatures (08, 408 and 708 F) that correspond to three minimum service temperature zones 1, 2 and 3 (AASHTO LRFD Table 6.6.2-1). According to Section 3.3 of the MaineDOT Bridge Manual, Maine is classified as an AASHTO LRFD "Cold Climate". The AASHTO LRFD temperature for steel in a cold climate is -308 to 1208 F which places Maine in CVN Zone 2 thus requiring certification of steel CVN toughness at 15 ft-lbs at 408 F.

ASTM A7 structural steel from the 1930’s was not formulated with any fatigue certification in mind and in the absence of actual testing it has been assumed that the steel will have a CVN of 7.5 ft-lbs. at 408F (half the AASHTO requirement). This assumption is based on experience on past projects where CVN testing was performed.

The determination of remaining fatigue life starts with a determination of the number of stress cycles a component has already experienced. In the case of bridges, that means first estimating the total truck volume in one lane from the bridge opening to the present (1931 – 2013). A present date of 2013 was used in the analysis to correspond to the date of the latest detailed bridge inspection. Estimated traffic data for the years 1947 through 2013, 2015, 2025, and 2035 were provided by MaineDOT. Traffic data before 1947 was calculated assuming variable growth rates based on available census data for Cumberland and Sagadahoc Counties and the State of Maine. The MaineDOT estimated truck percentage of 5% and directional distribution of 50% was held constant throughout.

The number of stress cycles per truck (CT) is based on AASHTO-LRFD Table 6.6.1.2.5-2:

Floor-beams (Transverse Members with Spacing >20 ft) CT = 1

The calculation of number of cycles is a basic numerical integration over time with varying growth rates.

$$N \equiv \int_0^P (1+GR)^X \times ADTT \times 365 days \approx Number\ of\ Vehicles\ \ for\ Period \times FT \times CT$$

GR = Growth Rate
ADTT = Average Daily Truck Traffic
P = Time Period
FT = Fraction of Trucks in one lane = 0.50
CT = Cycles per Truck CT = 1.0 floor-beams

For this bridge the estimated number of stress cycles for the period from 1931 to 2013 is:

Floor-beams = 11,600,000 cycles

The second part of determining the remaining fatigue life of a component is to determine a fatigue crack growth rate. In fatigue and fracture mechanics all growth models assume an initial flaw of some kind in the material. In steel, an initial flaw would be a crack assumed to be created in the production or fabrication processes. Thermal cut edges not ground smooth (common before the 1970’s) would more than likely have cracks and rolled shapes can contain flaws from milling operations though not nearly as common as thermal cutting. A typical assumed initial flaw size is less than 0.03” (1/32”).

Fatigue growth rate also depends on the total stress and the cyclic stress range the component is subjected to. It is obvious that the higher the stresses on the component, the shorter the fatigue

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life and vice versa. Determining the stresses due to bending for the stringers and floor-beams of the bridge is simple and straight forward. The determination of stresses in the clip angles for floor-beams is not so straight forward.

Floor-beam to truss connections are designed as simple pin connections assumed to have zero moment. The reality is that they have some negative moment caused by the resistance of the clip angle leg against the supporting element to rotation due to loading. Determination of the magnitude of the stresses due to moment using conventional mechanics is not an exact science and is highly dependent on the configuration of the connection. Estimates of live load stress can also be obtained through strain gages and field measurement under traffic. Another method of determining the stresses consists of using a crack growth model and inspection observation.

As mentioned above it is assumed that an initial flaw would be less than 0.03". Second, according to the available Bridge Inspection Reports and based on observations made during the reported Bridge Inspection there are no visible signs of cracking in the clip angle connections on the bridge, and that means that the largest a crack can be is 1/16" long without being visually detected. So we set the crack size to 1/16" for 2013. This estimate of an existing "non-detectable crack" could be further refined and reduced through various testing (dye-penetrant, magnetic particle, etc.) of a representative sample of the existing connections. This type of testing could change the assumptions regarding the existing conditions resulting in an increase in the estimated life. Third, calculate stresses based on conventional methods assuming a percentage of connection rigidity (in this case we started with 10% rigidity). Finally, use the crack growth model to determine an appropriate combination of initial crack size, crack growth rate and stresses to grow a crack to 1/16" in the estimated amount of stress cycles between 1931 and 2013 by numerical integration.

For clip angles the appropriate crack growth model is the single edge crack model (Ref: Barsom & Rolfe, page 17).

$$\Delta K_I = 1.12\Delta\sigma\sqrt{a_{AVG}\pi} \qquad\qquad \Delta N = \frac{\Delta a}{3.6\times10^{-10}\Delta K_I^3}$$

$\Delta\sigma$ = Live Load Stress Range of the AASHTO LRFD Fatigue Truck

Δa = crack growth rate

ΔK_I = Stress Intensity Factor Range

$\Delta N \equiv Number\ of\ Cycles\ \ for\ growth\ of\ crack\ \ from\ a_i\ to\ a_f$

a_j = Crack size at beginning of a period of cycles
a_f = Crack size at the end of a period of cycles
a_{AVG} = Average crack size during a period of cycles

The next part in calculating the remaining fatigue life is to estimate the total number of cycles it would take for a crack to grow to a Critical Flaw Size (a_{cr}).

Critical flaw size is the shortest crack length that would cause a fracture or would result in a component not able to provide enough design resistance to meet demand (in other words, a load rating of less than 1).

The critical flaw size (size that causes failure by brittle fracture) for the floor-beam to truss connections is computed based on Fracture Mechanics using the estimated maximum design stress. For clip angles the Fracture Critical Flaw Size is based on the edge crack model solved for crack size.

Critical Flaw Size (a_{cr}) to Fracture $$a_{cr} = \frac{K_{Id}^2}{1.12^2 \sigma^2 \pi}$$

σ = total stress in member (DL + LL)

$$K_{Id} = (5 \times E \times CVN)^{0.5} \quad (ksi\sqrt{in})$$

K_{Id} = Dynamic Stress Intensity Factor based on CVN

Assumed CVN = 7.5 ft-lbs at 408F (half AAHTO minimum for Zone 2)

The remaining fatigue life is calculated using numerical integration of the crack model from 1/16" to critical size using two different growth rates; the estimated growth rate between 1931-2013 (referred to as the slow growth rate) and a growth rate that is 2 or more times the slow rate. The two growth rates give a range of cycles to critical size.

The last part of calculating the remaining fatigue life is to translate the number of cycles to critical flaw size into years. This is done by projecting Truck traffic volume into the future. For this project we have estimated a traffic growth rate of 1% and held the percentage of trucks at 5% with the same 50% directional distribution factor.

Analysis Results:

	Crack Sizes			Remaining	Fatigue Life
	Initial (1931)	Current (2013)	Critical	Slow Rate years (year)	Accelerated Rate years (year)
Floor-beam to Truss Connection:					
Clip Angles (Interm. FB)	0.00431"	0.0625"	3.68"	27 (2040)	**14 (2027)**

These results show, once a crack is detected by visual inspection, the crack will propagate relatively quick. Crack growth rate can also be used to assess levels of concern as they relate to inspection cycle frequency and time to initiate repairs. These evaluation criteria are subjective and presume a repair will be initiated well before a crack reaches a critical state. A reasonably small crack will trigger significant concern and a repair. The evaluation can be used to qualitatively assess inspection frequency and repair concerns. The analysis results indicate the formation of a 1/8" or ¼" crack would take 6 and 8 years respectively at the computed growth rate. At that time 8 and 6 years respectively would remain before a crack grew to a critical size.

An analysis of two of the more difficult to estimate factors influencing the results (current crack size and live load stress range in the connection) were conducted to evaluate the sensitivity of the analysis. Using a current crack size of 1/32” (consistent with a more detailed inspection such as dye-penetrant testing), the Fatigue Life Accelerated Rate would be 28 years (2041). Using a reduced live load stress range at 85% of the calculated maximum value used in the fatigue analysis (a specific stress level would need to be established through strain gage measurements), the Fatigue Life Accelerated Rate would be 26 years (2039). Using a reduced live load stress range at 65% of the calculated maximum value used in the fatigue analysis, the Fatigue Life Accelerated Rate would be more than 50 years (>2065).

Conclusions & Recommendations:
The computed fatigue life for the floor beam to truss connection results are based on the best available information, and this estimate may be conservative. The sensitivity analysis shows that significantly different results may be obtained if better data was available for the analysis.

Based on the factors listed below, it is our opinion that the calculated fatigue life of the connection may not warrant the replacement of these connections as part of the current planned bridge rehabilitation:

- Conservative estimated fatigue life of 14 years based on available information.
- Sensitivity of the results to the available information.
- Long history, current observed condition, and past performance. Bridge has been in service for 84 years and recent detailed inspection did not identify any visible cracks in the floor-beam connections.
- The projected future crack growth rate and inspection cycle.
- There are reasonably low cost means of addressing any potential future cracks by crack arresting measures (drilled holes, etc.) or through replacement of the connection angles if needed. Cost for these types of repairs should be included in a life cycle cost analysis.

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From:	Norman Baker
To:	Kittredge, Joel
Cc:	Rick Hebert; Daniel Myers
Subject:	RE: FJW Fatigue
Date:	Friday, November 13, 2015 6:58:20 AM
Attachments:	FJ Wood Bridge - Progress Fatigue Evaluation Memo 2015-11-13.pdf LCCA - FJ Wood Bridge 2015-11-13.pdf

Joel,

I've attached the requested memo. Our conclusion is really based on the discussion we had with the Department earlier last month as described in the October 19, 2015, memo, that there is currently no evidence of fatigue issues, that the fatigue details would continue to get hands-on inspection bi-annually, and that fatigue issues could be repaired or mitigated if discovered. The first 4 pages of the Fatigue Evaluation Memo describes the background and approach we took. The last 2 pages really focus on the results and conclusions.

We have also made a modification to the LCCA previously sent to you earlier and included it here. That modification conservatively considers a hands-on inspection costing of $60,000 (previously $45,000) and $30,000 of maintenance repairs annually. We adjusted the matrix shown to determine the "break even" year for the rehabilitation project to become cost-effective. For the minimum rehab, one sidewalk, a future life of 26 years makes the rehab cost-effective. If an additional sidewalk is added to the existing bridge, the future life of the bridge would need to be 38 years to make it cost-effective.

The 30 year target life was not established by any calculated or empirical approach, but rather from a general approach on historical bridge life. This also was briefly discussed at the 11/19/15 meeting, the structural steel and substructure units would be 115 years old and the new deck and paint system would have 30 years use.

I hope this helps and I would be willing to come in and talk with you directly if you feel that would be useful.

Sincerely,

Norman L. Baker, P.E.
Senior Project Manager
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norman.baker@tylin.com

From: Kittredge, Joel [mailto:Joel.C.Kittredge@maine.gov]
Sent: Tuesday, November 10, 2015 3:46 PM
To: Norman Baker <norman.baker@tylin.com>
Subject: FJW Fatigue

Norm:

Would you please forward a *quick brief* narrative re what TYLIN has done for the analysis and what your conclusion is. Not looking to drill down for a full report, nor final recommendations, but rather a preliminary summary of assumptions, initial and resultant concerns, and where the 30 years target came from.

If I could have email by Friday 9 AM, that would be great.

Thanks---Joel.

STEPHEN F. HINCHMAN
ATTORNEY AT LAW

August 15, 2016

Cheryl Martin
Assistant Division Administrator
Federal Highway Administration – Maine Division
40 Western Ave
Augusta, ME 04330

Joel Kittredge
Maine DOT
16 State House Station
Augusta, ME 04333-0016

RE: Frank J. Wood Bridge Section 106
Consulting Parties Meeting

Dear Ms. Martin and Mr. Kittredge:

On behalf of the Friends of the Frank J. Woods Bridge ("Friends"), I am pleased to provide the following comments in response to the Section 106 Consulting Parties Meeting held on July 11, 2016 in Topsham regarding the pending Frank J. Wood Bridge improvement project.

The Frank J. Wood Bridge ("Bridge") is a steel truss bridge built in 1932 spanning the Androscoggin River and carrying US Route 201 between the towns of Brunswick and Topsham. As you are aware, the Maine Department of Transportation ("MDOT") is proposing to demolish this historic bridge and replace it with a $13 million concrete slab bridge on a new upstream alignment over the lower falls of the Androscoggin River.

The Friends are providing the following initial comments on this proposal. These comments primarily address (1) the proposed the FHWA and MDOT's preliminary determination regarding project compliance with the National Environmental Policy Act ("NEPA"), 42 U.S.C.A. § 4331 *et seq*., (2) the identification of alternatives to the proposed project that must be considered pursuant to Section 106 of the Historic Preservation Act, NEPA and other federal and state statutes, (3) the Area of Potential Effect under the Section 106 Review, and other issues.

I. FRIENDS OF THE FRANK J. WOOD BRIDGE.

The Friends of the Frank J Wood Bridge is a Maine non-profit corporation dedicated to the preservation of the historic Frank J. Wood Bridge between Brunswick and Topsham, Maine. The board and membership of the Friends is made up of residents of both towns who feel strongly that preservation of the bridge is important to the identity, economy, and quality of life of our communities. The Friends' Facebook group has more than 1,000 supporters as of July 2016. This number has been growing steadily since the page was established in May and continues to grow daily. We have sought the input of experts in engineering, historic preservation, and environmental and administrative law to assist us in our efforts, and will be submitting information during the federal and state review process. The Friends intends to be an active participant in both local discussions on the proposed bridge demolition and the Federal Section 106 review and other federal review proceedings.

II. MDOT'S PROPOSED ALTERNATIVE FOR BRIDGE REPLACEMENT IS NOT ELIGIBLE FOR A CATEGORICAL EXCLUSION UNDER NEPA.

At the July 11th meeting, FHWA indicated that MDOT and FHWA plan to apply a "Categorical Exclusion" ("CE") to exempt the proposed project from review under the National Environmental Policy Act. In FHWA's July 18th follow up email, Ms. Chase stated,

> At the Section 106 consulting parties meeting, a question was asked as to what type of National Environmental Policy Act (NEPA) document would be prepared. Based on the scope of work (bridge improvement), FHWA and MaineDOT made the initial determination that the appropriate class of action for this project would be a Categorical Exclusion, as stated under 23 CFR 771.117(c)(28).[1]

The Friends agree that rehabilitation of the existing bridge in place would likely meet the requirements of 23 C.F.R. §§ 771.117(c)(28) and 771.117(e). However, MDOT's preferred alternative to tear down the historic bridge and replace it with a new bridge on an upstream alignment is expressly ineligible for a categorical exclusion, for several reasons. While § 771.117(c)(28) provides a CE for certain bridge rehabilitation or replacement projects, § 771.117(e) prohibits the application of a CE for bridge replacement projects in the following circumstances – all of which would apply to the MDOT preferred alternative:

> (2) An action that … does not meet the terms and conditions of a U.S. Army Corps of Engineers nationwide or general permit under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899;
>
> (3) A finding of "adverse effect" to historic properties under the National Historic Preservation Act, the use of a resource protected under 23 U.S.C. 138 or 49 U.S.C. 303 (section 4(f)) except for actions resulting in *de minimis* impacts, or a finding of "may affect, likely to adversely affect" threatened or endangered species or critical habitat under the Endangered Species Act;
>
> (4) Construction of temporary access, or the closure of existing road, bridge, or ramps, that would result in major traffic disruptions;

Based on the Historic and Architectural Survey conducted by FHWA and MDOT, there appears to be no dispute that the Bridge and the affected properties surrounding the Bridge are historic properties protected under the National Historic Preservation Act and SAFETY-LU. Destruction,

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[1] Email of Cassandra Chase, FHWA Maine Division, regarding the *Frank J. Wood Bridge Section 106 Consulting Parties Meeting* (July 18, 2016 at 8:25 am).

removal, relocation and alteration of a historic property are *per se* adverse effects, 36 C.F.R. § 800.5(a)(2), any one of which requires full NEPA compliance. 23 C.F.R. § 771.117(e).

Likewise, historic properties are protected resources under SAFETY-LU, Section 4(f). A finding of an adverse affect to a historic property is, by definition, not a *de minimus* impact, 23 C.F.R. § 774.17(5)(1) and requires full NEPA compliance. 23 C.F.R. § 771.117(e).

Under the US Army Corps of Engineers Maine General Permit ("GP"), projects that adversely affect historic sites are ineligible for the GP and projects that "may affect" endangered species – including specifically Atlantic salmon or shortnose sturgeon – or that are in Essential Fish Habitat, are categorically ineligible for the Category 1 GP and may require an individual permit [2]

The project area contains known habitat for several endangered and threatened fish species. New construction of bridge abutments would likely result in at least a "may affect" (if not more significant) finding during an Endangered Species Act Section 7 consultation. Additionally, MDOT has identified the potential for significant traffic disruptions.

Any one of the above factors would negate the use of the Categorical Exclusion. Here all five appear to be present. Accordingly, the Friends request that FHWA reconsider its initial NEPA determination and restart the process using the appropriate procedures under NEPA – starting with full public notice and a formal scoping process. 23 C.F.R. § 771.111.

III. IDENTIFICATION OF ALTERNATIVES.

The Friends believe the following alternatives should be considered as part of the FHWA review process under NEPA[3], the Clean Water Act,[4] Section 4(f) of the DOT Act of 1966,[5] and Section 106 of the Historic Preservation Act.[6]

The purpose and need for the project is to provide safe crossing of the Androscoggin River for vehicles, pedestrians and bicycles – that is, rehabilitation or replacement of the existing bridge. The alternatives reviewed should seek to address issues related to historic preservation, solutions

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[2] Department of the Army General Permit State Of Maine, §§ V(8) & V(10) and V(11).

[3] Under NEPA, 42 U.S.C.A. § 4332(c), the federal regulations require review of all reasonable alternatives, including alternatives not under the jurisdiction of the lead agency. 40 C.F.R. § 1502.14.

[4] The Clean Water Act rules require review of all reasonable alternative and selection of the Least Environmentally Damaging Practicable Alternative. *See* 33 U.S.C.A. § 1334(b) and 40 C.F.R. § 230.

[5] Section 4(f) rules require selection of feasible and prudent alternative that can avoid or mitigate adverse impacts. See 23 C.F.R. § 774.3(a)(1).

[6] See alternatives review requirement at 36 C.F.R. §§ 800.6 and 800.8.

to reduce traffic impacts during construction, and long-term maintenance and inspection improvements to reduce traffic impacts and costs. With that in mind, the Friends suggest the following variations on the basic alternatives considered to date:

Rehabilitation Alternatives:

1. Perform deferred maintenance, fix any weakened steel, paint all steel, perform a load test to verify the actual current load capacity and determine whether there is in fact a need for full bridge rehabilitation or replacement.

2. Full rehabilitation using historic materials.

3. Full rehabilitation but using modern materials and technologies, including, for example:

    - a lightweight road deck with drainage to improve project life and to reduce corrosion of the lower superstructure;

    - engineered coatings over historic materials that can increase the usable life of materials, thereby reducing the cost and traffic impacts of future maintenance; and/or

    - use of concrete, composites, carbon, or other modern materials in place of riveted steel for the deck and substructure (i.e. a hybrid or replica that retains the historic look of the existing bridge but with rust resistant long-lived deck and substructure).

4. Rehabilitation with the following configurations:

    - Narrow drive lanes to 10 feet to accommodate five-foot bike lanes in both directions;

    - Eliminate the proposed DOT sidewalk on the northbound side; and/or

    - Restore and repurpose the historic bridge for pedestrian and bicycle use, and as a public historic park. Build a new bridge on alternative alignment.

Future Maintenance and Inspections:

- Evaluate use of electronic surveillance techniques to minimize cost and traffic impacts from future inspection and maintenance events, including

    - Load testing devices to enable real time monitoring; and/or

    - Fixed or moveable cameras or drones to allow visual inspection without bridge closures and at less cost.

Traffic Pressure During Construction:

- Evaluate feasibility of using the existing Route 196 connector/bypass bridge to minimize traffic disruptions during rehabilitation, including;
  - Closure of one lane of the Frank J Wood Bridge, with either north or south bound traffic detoured to Route 196; and
  - Detour trucks only to Route 196.
- Evaluate feasibility of using a temporary one or two lane bridge on upstream alignment to minimize traffic disruptions during rehabilitation.
- Evaluate other traffic mitigation strategies.

IV. AREA OF POTENTIAL EFFECT.

The Friends request that the area of potential effect ("APE") be expanded from the draft presented to the review committee meeting on July 11th to include the nearby historic districts in Brunswick and Topsham.

In addition, the Friends request that an analysis be undertaken to determine whether or not demolition of the Bridge and construction of the new bridge will affect the National Register eligibility of other properties, particularly the Cabot Mill and historic neighborhood on Summer Street.

The Cabot Mill has been determined eligible in combination with the Frank J. Wood Bridge and the Bowdoin Mill across the river. Removal of the historic bridge would eliminate the historic connection between mills, forcing an evaluation of whether or not Cabot Mill is individually eligible (a higher bar). The mill complex has already lost its historic office building, storehouse, power house, and dam and had its context disturbed by the construction of the Route 1 underpass in the 1960s. Any approach to a new bridge will require further impacts on the east and north sides of the property. This is a critical assessment. National Register eligibility provides the owner access to state and federal historic tax credits totaling 45% of rehabilitation costs for work done on the historic building.

V. DATA REQUEST

The Friends request FHWA and/or MDOT provide a matrix showing the maintenance history of the Frank J. Wood Bridge, showing the dates and maintenance activities performed on the bridge over the last 30 years, or longer if additional data is available.

VI. CONCLUSION.

In light of the need to comply with NEPA, the fact that FHWA and MDOT have not yet even identified – let alone reviewed – potential alternatives under the above listed statutes, and that no study of impacts of any alternative has yet been conducted and no results disclosed, it is premature for MDOT to seek public support and endorsements for its preferred alternative. It is particularly inappropriate for MDOT to solicit resolutions endorsing its preferred alternative from the towns of Brunswick and Topsham, the chambers of commerce and the general public.

Rather, under NEPA the agencies have a legal obligation to inform the towns and the interested public regarding the full NEPA process, opportunities to participate at each stage in the process, and the timing and availability of documents documenting project alternatives and evaluating the impacts of each alternative. 33 C.F.R. § 1506.5. MDOT's premature public advocacy for its preferred alternative is a direct violation of the NEPA process, which seeks to ensure that comprehensive and scientifically accurate information is made available prior to decision making:

> NEPA procedures must insure that environmental information is available to public officials and citizens *before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA.*

33 C.F.R. § 1500.1(b) (emphasis added).

Accordingly, Friends request that FHWA and MDOT withdraw and suspend all pending requests for the Brunswick and Topsham governments to support MDOT's so-called preferred alternative and that instead the agencies initiate the full NEPA scoping process and inform the Towns regarding the opportunity to participate in that process – including the ability to identify potential alternatives, to review and comment on a draft EA or EIS, and to see the full comparison of alternative and impacts of each alternative – before being asked to submit their comments.

The Friends believe that this process, if done fairly, openly and fully, will help the public, local communities and agencies better understand the reasonable alternatives and potential impacts, and will help lead to the best outcome for our communities. We look forward to further participation and thank you for the opportunity to comment.

Sincerely,

Stephen F. Hinchman, Esq., counsel for
Friends of the Frank J. Wood Bridge

Cc: Gregory G. Nadeau, Administrator, FHWA
David Bernhardt, Commissioner MaineDOT

Sen. Angus King
Sen. Susan Collins
Rep. Chellie Pingree
John Eldredge, Town Manager, Town of Brunswick
Richard Roedner, Town Manager, Town of Topsham

FJW Maintenance Activity Bridge #2016

Report date 8/29/16

Activity	Activity Description	Bridge No	State Fiscal Year	WIN
532	Repairing Bridge Curb or Sidewalk	2016	2006	
513	Repairing or Replacing Joints	2016	2008	
521	Repairing Wearing Surfaces	2016	2008	
511	Repairing or Replacing Main Support Members	2016	2010	
582	Washing Bridges	2016	2010	
631	Installing or Maintaining Minor Signs	2016	2010	
512	Repairing or Replacing Deck	2016	2011	
112	Repairing Surface	2016	2012	
511	Repairing or Replacing Main Support Members	2016	2012	
513	Repairing or Replacing Joints	2016	2012	
521	Repairing Wearing Surfaces	2016	2012	
562	Bridge Inspection	2016	2012	
579	Cleaning Bridges	2016	2012	
582	Washing Bridges	2016	2012	
D50	Final Structural Design	2016	2012	
531	Repairing or Replacing Bridge Rail	2016	2013	01994000
511	Repairing or Replacing Main Support Members	2016	2013	
513	Repairing or Replacing Joints	2016	2013	
562	Bridge Inspection	2016	2013	
ADM	Administration	2016	2013	
582	Washing Bridges	2016	2014	01994200
511	Repairing or Replacing Main Support Members	2016	2014	02116214
521	Repairing Wearing Surfaces	2016	2014	02116214
562	Bridge Inspection	2016	2014	
511	Repairing or Replacing Main Support Members	2016	2015	02116214
513	Repairing or Replacing Joints	2016	2015	02116214
521	Repairing Wearing Surfaces	2016	2015	02116214
562	Bridge Inspection	2016	2015	02116214
582	Washing Bridges	2016	2015	02116214
D55	Final Structural Plan Development	2016	2015	02116214
D55	Final Structural Plan Development	2016	2015	02116215
521	Repairing Wearing Surfaces	2016	2015	
562	Bridge Inspection	2016	2015	
582	Washing Bridges	2016	2015	
562	Bridge Inspection	2016	2017	02116216
582	Washing Bridges	2016	2017	02116216
562	Bridge Inspection	2016	2017	

Capital Projects:

1972 – installed steel grid decking and replaced bridge joints.

1985 – Painted structural steel below top of deck. Repaired and infilled steel grid decking with concrete and added bituminous wearing surface. Repaired expansion bearings. Repaired/replaced bridge joints.

2006 - Repair concrete piers and abutments. Replace/repair bridge rail. Replace bituminous wearing surface. Replace reinforced concrete sidewalk slab. Repair bridge joints.

2015 – Replaced bridge joints at piers and abutments

I. GENERAL INFORMATION

A. LOCATION/IDENTIFICATION

Bridge Number: 2016 Bridge Name: FRANK J. WOOD (ANDROSCOG)

Town: BRUNSWICK County: CUMBERLAND Division: ROCKLAND

Feature Carried/Feature Under: US 201 OVER ANDROSCOGGIN RIVER

Owner: MDOT Custodian: MDOT

Co-Owner: NOT APPLICABLE Co-Custodian: NOT APPLICABLE

B. STRUCTURAL INFORMATION

Main Span Type: THRU TRUSS Design: WARREN

Year Built: 1932 Years Altered/Rebuilt:

Total Number of Spans: 3 Overall Length: 815 ft (248.4 m)

Total of Type in Pre-1956 State Population: 44 Total Eligible: 22

Description of Superstructure:
3 span, 815'-long, riveted, Warren with verticals thru truss bridge with two, 310'-long spans and one, 175'-long span on the north end. Polygonal upper chords. Diagonals are rolled section. Concrete-filled steel grid deck. Cantilevered sidewalk on west side.

Description of Substructure:
Concrete abutments and piers. South abutment incorporates portions of the stone abutment from previous bridge.

Maine Department of Transportation
Historic Bridge Management Plan

12/1/2003

BRIDGE # 2016, FRANK J. WOOD (ANDROSCOG)
BRUNSWICK

Section I C - F

C. CLASSIFICATION OF SERVICE

Type Service on Bridge: Highway - pedestrian   Open, Posted, or Closed: Open

On National Highway System: On

Roadway Functional Classification: Other Principal Arterial

Number of Lanes On: 2   Direction of Traffic: 2 way traffic

ADT: 19140   % Truck: 4.0   Date ADT: 2000

D. GEOMETRIC INFORMATION

Bridge Roadway Width (c to c): 30 ft (9.1 m)   Approach Travelway Width: 30 ft (9.1 m)

Approach Roadway Shoulder Width Left: 0 ft (m)

Approach Roadway Shoulder Width Right: 0 ft (m)

Is Bridge Roadway as Wide or Wider Than Approaches?

Bridge roadway is as wide as approach roadway.

Sidewalk Width Left: 5 ft (1.5 m)   Sidewalk Width Right: 0.7 ft (0.2 m)

Vertical Clearance on Bridge: 15 ft. 8 in.   Approach Alignment: Equal to present desirable criteria.

Crash Data:

Two accidents reported for 1999-2001 period. One was due to stopped traffic on the bridge; other is not attributable to any bridge characteristic.

For Underpasses Only:

Number of Lanes Under: Total Horizontal Clearance: ft.

ADT Under: Vertical Clearance Under: 15 ft. 8 in.

E. SAFETY FEATURES

Bridge Railing: 2 rail high steel channel & angle railings inside trusses. Metal pile with bar fill at sidewalk.

Transition Railing: Acceptable transition railing is provided.

Approach Guide Rail: Acceptable metal beam rail is provided.

F. HYDRAULICS

Waterway Adequacy: Bridge deck and roadway approaches are above flood water elevations. (High water)

Scour Critical: Fndtn stable- not calcul scour cond.

Channel Condition: Good.

Maine Department of Transportation
Historic Bridge Management Plan
12/1/2003

BRIDGE # 2016, FRANK J. WOOD (ANDROSCOG)
BRUNSWICK
Section I G, Section II and Section III

G. TINIS SUFFICIENCY and LOAD RATING

Date of TINIS Report: JUNE 2002 Sufficiency Rating: 44.5

Structural Evaluation: 4 (Meets Minimum Tolerable Limit)

Superstructure Condition: 6 (Satisfactory) Deck Condition: 6 (Satisfactory)

Substructure Condition: 4 (Poor)

Load Rating: Type: HS loading Inventory: 24 T (HS) Operating: 40 T (HS)

Summary of Structural Deficiencies:

-South abutment significant spalling around east bearing.
-Spalling at pier bridge seats.
-Section loss of floorbeam webs.
-Spalling of sidewalk concrete.
-Deterioration of deck concrete at fascia.
-Sidewalk rail failed.

Reasons for Low Sufficiency Rating:

-Poor substructure condition.
-Inventory rating is not adequate.
-According to federal guidelines, ADT considered high for roadway width.
-Deck geometry and structural evaluation appraised at 4, meeting minimum tolerable limit.

II. CONFORMANCE WITH STANDARDS

	Actual	Required	Adequate (Y/N)
Load Rating (Inventory)	24 T (HS)	36 T (HS) (1)	No
Bridge Roadway Width	30 ft	30 ft (2)	Yes
Number of Lanes	2	2	Yes
Alignment/Sight Distance	-	-	Yes
Geometric Adequacy	-	-	Yes

Conformance Comments:

(1) The bridge carries a US route, HS 20 36 ton inventory rating is required.
(2) According to AASHTO, "A Policy on Geometric Design of Highways and Streets, 2001," p.485, the bridge roadway should equal the curb to curb width of the approach roadway.

III. PROJECT PLANNING

Is Bridge in 6 Yr. Work Plan?: Yes BTIP Candidate: No

Year of Plan: 2002-03 Project #: 19977 P.I. Number:

Plan Comments:

IV. HISTORICAL SIGNIFICANCE

Total of Type in Pre-1956 State Population: 44   Total Eligible: 22

Historical Rank: Average

Summary of Significance:

The 1932, riveted, Warren thru truss is not individually significant. It is a later example of a common bridge type, and it has no innovative or distinctive details. It is, however, located in a National Register-eligible textile mill historic district in Brunswick-Topsham. Since the bridge is located within the historic district, was built within its period of significance, and is complete, it is a contributing resource to the industrial historic district. The bridge carried a street railway at one time.

The bridge is judged to have average preservation priority because an example of a common bridge type and is located in a non-transportation related historic district.

Proximity to Identified Cultural Resources:

Historic Sites:	Located completely within NR-eligible historic district.
Archaeological Resources:	None known.
Other 4(f) Resources:	None known.

Maine Department of Transportation
Historic Bridge Management Plan

12/1/2003

BRIDGE # 2016, FRANK J. WOOD (ANDROSCOG)
BRUNSWICK

Section V and Section VI

V. SUMMARY OF PRESERVATION POTENTIAL

Is it prudent and feasible to preserve bridge for its current usage? Yes

Does the bridge have any preservation potential, including alternate use? Yes

Summary of Preservation Potential:

According to current guidelines and available information, the bridge is adequate in superstructure condition (2003 inspection), roadway width, vertical clearance, sight lines, and approach alignments. The bridge is not adequate in substructure condition and load capacity. The substructure condition is rated poor (4), and a poor rating may require further study to determine if there are prudent options to strengthen the bridge. The substructure has areas of significant deterioration including large spalls, scaling and cracking below the truss bearings at north abutment and north pier. MDOT rates the bridge at 24 tons inventory rating for HS truck loading and 36 ton HS20 is required. The rating calculations show that the flooring system members control the rating and that all truss members are adequate for HS20 loading. A structural analysis utilizing modern techniques is necessary to accurately assess the inventory load rating. The results of the analysis will determine the extent of member strengthening or replacement that will be required.

Since it is the flooring system that is controlling the lower-than-desired inventory load capacity, the rating can be increased to the desired level using conventional methods such as member replacement or reinforcement and/or dead load reduction. The information available in the bridge inspection reports may not fully represent the ability of the substructure to be repaired. Unless there is additional information that indicates the concrete inside the substructure units is in a state of advanced deterioration, it is anticipated that the substructure can be repaired using standard techniques. That work will not have an adverse effect on the bridge. Because the deficiencies can be addressed without an adverse effect, the average preservation priority bridge is determined to have preservation potential. It is feasible and prudent to rehabilitate it for its current usage.

No build:	This option will not address the deteriorated substructure or the low inventory rating. It is not prudent.
Rehab without adverse effect:	It appears that the deficient load capacity and substructure condition can be improved using conventional methods without adversely affecting the bridge. This option is prudent and feasible. One significant drawback, however, is that repairs/replacement of floor system members cannot be done under live load. Therefore the bridge will have to be closed to traffic while the work is done. Based on the high ADT, it is unlikely that the bridge can be closed for a long duration. Managing traffic and the limitation of working on the bridge without live load may add substantially to the cost of the rehabilitation.
Bypass/historic bridge left in place:	There is development at the quadrants, and the bridge is a contributor to a NR eligible historic district. A parallel bridge is not prudent. A new crossing beyond the historic district could be considered. It is not possible to determine a location for a new bridge without a complete traffic study of the area. This bridge could be left in place.
Other:	Relocation of the existing bridge as three single spans or in other arrangements could be considered for this bridge. The roadway width provided may prove to be a good solution for local road bridges in other areas. Generally the cost of relocating a large truss is costly. Additionally, its removal from the historic district will have an adverse effect on the district. This is not a prudent option.

VI. PRESERVATION RECOMMENDATION

-Consider structural analysis to determine HS20 inventory load rating.
-Repair bridge seats at piers and abutments.
-Repair other areas of substructure concrete deterioration.
-Repair sidewalk concrete.
-Repair deck concrete at fascias.

-Repair bridge rail.
-Paint steel as necessary.

Committee Recommendation:

The committee determined that it is prudent and feasible to preserve the bridge for its current usage and that it has preservation potential.

Date/Committee:

8/26/2003 – David Gardner, Rhonda Poirier, James Tukey, P.E., Everett Barnard, P.E., Maine DOT; Kirk Mohney, MHPC.

Fatigue not an issue — Makes sense to rehab

From:	Norman Baker
To:	Kittredge, Joel
Cc:	Rick Hebert; Daniel Myers
Subject:	RE: FJW Fatigue
Date:	Friday, November 13, 2015 6:58:20 AM
Attachments:	FJ Wood Bridge - Progress Fatigue Evaluation Memo 2015-11-13.pdf LCCA - FJ Wood Bridge 2015-11-13.pdf

Joel,

I've attached the requested memo. Our conclusion is really based on the discussion we had with the Department earlier last month as described in the October 19, 2015, memo, that there is currently no evidence of fatigue issues, that the fatigue details would continue to get hands-on inspection bi-annually, and that fatigue issues could be repaired or mitigated if discovered. The first 4 pages of the Fatigue Evaluation Memo describes the background and approach we took. The last 2 pages really focus on the results and conclusions.

We have also made a modification to the LCCA previously sent to you earlier and included it here. That modification conservatively considers a hands-on inspection costing of $60,000 (previously $45,000) and $30,000 of maintenance repairs annually. We adjusted the matrix shown to determine the "break even" year for the rehabilitation project to become cost-effective. For the minimum rehab, one sidewalk, a future life of 26 years makes the rehab cost-effective. If an additional sidewalk is added to the existing bridge, the future life of the bridge would need to be 38 years to make it cost-effective.

The 30 year target life was not established by any calculated or empirical approach, but rather from a general approach on historical bridge life. This also was briefly discussed at the 11/19/15 meeting, the structural steel and substructure units would be 115 years old and the new deck and paint system would have 30 years use.

I hope this helps and I would be willing to come in and talk with you directly if you feel that would be useful.

Sincerely,

Norman L. Baker, P.E.
Senior Project Manager
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norman.baker@tylin.com

From:	Norman Baker
To:	Kittredge, Joel
Cc:	Rick Hebert
Subject:	Brunswick-Topsham
Date:	Tuesday, June 16, 2015 1:32:09 PM

Joel,

As a follow-up to yesterday's meeting, I wanted to let you know that a fatigue analysis is not a requirement of design for a rehabilitation option. It is just another tool to evaluating the overall structure and estimating its useful life. The detailed inspection and rating analysis done on the bridge did not find any fatigue issues and there is no indication that it will be an issue in the future. We recommend that the Department convene a discussion as to whether it is worthwhile proceeding with a fatigue analysis. I am happy to attend this if you think that would be beneficial.

Rehabilitation of the existing bridge is a viable alternative here, especially if a shortened bridge is not a consideration. It is even more attractive if comparing it to a long-span structure. We are preparing an alignment upstream that is on a curve and utilizes the ledge outcrops and spans the dam sluiceway. We should have the alignment soon and develop rough span arrangement by COB today. As I mentioned to you yesterday, the long-span alternative (300'+/-) is substantially more expensive than a conventional 150' to 200' span. Steel beams or boxes will be 10' to 13' deep. Shipping and constructing these large beams adds complexity, especially if curved. Having a construction expert, Jason Molten, on the Team will be a real benefit here in estimating the cost of this alternative. I will reach out to him today for a proposal.

Please let me know if you would like to discuss any of this further.
Sincerely,

Norman L. Baker, P.E.
Senior Project Manager
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From:	Norman Baker
To:	Kittredge, Joel
Cc:	Rick Hebert; Daniel Myers; Tim Kelley
Subject:	Brunswick-Topsham, Frank J Wood Bridge, Preliminary Estimates & LCCA
Date:	Monday, November 09, 2015 1:39:50 PM
Attachments:	FJ Wood APPENDIX Preliminary Estimate - Alt. 1 11-09-15.pdf FJ Wood APPENDIX Preliminary Estimate - Alt. 2 11-09-15.pdf FJ Wood APPENDIX Preliminary Estimate - Alt. 3 11-09-15.pdf FJ Wood APPENDIX Preliminary Estimate - Alt. 4 11-09-15.pdf LCCA - FJ Wood Bridge 11-09-15.pdf

Joel,

Thanks for meeting with me this morning. Attached are preliminary estimates for the replacement structure and rehabilitation of the existing bridge as follows:

- Alternate 1 is replacement on existing alignment. The cost of the temporary bridge controls this cost.
- Alternate 2 is the US replacement alignment with 2 5' sidewalks.
- Alternate 3 is minimum rehabilitation for 30 + years of life. New conventional concrete deck should last 40-50 years.
- Alternate 4 is rehabilitation with added DS sidewalk. This required lightening the deck by using an exodermic deck so that the ratings would not be affected.
- LCCA is the life cycle cost analysis. This shows that for the minimum rehab, the bridge repair needs to last only 25 years to be cost effective. With the added sidewalk, this life would need to be 35 years.

These estimates are draft and show preliminary values for engineering and no R/W costs. These would both need input from the Department.

I have asked my highway designer to complete the impacts to the parking area and will bring a hardcopy to tomorrow's meeting.
Sincerely

Norman L. Baker, P.E.
Senior Project Manager
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From:	Kittredge, Joel
To:	"Norman Baker"
Subject:	Monday"s presentation
Date:	Friday, April 22, 2016 11:36:51 AM

Norm:

As discussed, please

- **1st slide: reduce font, insert date, and use the aerial rendering, view looking upstream as backdrop.**
- **2nd slide, location map, remove.**
- **"Existing Bridge" slide, please look through images for the absolutely worst, ugliest, restricted most corroded, etc., and use that.** → not baised!
- **Make an "Upstream Alternative---Advantages" slide**
  - **Include**
    - **Whatever we have had done in the past**
    - **Safety**
    - **Maintenance of traffic**
    - **Etc.**
- **Remove bridge drains from "Proposed Bridge Section" slide.**
- **See if getting rid of green frame color on "Exisitng Bridge Section slide "reduces" visual width.**
- **Need something to show the intersections and sidewalk connections.**
- **Get rid of the "Questions?" slide and use the aerial rendering, view looking upstream for the last slide to remain during questions.**

Have a great weekend.

Thanks---Joel

T·Y·LIN INTERNATIONAL
engineers | planners | scientists

To:	Joel Kittredge, MaineDOT	**From:**	Rick Hebert
		Date:	November 13, 2015
Address:		**CC:**	File
Re:	Brunswick-Topsham, WIN # 022603.00, F.J. Wood Bridge – Progress Fatigue Evaluation		

MEMORANDUM

Background Information:
The F.J. Wood Bridge is a three span 812 ft. steel truss bridge that carries U.S. Route 201 / SR 24 over the Androscoggin River between the towns of Brunswick and Topsham. The superstructure consists of six uniquely designed and detailed overhead trusses. The upstream side trusses carry a cantilevered sidewalk in addition to the roadway. The pier and truss supports between Spans 1 and 2 (southerly most spans) is skewed 15 degrees. The Span 1 and 2 trusses vary in span length between 305.5' and 316.5'. Span 3 trusses span 176 ft. The existing truss bridge was constructed in 1931. Major bridge rehabilitation efforts were completed in 2006 and 2015. The 2006 bridge rehabilitation included new bridge rails, sidewalk concrete, wearing surface, and repairs to bridge joints and substructures. The 2015 rehabilitation included new bridge joints. The existing configuration of the deck of the truss varies from the original 1931 design plans. The 1931 plans show a variable depth bare concrete deck with an accommodation for rail traffic in the center of the bridge. The existing bridge structural deck configuration consists of concrete filled steel bridge deck supported on shallow (6" deep) transverse steel I-beams spaced on 2 ft. centers welded to the top of the truss floor framing stringers. The date of the installation of the existing bridge deck system or any deck modifications is unknown.

A detailed routine and fracture critical inspection was recently completed in 2013. The Bridge Inspection Report provides and documents the condition of the major bridge components (deck, trusses, bearings, piers, abutments, etc.) and also identified several welded fatigue sensitive details (FSD) in fracture critical members (FCMs). The following truss elements were documented to be FCMs:

- Truss diagonals and verticals subject to tension (11 of 19 members in each Span 1 and Span 2 truss and 8 of 15 members in each Span 3 truss).
- Bottom chord of the trusses (10 members in each Span 1 and Span 2 truss and 8 members in each Span 3 truss).
- Transverse floor beams (11 members in each Span 1 and Span 2 truss and 9 members in each Span 3 truss).

A summary of the inspection reported FSD-FCMs are as follows:

- Plates welded to truss diagonals and verticals at the sidewalk level
- End floor beams with welded partial depth or full depth stiffeners

12 Northbrook Drive, Building A, Suite 1 | Falmouth, ME 04105 | 207.781.4721 | F 207.781.4753 | www.tylin.com

- Sidewalk cantilever bracket welded full height to truss bottom chord/end diagonal connection gusset plate at Span 1 node L0.

In addition to these welded FSD-FCMs, the clip angle connections of the floor beams to the truss and the truss gusset plate connections are a non-welded FSD-FCM. It is not uncommon for clip angles to crack and require replacement in bridges of this age.

The original scope of services to be provided by T.Y. Lin International (TYLI) for the development of the preliminary design and Preliminary Design Report for the F.J. Wood Bridge includes investigation of rehabilitation and replacement alternatives. A detailed engineering evaluation of the FSD-FCMs was not included in the original scope of services to be provided by TYLI as mutually agreed upon with the MaineDOT due to the significant engineering effort required. The need for these added services would be determined as the project was further developed and as the direction of the project became better defined.

Based on the development of replacement alternatives and a review of condition and load rating improvements needed for the truss bridge rehabilitation, it was determined that a rehabilitation alternative may be competitive with a replacement alternative. As a result, the MaineDOT requested TYLI to conduct a limited review of FSD-FCMs that may be critical to the viability of the rehabilitation alternative. It was determined through qualitative analysis that replacement of the end floor beams to remove these FSD-FCMs would not adversely impact the viability of the rehabilitation alternative due to the limited number of members involved. It was further qualitatively determined that a detailed evaluation of the truss diagonals and verticals, connection gusset plate at Span 1 node L0, and gusset plates would require extensive engineering effort. The floor beam connections to the truss could be evaluated for a modest engineering effort, and if strengthening or replacement was determined to be warranted based on a fatigue analysis, then this work would have a significant influence on the cost competitiveness of the truss rehabilitation alternate. MaineDOT directed TYLI to perform a limited fatigue evaluation that included the connection of the floor beam to the truss, and the summary of the study and findings are included herein.

Assumptions & Methodology:
The remaining fatigue life calculations for the Floor beam to truss connections have remaining fatigue lives that are in the range of the bridge's useful life.

Since the Charpy V-notch toughness is assumed at 1/2 the current Standard requirements AASHTO procedures cannot be used. The estimated remaining fatigue life for Clip Angles was calculated using procedures outlined on pages 311 - 312 in Barson and Rolfe (1987). The analysis is based on a number of assumptions including estimates of Charpy V-notch toughness, past and future number of stress cycles, degree of partial restraint provided by the connection and resulting live load stress range, and maximum initial flaw size.

Charpy notch toughness (CVN) is a measure of a material's resistance to fatigue and fracture in the presence of a flaw. Since the 1970's AASHTO has required all bridge non-fracture critical steels be certified to 15 ft-lbs at three temperatures (08, 408 and 708 F) that correspond to three minimum service temperature zones 1, 2 and 3 (AASHTO LRFD Table 6.6.2-1). According to Section 3.3 of the MaineDOT Bridge Manual, Maine is classified as an AASHTO LRFD "Cold Climate". The AASHTO LRFD temperature for steel in a cold climate is -308 to 1208 F which places Maine in CVN Zone 2 thus requiring certification of steel CVN toughness at 15 ft-lbs at 408 F.

ASTM A7 structural steel from the 1930's was not formulated with any fatigue certification in mind and in the absence of actual testing it has been assumed that the steel will have a CVN of 7.5 ft-lbs. at 408F (half the AASHTO requirement). This assumption is based on experience on past projects where CVN testing was performed.

The determination of remaining fatigue life starts with a determination of the number of stress cycles a component has already experienced. In the case of bridges, that means first estimating the total truck volume in one lane from the bridge opening to the present (1931 – 2013). A present date of 2013 was used in the analysis to correspond to the date of the latest detailed bridge inspection. Estimated traffic data for the years 1947 through 2013, 2015, 2025, and 2035 were provided by MaineDOT. Traffic data before 1947 was calculated assuming variable growth rates based on available census data for Cumberland and Sagadahoc Counties and the State of Maine. The MaineDOT estimated truck percentage of 5% and directional distribution of 50% was held constant throughout.

The number of stress cycles per truck (CT) is based on AASHTO-LRFD Table 6.6.1.2.5-2:

Floor-beams (Transverse Members with Spacing >20 ft) CT = 1

The calculation of number of cycles is a basic numerical integration over time with varying growth rates.

$$N \equiv \int_0^P (1+GR)^X \times ADTT \times 365 days \approx Number\ of\ Vehicles\ \ for\ Period \times FT \times CT$$

GR = Growth Rate
ADTT = Average Daily Truck Traffic
P = Time Period
FT = Fraction of Trucks in one lane = 0.50
CT = Cycles per Truck CT = 1.0 floor-beams

For this bridge the estimated number of stress cycles for the period from 1931 to 2013 is:

Floor-beams = 11,600,000 cycles

The second part of determining the remaining fatigue life of a component is to determine a fatigue crack growth rate. In fatigue and fracture mechanics all growth models assume an initial flaw of some kind in the material. In steel, an initial flaw would be a crack assumed to be created in the production or fabrication processes. Thermal cut edges not ground smooth (common before the 1970's) would more than likely have cracks and rolled shapes can contain flaws from milling operations though not nearly as common as thermal cutting. A typical assumed initial flaw size is less than 0.03" (1/32").

Fatigue growth rate also depends on the total stress and the cyclic stress range the component is subjected to. It is obvious that the higher the stresses on the component, the shorter the fatigue life and vice versa. Determining the stresses due to bending for the stringers and floor-beams of the bridge is simple and straight forward. The determination of stresses in the clip angles for floor-beams is not so straight forward.

Floor-beam to truss connections are designed as simple pin connections assumed to have zero moment. The reality is that they have some negative moment caused by the resistance of the clip angle leg against the supporting element to rotation due to loading. Determination of the magnitude of the stresses due to moment using conventional mechanics is not an exact science and is highly dependent on the configuration of the connection. Estimates of live load stress can also be obtained through strain gages and field measurement under traffic. Another method of determining the stresses consists of using a crack growth model and inspection observation.

As mentioned above it is assumed that an initial flaw would be less than 0.03". Second, according to the available Bridge Inspection Reports and based on observations made during the reported Bridge Inspection there are no visible signs of cracking in the clip angle connections on the bridge, and that means that the largest a crack can be is 1/16" long without being visually detected. So we set the crack size to 1/16" for 2013. This estimate of an existing "non-detectable crack" could be further refined and reduced through various testing (dye-penetrant, magnetic particle, etc.) of a representative sample of the existing connections. This type of testing could change the assumptions regarding the existing conditions resulting in an increase in the estimated life. Third, calculate stresses based on conventional methods assuming a percentage of connection rigidity (in this case we started with 10% rigidity). Finally, use the crack growth model to determine an appropriate combination of initial crack size, crack growth rate and stresses to grow a crack to 1/16" in the estimated amount of stress cycles between 1931 and 2013 by numerical integration.

For clip angles the appropriate crack growth model is the single edge crack model (Ref: Barsom & Rolfe, page 17).

$$\Delta K_I = 1.12\Delta\sigma\sqrt{a_{AVG}\pi} \qquad\qquad \Delta N = \frac{\Delta a}{3.6\times10^{-10}\Delta K_I^3}$$

$\Delta\sigma$ = Live Load Stress Range of the AASHTO LRFD Fatigue Truck

Δa = crack growth rate

ΔK_I = Stress Intensity Factor Range

$\Delta N \equiv \mathit{Number\ of\ Cycles\ for\ growth\ of\ crack\ from\ } a_i \mathit{\ to\ } a_f$

a_j = Crack size at beginning of a period of cycles
a_f = Crack size at the end of a period of cycles
a_{AVG} = Average crack size during a period of cycles

The next part in calculating the remaining fatigue life is to estimate the total number of cycles it would take for a crack to grow to a Critical Flaw Size (a_{cr}).

Critical flaw size is the shortest crack length that would cause a fracture or would result in a component not able to provide enough design resistance to meet demand (in other words, a load rating of less than 1).

The critical flaw size (size that causes failure by brittle fracture) for the floor-beam to truss connections is computed based on Fracture Mechanics using the estimated maximum design stress. For clip angles the Fracture Critical Flaw Size is based on the edge crack model solved for crack size.

Critical Flaw Size (a_{cr}) to Fracture $$a_{cr} = \frac{K_{Id}^2}{1.12^2 \sigma^2 \pi}$$

σ = total stress in member (DL + LL)

$$K_{Id} = (5 \times E \times CVN)^{0.5} \quad (ksi\sqrt{in})$$

K_{Id} = Dynamic Stress Intensity Factor based on CVN

Assumed CVN = 7.5 ft-lbs at 408F (half AAHTO minimum for Zone 2)

The remaining fatigue life is calculated using numerical integration of the crack model from 1/16" to critical size using two different growth rates; the estimated growth rate between 1931-2013 (referred to as the slow growth rate) and a growth rate that is 2 or more times the slow rate. The two growth rates give a range of cycles to critical size.

The last part of calculating the remaining fatigue life is to translate the number of cycles to critical flaw size into years. This is done by projecting Truck traffic volume into the future. For this project we have estimated a traffic growth rate of 1% and held the percentage of trucks at 5% with the same 50% directional distribution factor.

Analysis Results:

	Crack Sizes			Remaining	Fatigue Life
	Initial (1931)	Current (2013)	Critical	Slow Rate years (year)	Accelerated Rate years (year)
Floor-beam to Truss Connection:					
Clip Angles (Interm. FB)	0.00431"	0.0625"	3.68"	27 (2040)	**14 (2027)**

These results show, once a crack is detected by visual inspection, the crack will propagate relatively quick. Crack growth rate can also be used to assess levels of concern as they relate to inspection cycle frequency and time to initiate repairs. These evaluation criteria are subjective and presume a repair will be initiated well before a crack reaches a critical state. A reasonably small crack will trigger significant concern and a repair. The evaluation can be used to qualitatively assess inspection frequency and repair concerns. The analysis results indicate the formation of a 1/8" or ¼" crack would take 6 and 8 years respectively at the computed growth rate. At that time 8 and 6 years respectively would remain before a crack grew to a critical size.

An analysis of two of the more difficult to estimate factors influencing the results (current crack size and live load stress range in the connection) were conducted to evaluate the sensitivity of the analysis. Using a current crack size of 1/32" (consistent with a more detailed inspection such as dye-penetrant testing), the Fatigue Life Accelerated Rate would be 28 years (2041). Using a reduced live load stress range at 85% of the calculated maximum value used in the fatigue analysis (a specific stress level would need to be established through strain gage measurements), the Fatigue Life Accelerated Rate would be 26 years (2039). Using a reduced live load stress range at 65% of the calculated maximum value used in the fatigue analysis, the Fatigue Life Accelerated Rate would be more than 50 years (>2065).

Conclusions & Recommendations:
The computed fatigue life for the floor beam to truss connection results are based on the best available information, and this estimate may be conservative. The sensitivity analysis shows that significantly different results may be obtained if better data was available for the analysis.

Based on the factors listed below, it is our opinion that the calculated fatigue life of the connection may not warrant the replacement of these connections as part of the current planned bridge rehabilitation:

- Conservative estimated fatigue life of 14 years based on available information.
- Sensitivity of the results to the available information.
- Long history, current observed condition, and past performance. Bridge has been in service for 84 years and recent detailed inspection did not identify any visible cracks in the floor-beam connections.
- The projected future crack growth rate and inspection cycle.
- There are reasonably low cost means of addressing any potential future cracks by crack arresting measures (drilled holes, etc.) or through replacement of the connection angles if needed. Cost for these types of repairs should be included in a life cycle cost analysis.

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Brunswick-Topsham, F.J. Wood Bridge
JN: 411813.00

By: RMH
Date: 11/13/2015
Check:
Date:

Life Cycle Cost Analysis

Assumptions:

Replacement Bridge Design Life = L =	75 years			
Discount Rate = D =	4 %			
Remaining Useful Life of Existing Bridge = RL =	**20 years**	**26 years**	**30 years**	**38 years**
Annual Inspection Cost for Existing Truss Bridge = TI =	$ 60,000			
Annual Inspection Cost for Replacement Bridge = RI =	$ 600			
Annual Maintenance Cost for Existing Truss Bridge (Fatigue Repairs) = TM =	$ 30,000			

Estimated Construction Cost of Alternates:

Bridge Rehabilitation Construction Cost (Alt 3) = R3 =	$ 7,700,000
Bridge Rehabilitation Construction Cost (Alt 4) = R4 =	$ 9,630,000
Low Cost Bridge Replacement Construction Cost (Alt 2) = R2 =	$ 12,990,000

Differential Present Values:

Deferred Bridge Replacement Cost = $R2/(1+D/100)^{RL}$ = DBC =	$ 5,928,000	$ 4,685,000	$ 4,005,000	$ 2,926,000
Residual Value of Replacement Bridge at Year 75 = $R2*(RL/L)/(1+D/100)^{L}$ = RVR =	$ 183,000	$ 238,000	$ 274,000	$ 347,000
Differential Bridge Inspection Cost = $(TI-RI)*RL/(1+D/100)^{RL}$ = DBI =	$ 542,000	$ 557,000	$ 549,000	$ 509,000
Differential Bridge Maintenance Cost = $TM*RL/(1+D/100)^{RL}$ = DBM =	$ 274,000	$ 281,000	$ 277,000	$ 257,000

Bridge Rehabilitation (Alt 3) Net Present Value in Comparison to Low Cost Alternate 3:

Net Present Value of Bridge Rehabilitation = R3+DBC-RVR+DBI+DBM =	**$ 14,260,000**	**$ 12,990,000**	**$ 12,260,000**	**$ 11,050,000**

Bridge Rehabilitation (Alt 4) Net Present Value in Comparison to Low Cost Alternate 3:

Net Present Value of Bridge Rehabilitation = R4+DBC-RVR+DBI+DBM =	**$ 16,190,000**	**$ 14,920,000**	**$ 14,190,000**	**$ 12,980,000**

From:	Norman Baker
To:	Kittredge, Joel
Cc:	Rick Hebert; Daniel Myers
Subject:	RE: FJW Fatigue
Date:	Friday, November 13, 2015 6:58:20 AM
Attachments:	FJ Wood Bridge - Progress Fatigue Evaluation Memo 2015-11-13.pdf LCCA - FJ Wood Bridge 2015-11-13.pdf

Joel,

I've attached the requested memo. Our conclusion is really based on the discussion we had with the Department earlier last month as described in the October 19, 2015, memo, that there is currently no evidence of fatigue issues, that the fatigue details would continue to get hands-on inspection bi-annually, and that fatigue issues could be repaired or mitigated if discovered. The first 4 pages of the Fatigue Evaluation Memo describes the background and approach we took. The last 2 pages really focus on the results and conclusions.

We have also made a modification to the LCCA previously sent to you earlier and included it here. That modification conservatively considers a hands-on inspection costing of $60,000 (previously $45,000) and $30,000 of maintenance repairs annually. We adjusted the matrix shown to determine the "break even" year for the rehabilitation project to become cost-effective. For the minimum rehab, one sidewalk, a future life of 26 years makes the rehab cost-effective. If an additional sidewalk is added to the existing bridge, the future life of the bridge would need to be 38 years to make it cost-effective.

The 30 year target life was not established by any calculated or empirical approach, but rather from a general approach on historical bridge life. This also was briefly discussed at the 11/19/15 meeting, the structural steel and substructure units would be 115 years old and the new deck and paint system would have 30 years use.

I hope this helps and I would be willing to come in and talk with you directly if you feel that would be useful.

Sincerely,

Norman L. Baker, P.E.
Senior Project Manager
T·Y·LIN INTERNATIONAL
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Falmouth, ME 04105
207.781.4721 main
207.347.4349 direct
207.310.4559 mobile
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From: Kittredge, Joel [mailto:Joel.C.Kittredge@maine.gov]
Sent: Tuesday, November 10, 2015 3:46 PM
To: Norman Baker <norman.baker@tylin.com>
Subject: FJW Fatigue

Norm:

Would you please forward a *quick brief* narrative re what TYLIN has done for the analysis and what your conclusion is. Not looking to drill down for a full report, nor final recommendations, but rather a preliminary summary of assumptions, initial and resultant concerns, and where the 30 years target came from.

If I could have email by Friday 9 AM, that would be great.

Thanks---Joel.

From: John Shattuck
To: Kittredge, Joel
Subject: \MHPC #1595-15 Frank J. Wood Bridge- Topsham-Brunswick
Date: Friday, April 22, 2016 9:50:07 AM

FYI

From: Carol Eyerman
Sent: Friday, April 22, 2016 9:30 AM
To: Rod Melanson; John Shattuck; Rich Roedner
Subject: FW: MHPC #1595-15 Frank J. Wood Bridge- Topsham-Brunswick

See below for discussion with John Graham re: FW Bridge. I advised that he should bring letter to HDC for a vote and go from there.

Best,

Carol Eyerman, AICP
Assistant Planner

From: John Graham [mailto:John@johngrahamrealestate.com]
Sent: Friday, April 22, 2016 8:51 AM
To: Carol Eyerman <ceyerman@topshammaine.com>
Subject: Fwd: MHPC #1595-15 Frank J. Wood Bridge- Topsham-Brunswick

Hi Carol,

Please see the emails below. I think the the Historical Board should be a consulting party in the removal of the bridge. We would need to write a letter and send it to the Federal DOT. I can write it or you can. I just want to see what the process should be. Should we vote as a committee? Please advice.

John

John Graham
John Graham Real Estate
www.johngrahamrealestate.com
207-491-1660
10 Pleasant Street
Topsham, ME 04086

Begin forwarded message:

From: "Hopkin, Megan M" <Megan.M.Hopkin@maine.gov>
Subject: RE: MHPC #1595-15 Frank J. Wood Bridge- Topsham-Brunswick

Date: April 22, 2016 at 8:40:24 AM EDT
To: John Graham <John@johngrahamrealestate.com>
Cc: Cassie Chase <Cassandra.Chase@dot.gov>

John,

Thank you for your inquiry. In order for the Topsham Historical Review Board to be considered a consulting party for Section 106 review, the Review Board will have to submit a letter in writing to Federal Highway Maine Division. I am copying Cassandra Chase (Cassandra.chase@dot.gov or 207-512-4921) on this email. Since FHWA is the lead federal agency on this project, they oversee the Section 106 process handled by MaineDOT. Cassie will be more than willing to answer any questions you may have about becoming a consulting party and what details need to be included in the formal request.

Please don't hesitate to contact me with any further questions you may have about the 106 process for this project.

I look forward to working with you and the Topsham Historical Review Board.

Sincerely,

Megan M. Hopkin

-----Original Message-----
From: John Graham [mailto:John@johngrahamrealestate.com]
Sent: Thursday, April 21, 2016 6:43 PM
To: Hopkin, Megan M
Subject: MHPC #1595-15 Frank J. Wood Bridge- Topsham-Brunswick

Hi Megan,

I am writing to request that the Topsham Historical Review Board be listed and included as a Consulting Party for the 106 Review of Frank J. Wood Bridge. I spoke with Robin Reed and she informed me that I needed to reach out to you. Please advice how we need to be listed and included in this process?

John Graham
Vice-President
Town of Topsham
Historical Board.
207-491-1660

John Graham
John Graham Real Estate
www.johngrahamrealestate.com
207-491-1660
10 Pleasant Street
Topsham, ME 04086

Total Control Panel Login

To: ceyerman@topshammaine.com	Message Score: 50	High (60): Pass
From: john@johngrahamrealestate.com	My Spam Blocking Level: Medium	Medium (75): Pass
	Block this sender	Low (90): Pass
	Block johngrahamrealestate.com	

This message was delivered because the content filter score did not exceed your filter level.

Brunswick-Topsham Bridge

Respecting the past and moving toward an exciting future!

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Preliminary Design Study Objectives

- Evaluate project constraints & impacts
- Investigate bridge rehabilitation / replacement options
- Identify alternatives that best meet project objectives
  - Improvements to FJW Bridge that promote safety and mobility

Project History

- Detailed Inspection & Load Rating
- Programmed for Improvements
- Preliminary Public Meeting
- Several meetings with Town Officials & Brookfield Power
- Presentations to impacted abutters, Brunswick TC & Area Interest Grps.

Existing Conditions

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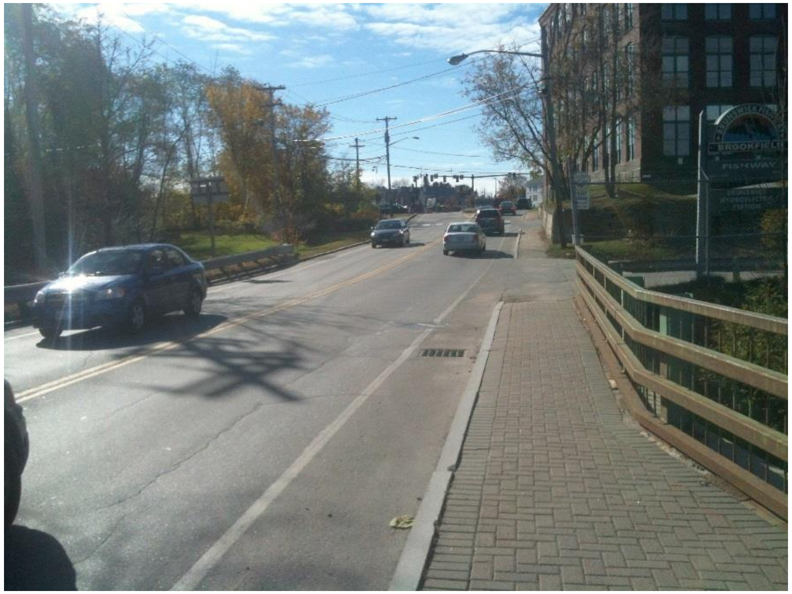
South Approach



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North Approach

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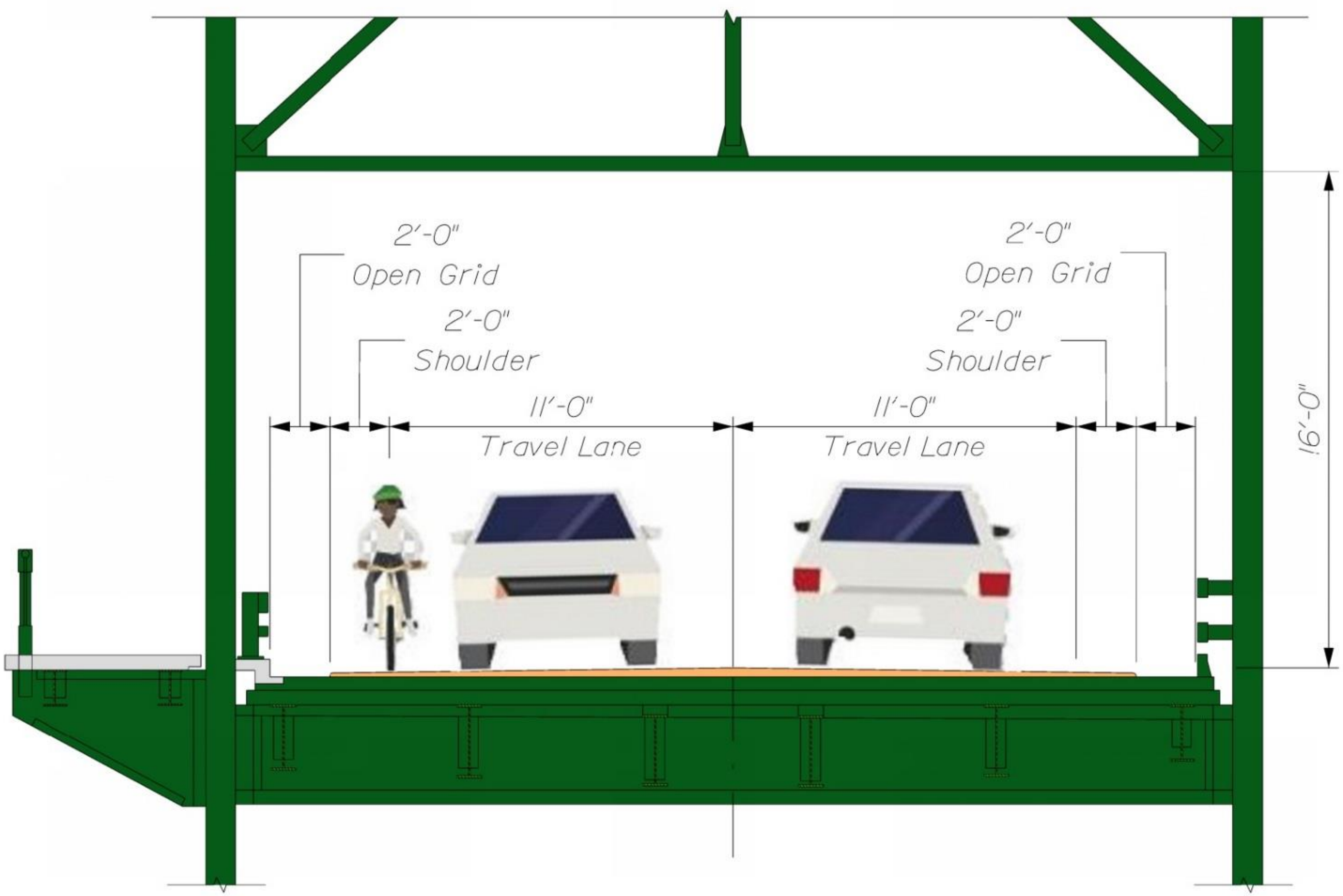
Existing Bridge

- Painted Steel Thru Truss 800’ Long
- Concrete Abutments & Piers
- 22’ travelway with 4’ shlders & 5’ sidewalk
- 2015 AADT = 18,860
- 2035 AADT = 22,630
- Critical Rate Factor < 1.0
- Repaired in 1985, 2006 & 2015

Existing Bridge Transverse Section



EXISTING BRIDGE SECTION

Alternates Investigated

- Rehabilitation of Existing Bridge
- Rehabilitation of Existing Bridge with a 2nd Sidewalk
- Replacement Downstream
- Replacement Upstream

Rehab Existing Bridge

- Cost $10 Million (Includes 2nd sidewalk)
  - New Concrete Deck
  - Repair or Replace some deteriorated steel elements
  - Strengthen some members for current loading standards
  - Abutment Repair
  - Paint all the steel

Rehabilitation Advantages

- Maintains Existing Alignment
- Reduced Environmental Impacts
- No R/W or Utility Impacts
- Least Initial Cost

Rehabilitation Disadvantages

- Additional Sidewalk
- Traffic Disruptions during Construction
- Total project length about 19 months with 5 months traffic use in the middle
- Future Inspections Expensive & Disruptive to Traffic
- Most Expensive Life Cycle Costs
- Increased Uncertainties
- Lifespan of 30 years +/-
- Removal of a historic bridge structure

Replacement Alternatives

- Cost $12-13 Million
- Inspection & Maint. Costs Reduced
- Increased Improvement to Mobility & Safety
- Lifespan of 100 years

Downstream Alternative

- Impacts in Brunswick
  - Town Park
- Impacts in Topsham
  - Street Parking
  - Dentist Office
- River Impacts
  - Hydraulics
  - Substructures within Dam Sluiceway

Upstream Alternative

- Impacts in Brunswick
  - Improve Retaining Wall for Parking Lot
  - Riverbank Parking
- Impacts in Topsham
  - Parking Bank
- River Impacts
  - Closer to Dam & Fishway
  - Improve Hydraulics
  - Utilize Ledge Outcrops

Upstream Alternate Benefits

- Improves mobility and public safety
- Added sidewalk and roadway width improves public safety and addresses local concern
- Minimizes traffic disruption during construction
- Low maintenance structure
- Maintains existing hydraulic conditions

Existing Bridge

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Replacement Bridge - Upstream Alignment

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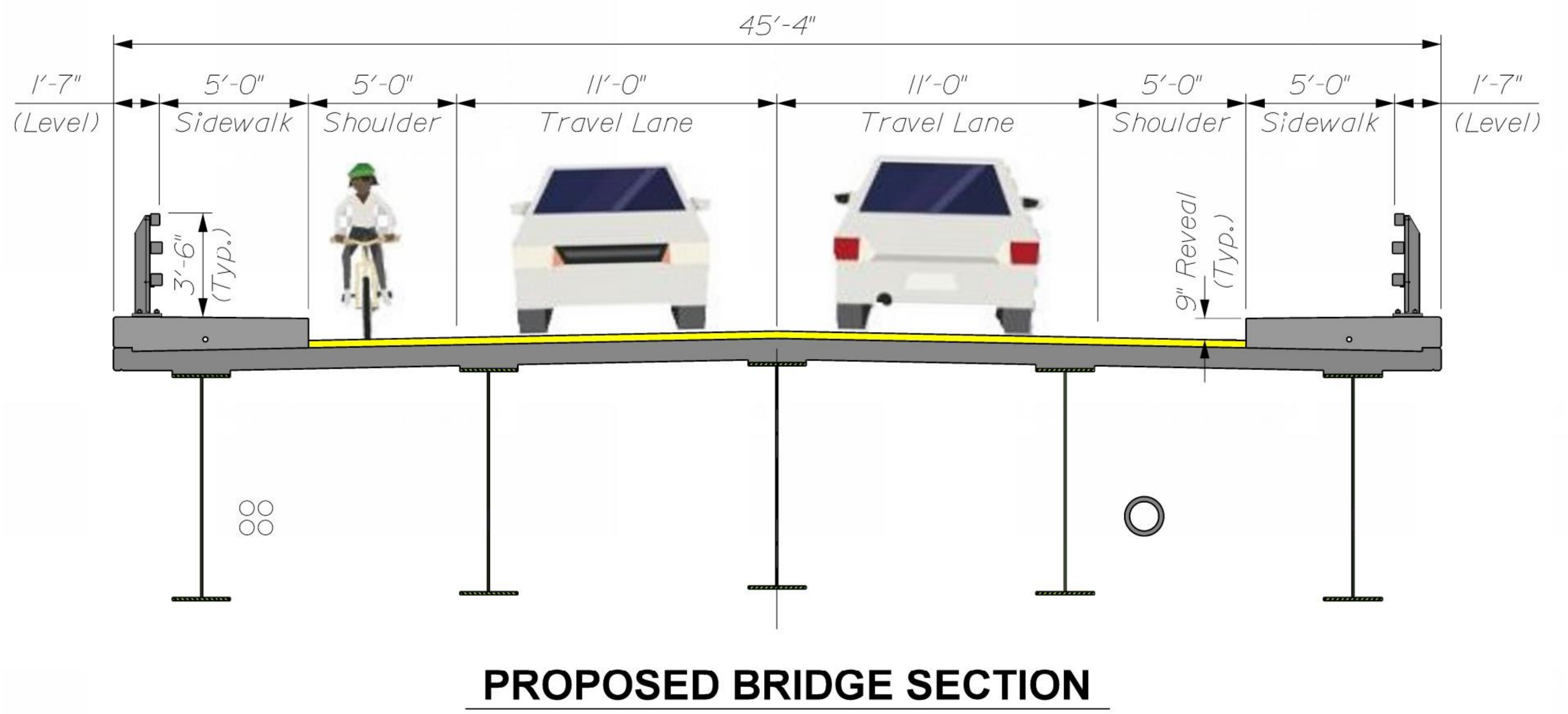
Downstream View

Proposed Bridge Transverse Section



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Brunswick Approach

Brunswick Approach

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Obs. Platform View

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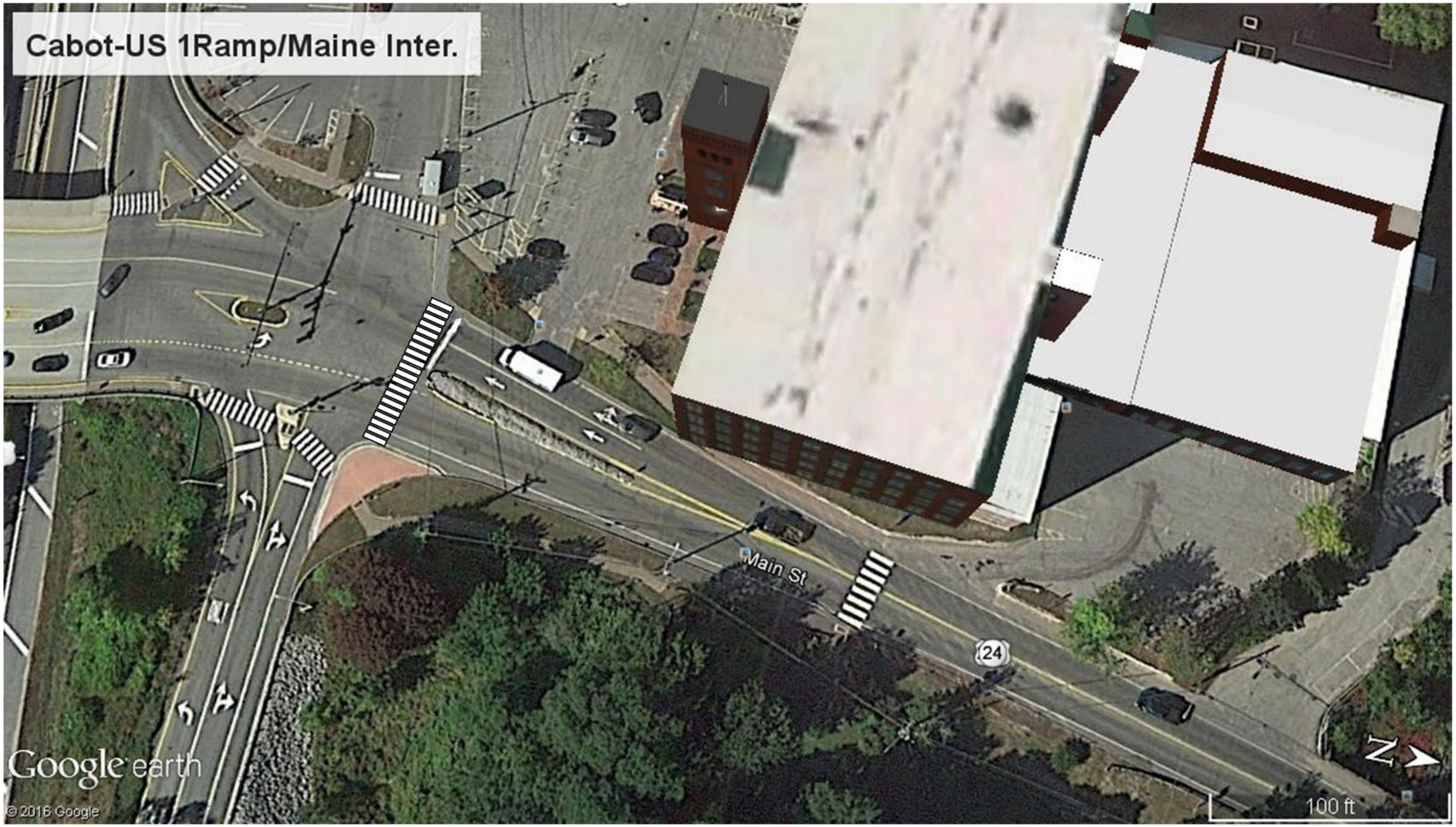

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Topsham Approach

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Topsham Approach

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Obs. Platform View

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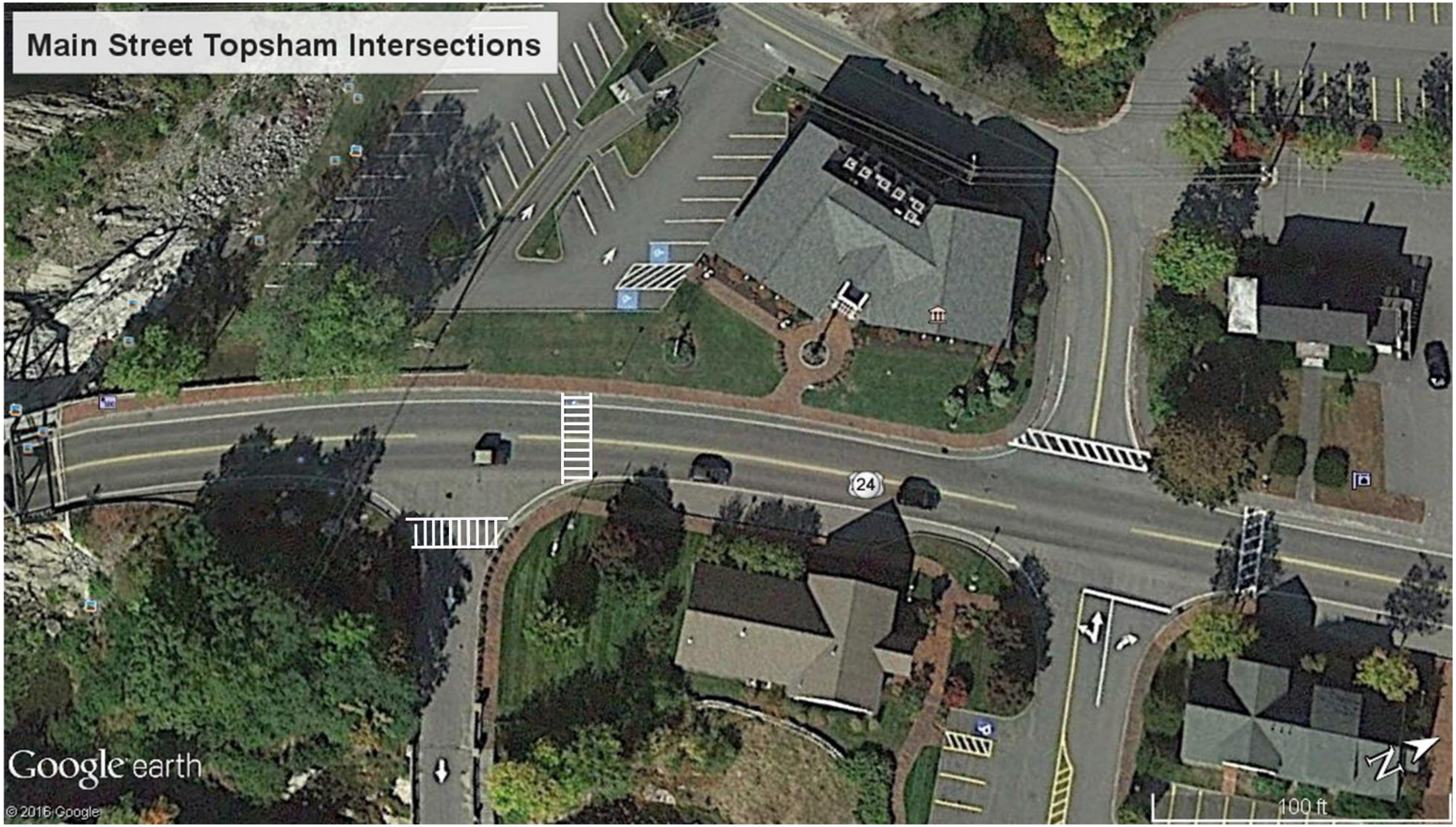
Main Street Topsham Intersections
24
Google earth
© 2016 Google
100 ft

Elevation View

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- **Question:** **Trail/sidewalk under the abutments?**
- ***Answer:*** ***Requires significant ramps in the park and on the Brookfield side to get a trail in front of the Brunswick abutment. Trail would need to be cut into the riprap slope. Need Brookfield input.***

- **Question:** **What is the connectivity of our project to the Riverwalk.**
- **Answer:** **C*onnected easily on both ends. If park develops in Topsham, can consider stairway access from retaining wall.***

- **Question:** **How are the rails tied in or ended to allow connectivity?**
- **Answer:** ***The bridge rails will end with concrete endposts on 3 corners with Type 3 guard rail attached with bridge transitions. The 4th corner, northwest corner, the bridge rail will continue along the retaining wall and end with a concrete endpost and similar guard rail transitions.***

- **Question: LCCA---Explain the assumptions. How we got to the $10 M.**
- ***Answer: Included in presentation.***

- **Question: Need a graphic showing the actual detail re riders on a 4' rehab shoulder vs a 5' replacement shoulder.**
- ***Answer: Included in presentation.***

- **Question: How many trusses / similar structures have we removed/rehabilitated?**
- ***Answer: Steel trusses removed since 1999: 23 NR-eligible, 24 Non-NR-eligible. NR-Eligible Trusses with rehabilitations recently instead of replacement: 1***

- **Question: Intersections (sidewalk are where exactly?) and what are we doing on Main Street?**
- ***Answer: Included in presentation.***

- **Question: Can we mount rail pales on the front side?**
- ***Answer: This won't prevent climbing as the 4" spacing of the pales would still allow a foot to slip onto the railing. Only solution to climbing would be to face with something like chainlink fence or to make a solid barrier.***

- **Question: Rail spacing? Contractor/OSHA?**
- ***Answer: BOCA or IBC code controls the "climbing" restrictions in buildings.   Don't believe that bridge railings are subject to these crash tested railings that are used nationally.***

- Question: **What about raised shoulders for bikes with colored paint for delineation.**
- **Answer:** ***Raised will cause another debris trap. We should explore pavement dyes.***

- **Question: Calming? Rumble strips, paint, other?**
- ***Answer: Wider fog line, dyed shoulder are options. Rumble strips a big issue for bridges and cylists. Paint may be slippery.***

- **Question: Fishing spot(s) at abutments in park areas?**
- ***Answer: Can work on improving access with towns and abutters.***

Obs. Platform View

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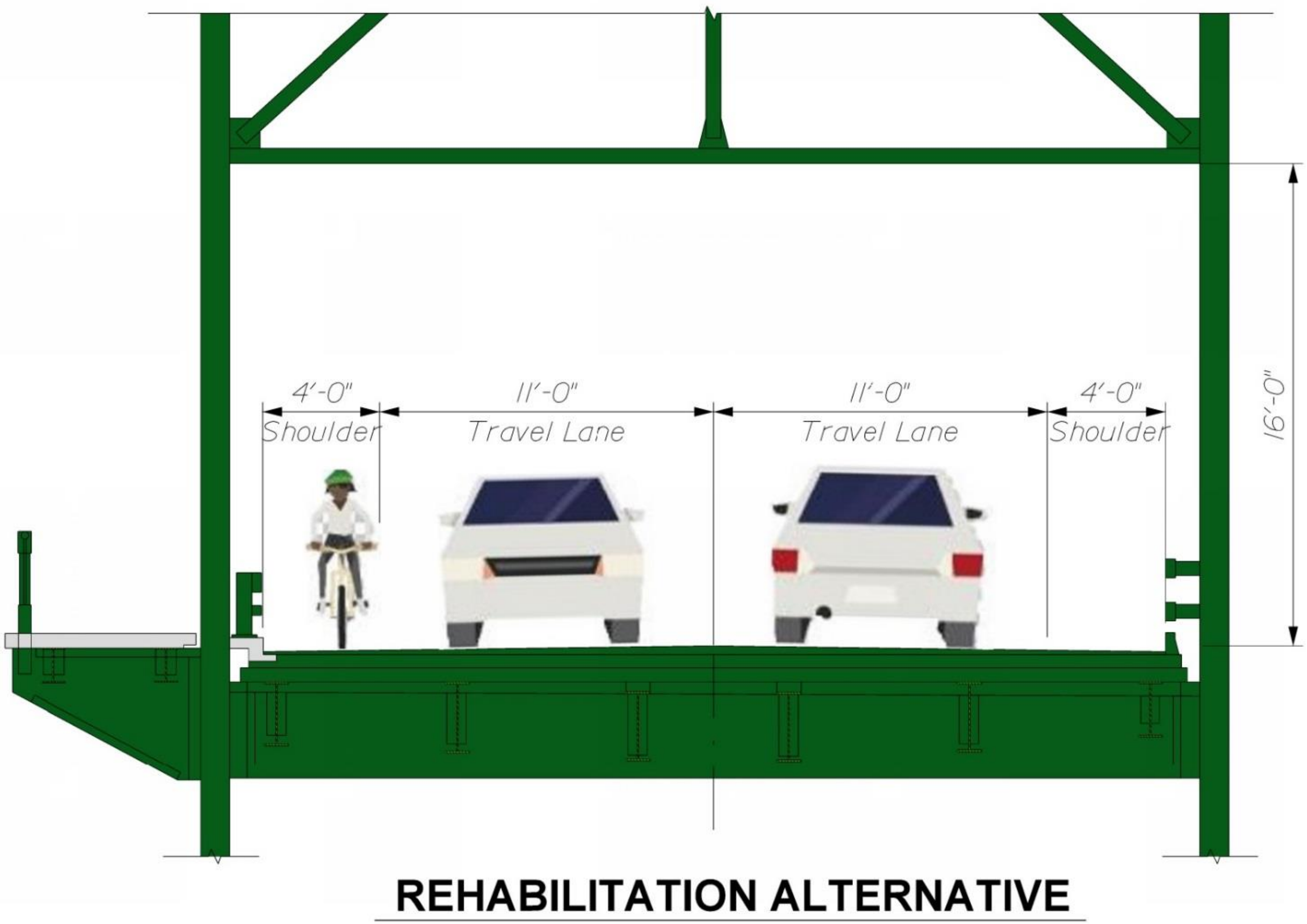
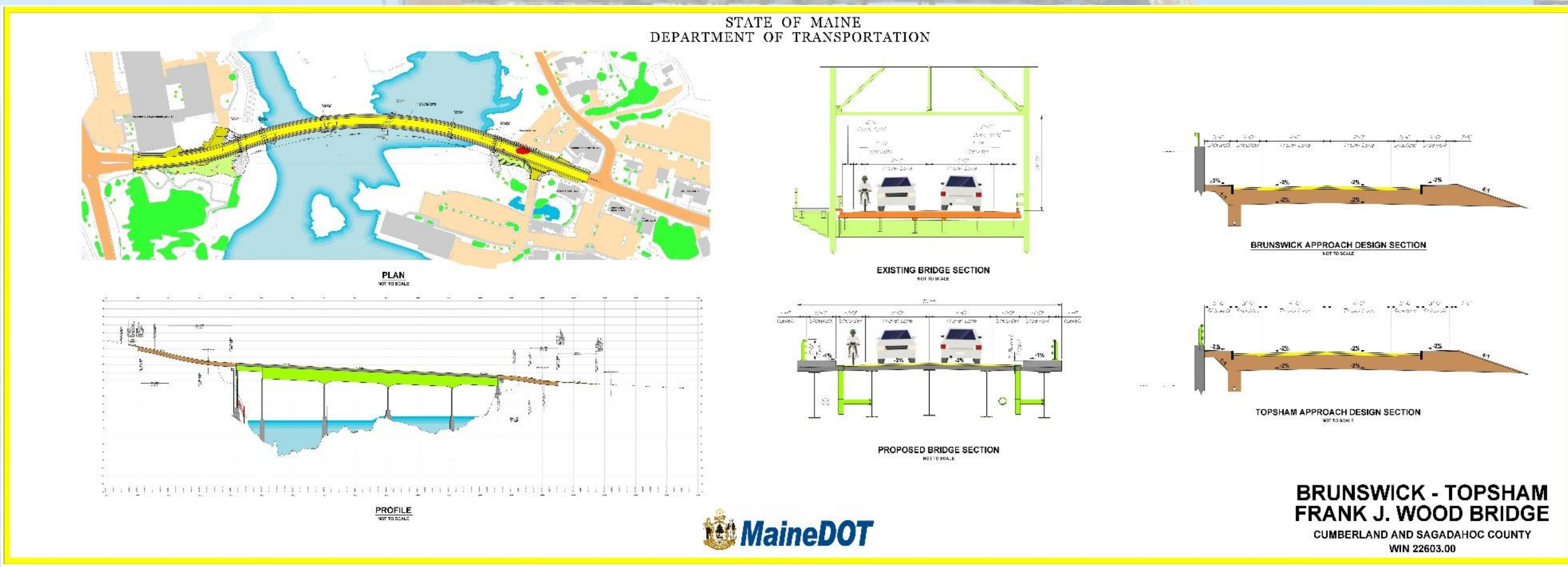
Rehab Alt. Transverse Section



Hearing Plan



Questions?

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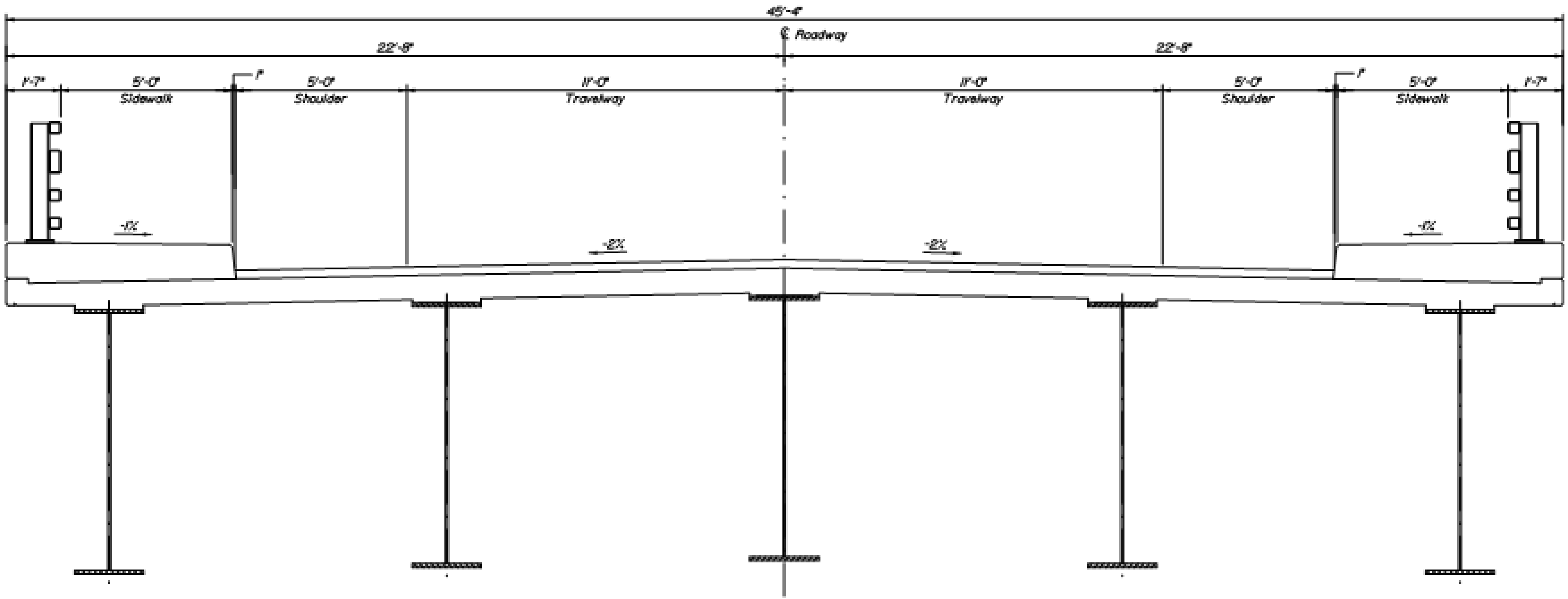
Replacement Bridge – Transverse Section



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Replacement Benefits

- Added sidewalk improves public safety and addresses local concern
- Added roadway width improves bicycling
- No significant traffic disruptions
- Low maintenance

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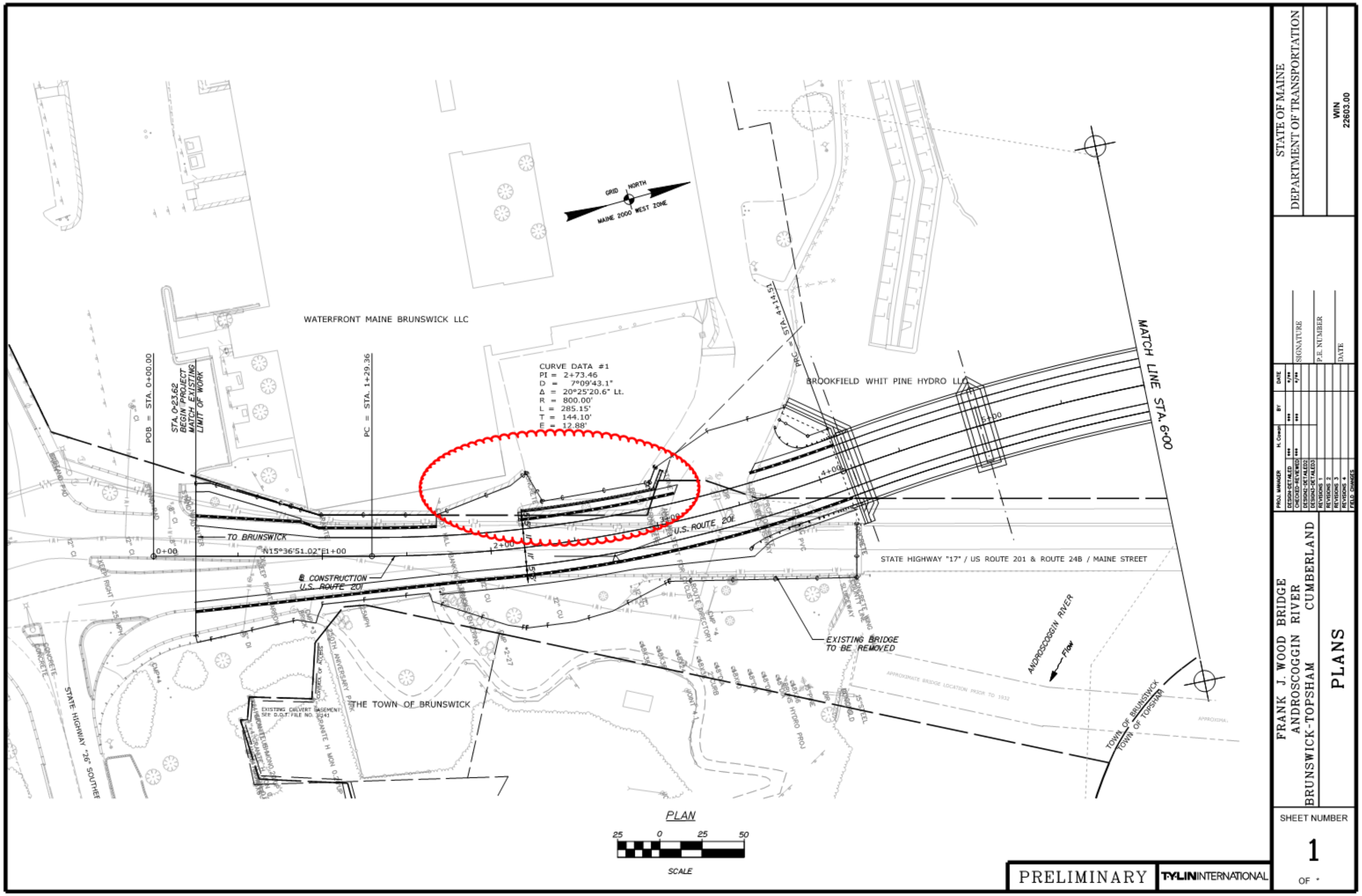
MaineDOT

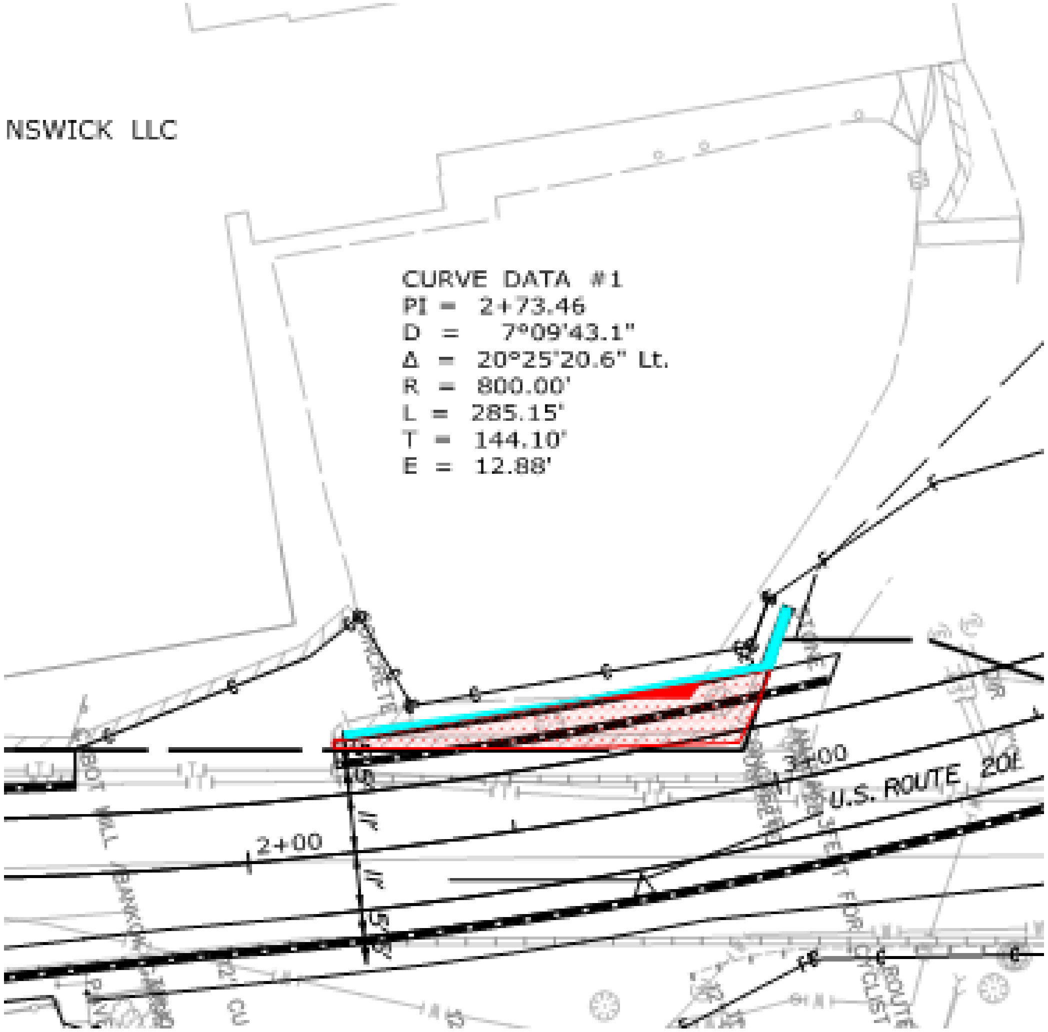
Measures Taken to Reduce Impacts – Brunswick Approach



T·Y·LIN INTERNATIONAL

MaineDOT

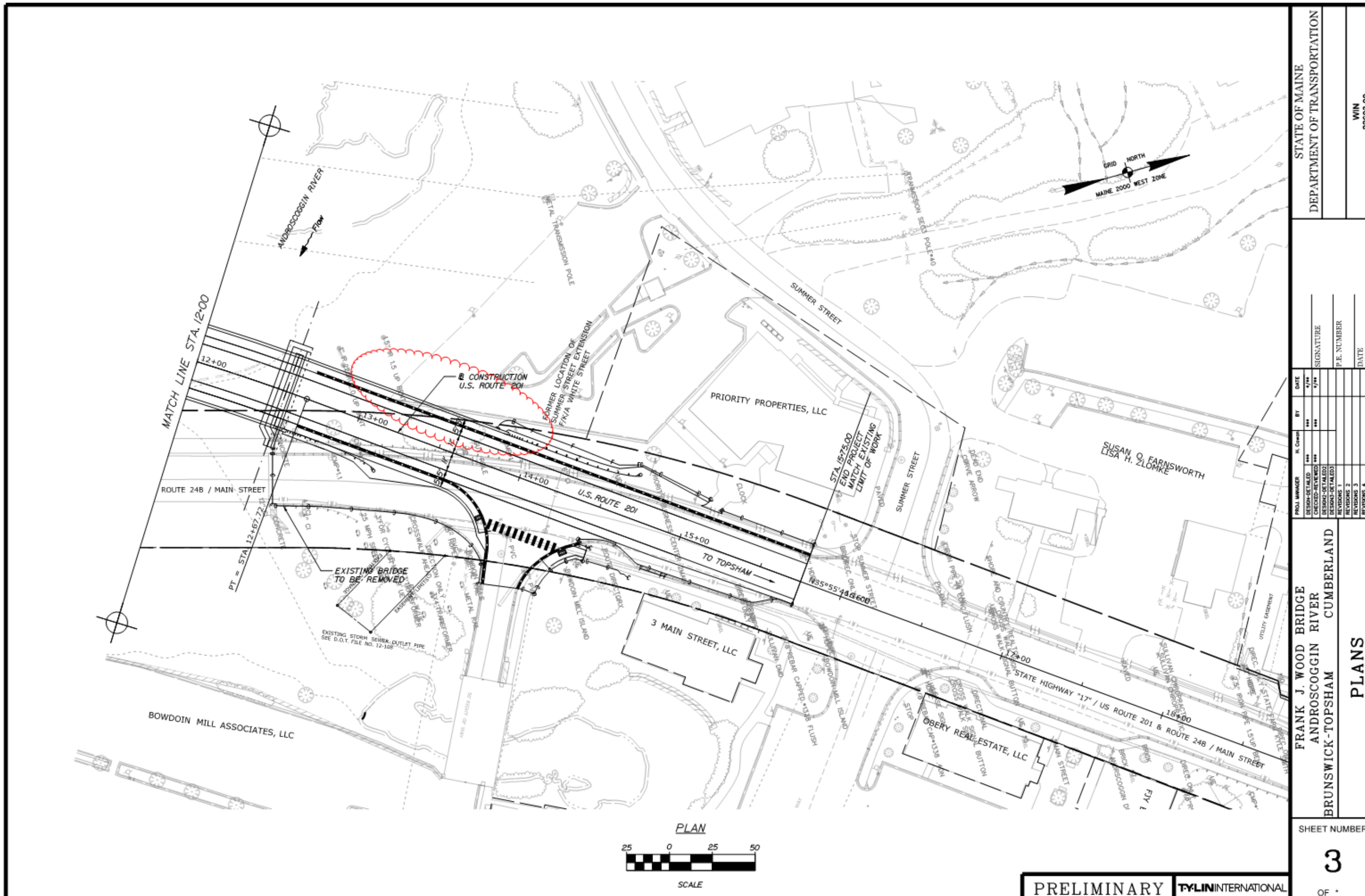
Measures Taken to Reduce Impacts – Brunswick Approach



T·Y·LIN INTERNATIONAL

MaineDOT

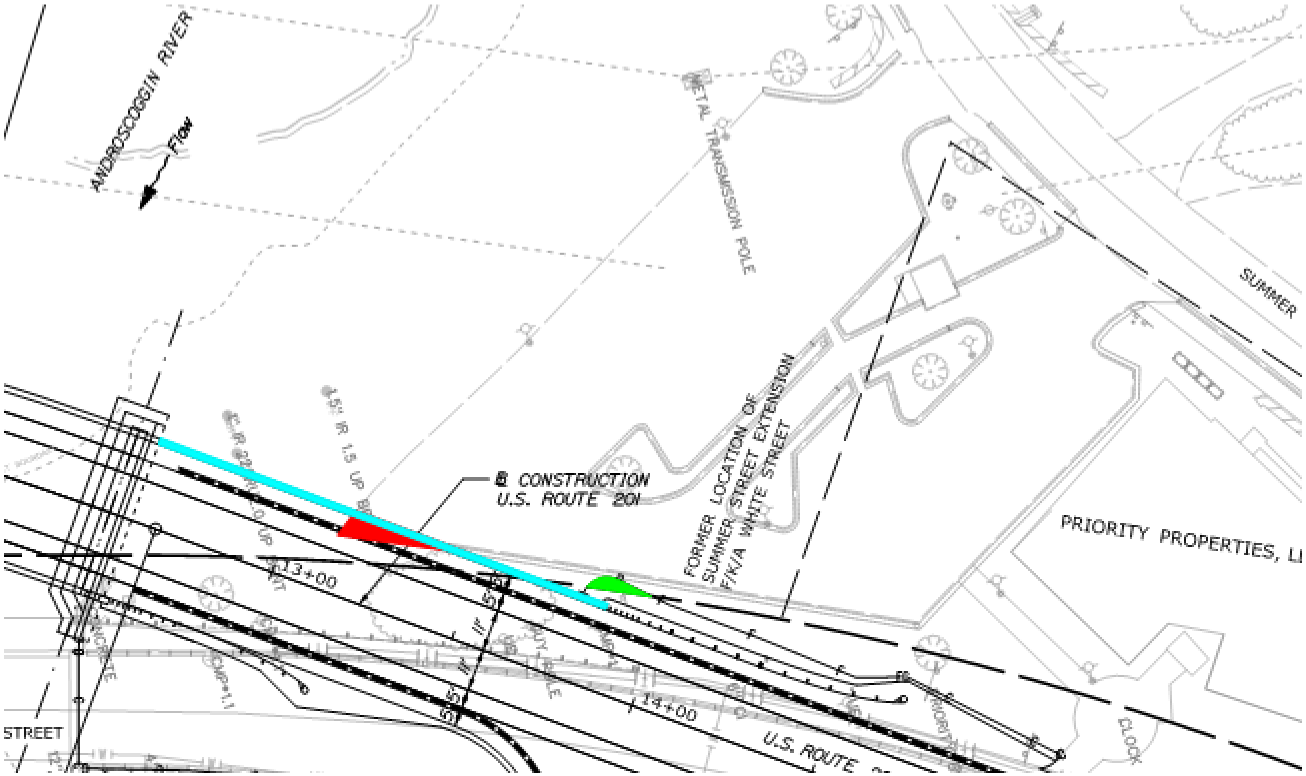
Measures Taken to Reduce Impacts – Topsham Approach



TY·LIN INTERNATIONAL

MaineDOT

Measures Taken to Reduce Impacts – Topsham Approach



TY·LIN INTERNATIONAL

MaineDOT

Replacement Bridge - Elevation

Replacement Bridge - Section

TYLININTERNATIONAL

MaineDOT

From: Kittredge, Joel
To: "Norman Baker"
Subject: Monday"s presentation
Date: Friday, April 22, 2016 11:36:51 AM

Norm:

As discussed, please

- **1st slide: reduce font, insert date, and use the aerial rendering, view looking upstream as backdrop.**
- **2nd slide, location map, remove.**
- **"Existing Bridge" slide, please look through images for the absolutely worst, ugliest, restricted most corroded, etc., and use that.** → not baised!
- **Make an "Upstream Alternative---Advantages" slide**
  - **Include**
    - **Whatever we have had done in the past**
    - **Safety**
    - **Maintenance of traffic**
    - **Etc.**
- **Remove bridge drains from "Proposed Bridge Section" slide.**
- **See if getting rid of green frame color on "Exisitng Bridge Section slide "reduces" visual width.**
- **Need something to show the intersections and sidewalk connections.**
- **Get rid of the "Questions?" slide and use the aerial rendering, view looking upstream for the last slide to remain during questions.**

Have a great weekend.

Thanks---Joel

From:	Kittredge, Joel
To:	Norman Baker
Subject:	FJW STATUS
Date:	Monday, May 02, 2016 1:22:39 PM

Norm:

- **Municipal resolutions are coming quickly: 2 weeks for Brunswick, and Topsham will deliver on Thursday.**
- **Towns are moving forward with a replacement bridge advisory committee of 15; 7 people from each side of the river, and 1 from Harpswell. The committee includes supportive bike/ped representatives and historic board members**
- **Business groups and committees in each town will be drafting letters of support.**
- **A 3 way meeting between MaineDOT, MHPC and John G, etc. received a thumbs down for now, as it is thought that they are already talking to Kirk Mohney, etc. We may meet later.**
- ***We need to forward LCCA to John G. later this week. Would you please compile a package of material/files that you feel would best clearly state our assumptions and the outcome.***

Thanks---Joel

From:	John Shattuck
To:	Kittredge, Joel
Subject:	FJW Bridge §106 process
Date:	Tuesday, May 24, 2016 12:48:11 PM

JOEL: Many thanks for Kristin contact info!!

I think I left you a VM message regarding the §106 process, saying that I don't think we have much to worry about, even though the feds will apparently give "consulting party" status to pretty much anyone who requests it. After reviewing the implications of a consulting party designation with both Cassie Chase and Kristin Chamberlain, I'm satisfied that the designation will not elevate the impact of their comments. That said, the towns are planning to note their entitled consulting party status in their resolutions. Please don't hesitate to call if you want to discuss this further. Thanks, John

---

From: Kittredge, Joel [Joel.C.Kittredge@maine.gov]
Sent: Tuesday, May 24, 2016 12:26 PM
To: John Shattuck
Subject: RE: Kristen Chamberlain contact info

Kristen Chamberlain
Bridge, Multi Modal and Traffic Team Leader
Environmental Office
Maine Department of Transportation
(207) 557-5089
(207) 624-3101 Fax

Chamberlain, Kristen Kristen.Chamberlain@maine.gov
557-5089

From: John Shattuck [mailto:jshattuck@topshammaine.com]
Sent: Tuesday, May 24, 2016 12:23 PM
To: Kittredge, Joel
Cc: John Shattuck
Subject: Kristen Chamberlain contact info

JOEL: I believe you've already sent me Kristin's contact info, but I seem to have misplaced it - I'd be grateful if you could take a moment as soon as you can to send it to me again. Thanks, John

---

Block this sender

Block maine.gov

This message was delivered because the content filter score did not exceed your filter level.

From:	John Shattuck
To:	Kittredge, Joel
Cc:	Rich Roedner; Rod Melanson; lsmith@brunswickme.org; abreinich@brunswickme.org; jeldridge@brunswickme.org
Subject:	FJWB news coverage
Date:	Wednesday, April 20, 2016 1:38:46 PM

Here's the coverage, so far. The article in the TR is a bit odd, as the reporter seems to think that the various options are still being actively considered …

http://www.timesrecord.com/news/2016-04-20/Front_Page/Repair_or_replace_Green_Bridge.html

http://www.theforecaster.net/construction-of-new-brunswick-topsham-bridge-could-start-in-2018/

--
John Shattuck
Director, Economic & Community Development
Town of Topsham
100 Main Street
Topsham ME 04086

Office: (207) 373-5097
Mobile: (207) 650-0012
Email: jshattuck@TopshamMaine.com

Topsham because: http://youtu.be/Y_luU6wJMOU

From:	Kittredge, Joel
To:	Norman Baker
Subject:	FW: "A 4 or less"
Date:	Thursday, May 12, 2016 8:17:15 AM

Hi Norm:

Would you please clarify what (if any) issue there was/is?

Thanks---Joel

From: John Shattuck [mailto:jshattuck@topshammaine.com]
Sent: Wednesday, May 11, 2016 7:57 PM
To: Kittredge, Joel
Subject: "A 4 or less"

JOEL: During a discussion of the FJWB project at tonight's regular monthly meeting of the Topsham Historic District Commission (HDC), Commission member John Graham stated that, subsequent to the 04-27 public hearing, Norm Baker had "apologized" to him for his (Norm's) statement during the hearing, that the FJWB was "A 4 or less" on a nine point scale – presumably the National Bridge Inventory (NBI) 0 to 9 rating scale. The pertinent transcript excerpt is below.

Given Norm's good manners, it is, of course, entirely possible that he apologized to John for not being able to provide an immediate answer or documentation in response to a question. It seems exceedingly unlikely to me, that Norm would apologize for his statement, but I thought I should pass it on to you. John Graham also asserted that, in response to his requests, he's received additional information from Norm via email. Interestingly, John did not assert that the "apology" was included in any email. I'd be interested in your thoughts.

I should also mention that, because the FJWB project was not on tonight's HDC agenda as an action item, the Commission did not take a formal vote on taking a position on the project, but three of the four Commission members in attendance made it very clear that they supported the Department's recommendation that the existing bridge be replaced. John

ps: On Friday I'll be heading down to Bar Harbor to attend the annual Downtown Conference. On the way home, I'm looking forward to detouring over to take a look at the new Penobscot Narrows Bridge. It's probably kinda pathetic that I consider that big fun – but I do!

TRANSCRIPT EXCERPT – beginning at p. 52, l. 14:

AUDIENCE MEMBER: (John Graham.) Do you know what that scored in that 1 through 9?

MR. BAKER: What part if it, sir?

AUDIENCE MEMBER: (John Graham.) The safety, the structural safety of the ability to continue to drive traffic across that bridge.

MR. BAKER: This bridge is considered structurally deficient.

AUDIENCE MEMBER: (John Graham.) Do you know what number that scored on that?

MR. BAKER: A 4 or less.

AUDIENCE MEMBER: (John Graham.) A 4 or less. Okay.

MR. BAKER: A 4 or less.

AUDIENCE MEMBER: (John Graham.) **The reason he says that is because everything above 5 calls for preventative maintenance**, so everything above 5 calls for preventative maintenance. For 0 the bridge is unsafe. From 1 to 4 is rehab or replace. [**Emphasis added**]

--
John Shattuck
Director, Economic & Community Development
Town of Topsham
100 Main Street
Topsham ME 04086

Office: (207) 373-5097
Mobile: (207) 650-0012
Email: jshattuck@TopshamMaine.com

Topsham because: http://youtu.be/Y_luU6wJMOU

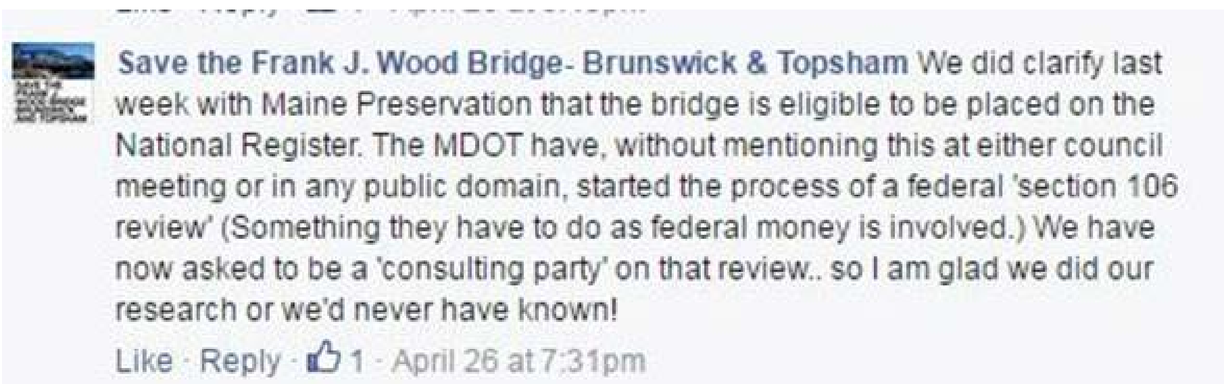
From:	Kittredge, Joel
To:	Chamberlain, Kristen; Folsom, Jeff; Frankhauser Jr, Wayne
Subject:	FW: Consulting party status
Date:	Monday, May 02, 2016 1:44:37 PM

fyi

From: John Shattuck [mailto:jshattuck@topshammaine.com]
Sent: Monday, May 02, 2016 1:38 PM
To: Kittredge, Joel
Subject: Consulting party status

JOEL: Please see below for the post I mentioned on the save the bridge Facebook page* regarding their intention to seek “consulting party” status in the section 106 process. Below the post, I’ve also attached a couple of links to the resources they are apparently using for guidance. John

* Save the Frank J. Wood Bridge- Brunswick & Topsham
Facebook page: https://www.facebook.com/FrankJWoodBridge/?fref=ts



Save the Frank J. Wood Bridge- Brunswick & Topsham We did clarify last week with Maine Preservation that the bridge is eligible to be placed on the National Register. The MDOT have, without mentioning this at either council meeting or in any public domain, started the process of a federal 'section 106 review' (Something they have to do as federal money is involved.) We have now asked to be a 'consulting party' on that review.. so I am glad we did our research or we'd never have known!
Like · Reply · 1 · April 26 at 7:31pm

Protecting Historic Properties:
A Citizens Guide to Section 106 Review – see pp 14-17
http://www.achp.gov/docs/CitizenGuide.pdf

Section 106 Applicant Toolkit
http://www.achp.gov/apptoolkit.html

--
John Shattuck
Director, Economic & Community Development
Town of Topsham

100 Main Street
Topsham ME 04086

Office: (207) 373-5097
Mobile: (207) 650-0012
Email: jshattuck@TopshamMaine.com

Topsham because: http://youtu.be/Y_luU6wJMOU

From:	Kittredge, Joel
To:	Talbot, Ted W (DOT); Folsom, Jeff; Frankhauser Jr, Wayne
Subject:	Fw: Take a meander over to Facebook, check out the following page
Date:	Thursday, April 21, 2016 12:16:16 PM

Fyi

Sent from my BlackBerry 10 smartphone on the Verizon Wireless 4G LTE network.

From: Rich Roedner <rroedner@topshammaine.com>
Sent: Thursday, April 21, 2016 10:37 AM
To: Kittredge, Joel
Cc: John Shattuck
Subject: FW: Take a meander over to Facebook, check out the following page

Hi Joel

Just to keep you up to date on bridge goings-on.

There is a facebook page started last week call Save the Frank J. Wood Bridge.

You might want to check it out to see comments and issues as you and your team prep for next week's meetings.

Rich

Rich Roedner
Town Manager
Town of Topsham

rroedner@topshammaine.com
www.topshammaine.com

207-725-5821

From: Pam Leduc
Sent: Thursday, April 21, 2016 9:13 AM
To: John Shattuck <jshattuck@topshammaine.com>; Rich Roedner <rroedner@topshammaine.com>
Subject: Take a meander over to Facebook, check out the following page

Save the Frank J. Wood Bridge- Brunswick & Topsham

Started by Scott Hansen

Thank you,

Pam

Pam LeDuc, Director
Topsham Parks and Recreation
100 Main Street
Topsham, ME 04086

Office – 207-725-1726
Fax – 207-725-1732

www.topshammaine.com/pnr

no proof of bike/ped use

From: Adams, Patrick
To: Kittredge, Joel
Cc: "norman.baker@tylin.com"
Subject: RE: Brunswick-Topsham Frank J. Wood Bridge 22603.00
Date: Friday, April 17, 2015 11:20:22 AM

I was under the impression that the BikePed numbers on this bridge were very low. The majority of those walkers and bicyclists in the area use the nearby bridge for the multiuse trail.

When I was talking with the town last week, we were discussing the potential for a new sidewalk taking people from the ramp and the Parkway Rd intersection to just up past the Dunkin Donuts where it will tie in to the multiuse path.

I was under the impression that your bridge would only have shoulders as the accommodation. Were you thinking something else?

Patrick D. Adams
Bicycle and Pedestrian Program Manager
MaineDOT - Multimodal Planning Division
16 State House Station
Augusta, ME 04333-0016
Direct Line: (207) 624-3311
Cell Phone: (207) 592-0873
Office: (207) 624-3300
Fax: (207) 624-3099
Web: http://www.maine.gov/mdot/bikeped/

From: Kittredge, Joel
Sent: Friday, April 17, 2015 8:49 AM
To: Adams, Patrick
Cc: 'norman.baker@tylin.com'
Subject: Brunswick-Topsham Frank J. Wood Bridge 22603.00

Hi Patrick;

Thanks for introducing yourself when we met in Bethel last week.

We are in preliminary design working toward structure recommendations for the above referenced project.

Do we have any ped/bike counts for the bridge. We all know it is heavily used, but actual counts are always helpful in reports and public discussion.

Can you help us out in getting some numbers?

Thanks---Joel

No proof
a second side walk is
needed

From:	Hanscom, Ed
To:	Frankhauser Jr, Wayne
Cc:	Kittredge, Joel
Subject:	Pedestrian traffic at Frank Wood Bridge
Date:	Monday, November 07, 2016 4:17:36 PM

Wayne,

As I mentioned earlier in response to your question, I am not aware of any actual pedestrian counts on the bridge itself. There are pedestrian counts for the crosswalks parallel to Maine Street at the US 1 SB off-ramp and at Cabot Street (Fort Andross). They were collected in July 2006 as part of a 12-hour turning movement count. Here are the raw numbers:

	Cabot St	US 1 SB off
12-hour count	199	31
Peak-hour count	38	8
Pedestrian peak hour	1-2 pm	6-7 am

Much of this pedestrian traffic may be generated by Fort Andross and not use the bridge, but we can say there is pedestrian traffic near the bridge. The crosswalk at the US 1 SB off, which has less pedestrian traffic, leads to the Maine Street crosswalk at the Fort Andross building. ?

Edward W. Hanscom, P.E.
Head of Transportation Analysis Section
Bureau of Planning
Maine Department of Transportation
State House Station 16
Augusta, ME 04333-0016

(207) 624-3320
ed.hanscom@maine.gov

12 hours
237 people ~~[illegible]~~
Not all even used
bridge

From:	Cassandra.Chase@dot.gov
To:	Kittredge, Joel
Cc:	Chamberlain, Kristen; Hopkin, Megan M
Subject:	RE: Frank J. Wood Bridge - Section 106 Consulting Parties
Date:	Wednesday, May 18, 2016 12:39:52 PM

Good question. I originally contacted my HQ and asked this very question. The answer I received was that basically, we cannot deny a request simply because someone is not local. It's specifically stated in the regulations that if an individual or organization has a "demonstrated interest" in the undertaking (36 CFR 800.2(c)(5)), they may participate as a Section 106 consulting party. Both Ms. Henderson and Mr. Holth provided me with a demonstrated interest in the undertaking regarding their concerns with the proposed project's effects on the historic Frank J. Wood Bridge.

I also posed this question to some of my counterparts in New Hampshire and Massachusetts. Their response was that it is common in their states for national historic bridge preservation representatives to request to participate in Section 106 on their projects. I guess we just haven't been privy to that yet, until now. I did also hear that there have been instances where perhaps the individual is considered mentally unbalanced or dangerous, and that would be a consideration to reject their involvement, but I anticipate that would be a rare occasion, and do not think that is the case here.

I hope this answers your question. Feel free to give me a call too, if you want to discuss further. You can reach me on my cell phone today: 207-689-8007.

Cassie

Cassie Chase
Environmental Engineer
Federal Highway Administration – Maine Division
Office: 207-512-4921
Cell: 207-689-8007
Cassandra.chase@dot.gov

From: Kittredge, Joel [mailto:Joel.C.Kittredge@maine.gov]
Sent: Wednesday, May 18, 2016 12:16 PM
To: Chase, Cassandra (FHWA)
Cc: Chamberlain, Kristen
Subject: FW: Frank J. Wood Bridge - Section 106 Consulting Parties

Hi Cassie:

Thanks for sending the email and attachment.

I am glad that there will be good opportunity for interested people to participate in the consultation, but with adequate local input, why would we entertaining direct participation from residents of Michigan and Texas??

Thanks---Joel

From: Kittredge, Joel
Sent: Wednesday, May 18, 2016 12:03 PM
To: John Shattuck (jshattuck@topshammaine.com)
Subject: FW: Frank J. Wood Bridge - Section 106 Consulting Parties

---

From: Cassandra.Chase@dot.gov [mailto:Cassandra.Chase@dot.gov]
Sent: Wednesday, May 18, 2016 7:14 AM
To: Hopkin, Megan M; Kittredge, Joel; Reed, Robin K
Cc: Cheryl.Martin@dot.gov; Mohney, Kirk; Chamberlain, Kristen
Subject: Frank J. Wood Bridge - Section 106 Consulting Parties

Good Morning!

Since there is a great deal of interest from several citizens in becoming Section 106 consulting parties on the subject project, I've put together a list of those citizens who've formally requested consulting party status (attached). Megan or Robin, have you received any additional consulting party requests from others that I may have missed? I know Alan Bowes inquired about the role of MHPC in the project, but did he request to become a consulting party? What about the Topsham Historic District Commission?

Once I get a full list of all Section 106 consulting parties, I will send out a doodle poll to set up a meeting to talk about where we are in the Section 106 process and the expectation of consulting parties. Kitty Henderson of the Historic Bridge Foundation requested materials from the public meeting (powerpoint, handouts, transcript, etc.). Joel, can you provide me with any of those materials, so I can include in my initial e-mail to the consulting parties?

Thank you!

Cassie

Cassie Chase
Environmental Engineer
Federal Highway Administration – Maine Division
Office: 207-512-4921
Cell: 207-689-8007
Cassandra.chase@dot.gov

From:	Kittredge, Joel
To:	Chamberlain, Kristen; Paraschak, Rick; Sproul, Roger
Subject:	FW: Brunswick-Topsham, Frank J. Wood Bridge, WIN 22603.00
Date:	Friday, June 03, 2016 3:17:07 PM
Attachments:	Frank J Wood Draft PDR 16-05-31.pdf

Good afternoon:

Would you please all respond to the respective highlighted text below *and* within the PDR.

Thanks---Joel

From: Norman Baker [mailto:norman.baker@tylin.com]
Sent: Tuesday, May 31, 2016 4:10 PM
To: Kittredge, Joel
Cc: Rick Hebert; Daniel Myers; Heath Cowan; David Burhans; Kevin Ducharme
Subject: Brunswick-Topsham, Frank J. Wood Bridge, WIN 22603.00

Joel,
Attached is the Draft PDR for the Brunswick-Topsham, Frank J. Wood Bridge Improvement Project, WIN 22603.00. We have a number of outstanding information that I have bulleted below. This was left highlighted in yellow throughout the document as something that needs to be addressed. They are as follows:

Recommendation Form

- We have assumed an advertise date of January, 2018, as a place holder.
- We will fill in the Program Amount and Breakdown when we receive it.
- **We will add the Utilities involved when we receive the list.**
- We have listed "none" for exceptions to standards. However, we want to mention that the break in the bridge rails for the overlooks may need an exception to be considered. The railing will be continuous but will have a jog in it that can catch an errant vehicle and stop it abruptly. We request that the Department considers approving this.

Summary of Impacts

- We have filled in what we can and left portions highlighted in yellow as we wait for requested information.

Summary of Preliminary Design

- **I believe you and I talked about a paragraph or two needed in this section for the 106 process. I think we had agreed that the Environmental Section was best to draft this. We can add this to the Report upon receiving it from them.**

Existing Bridge Synopsis

- We have very little information about maintenance problems or work on the existing bridge. One of the big issues, the leaking joints, has already been remedied by your contract last year. We have listed what we have found.
- We are unsure if the last structure at this site was the Timber Covered Bridge we have seen

in flood photos. We believe it was, but cannot corroborate it.

We look forward to hearing from you and we are available to discuss this at your convenience.
Sincerely

Norman L. Baker, P.E.
Senior Project Manager
T·Y·LIN INTERNATIONAL
12 Northbrook Drive
Falmouth, ME 04105
207.781.4721 main
207.347.4349 direct
207.310.4559 mobile
207.781.4753 fax
norman.baker@tylin.com
Visit us online at www.tylin.com
Twitter | Facebook | LinkedIn | Google+

From: John Graham
To: Kittredge, Joel
Subject: Friends of the Frank J Wood Bridge Report presented to Topsham Selectman
Date: Friday, June 03, 2016 8:20:51 AM
Attachments: FJWB Report 2016.06.02.dotx.pdf
ATT00001.txt

Morning Joel,

Thanks for coming out last night and listening. We appreciate it. Please see the attached as promised. Look forward to discussing further with you in the future.

All the best,

John

From:	Kittredge, Joel
To:	Norman Baker
Subject:	Re: "A 4 or less"
Date:	Friday, May 20, 2016 2:42:04 PM

Thanks. We are fine.

Sent from my BlackBerry 10 smartphone on the Verizon Wireless 4G LTE network.

From: Norman Baker
Sent: Friday, May 20, 2016 1:42 PM
To: Kittredge, Joel
Subject: RE: "A 4 or less"

Joel,
As I mentioned to you last week, I have had no contact with Mr. Graham since the public meeting. I have not sent him any emails, however, he may be referring to the information he requested from you after the meeting that I provide to you. Also, all of my contact with him was within the public meeting record, nothing before or after.

As for what was said, I was mistaken on the condition of the deck slab. The last rating has identified it as a 5 or "Fair" condition, not a 4 or "Poor" condition. This does not change the need to replace the deck, however. The need to improve safety and mobility for pedestrians requires the second sidewalk. This can only be accomplished by replacing the concrete deck with a lighter one so the existing truss can accept the additional weight of the new sidewalk.

I hope this responds to all the questions below and for my mistake at the public meeting, I do apologize. I should not have relied on my memory.
Sincerely

Norman L. Baker, P.E.
Senior Project Manager
TYLIN INTERNATIONAL
12 Northbrook Drive
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207.347.4349 direct
207.310.4559 mobile
207.781.4753 fax
norman.baker@tylin.com
Visit us online at www.tylin.com
Twitter | Facebook | LinkedIn | Google+

From: Kittredge, Joel [mailto:Joel.C.Kittredge@maine.gov]
Sent: Friday, May 20, 2016 8:35 AM
To: Norman Baker <norman.baker@tylin.com>
Cc: 'John Shattuck' <jshattuck@topshammaine.com>

Subject: RE: "A 4 or less"

Good morning. Norm:

I know that we chatted re this, but would you please close the loop in bulleted format.

Thanks---Joel

From: John Shattuck [mailto:jshattuck@topshammaine.com]
Sent: Thursday, May 19, 2016 6:29 PM
To: Kittredge, Joel
Subject: RE: "A 4 or less"

JOEL: Just checking to see if you had any thoughts on this. Thanks, John

---

From: John Shattuck
Sent: May 11, 2016 19:57
To: Kittredge, Joel <Joel.C.Kittredge@maine.gov>
Subject: "A 4 or less"

JOEL: During a discussion of the FJWB project at tonight's regular monthly meeting of the Topsham Historic District Commission (HDC), Commission member John Graham stated that, subsequent to the 04-27 public hearing, Norm Baker had "apologized" to him for his (Norm's) statement during the hearing, that the FJWB was "A 4 or less" on a nine point scale – presumably the National Bridge Inventory (NBI) 0 to 9 rating scale. The pertinent transcript excerpt is below.

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ps: On Friday I'll be heading down to Bar Harbor to attend the annual Downtown Conference. On the way home, I'm looking forward to detouring over to take a look at the new Penobscot Narrows Bridge. It's probably kinda pathetic that I consider that big fun – but I do!

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AUDIENCE MEMBER: (John Graham.) A 4 or less. Okay.

MR. BAKER: A 4 or less.

AUDIENCE MEMBER: (John Graham.) **The reason he says that is because everything above 5 calls for preventative maintenance**, so everything above 5 calls for preventative maintenance. For 0 the bridge is unsafe. From 1 to 4 is rehab or replace. [**Emphasis added**]

--
John Shattuck
Director, Economic & Community Development
Town of Topsham
100 Main Street
Topsham ME 04086

Office: (207) 373-5097
Mobile: (207) 650-0012
Email: jshattuck@TopshamMaine.com

Topsham because: http://youtu.be/Y_luU6wJMOU

considered public records and available for review by any interested party.

From:	Van Note, Bruce A.
To:	Kittredge, Joel
Subject:	RE: BRUNSWICK-TOPSHAM FRANK J WOOD 22603.00 - Progress Renderings
Date:	Wednesday, March 16, 2016 5:22:17 PM

I really like the look of the bridge. Clean, curved, simple.

My thoughts – perhaps too late.

1. To sell, a view from the Sea Dog is needed.
2. Also pedestrian views from the overlooks up and down river.
3. Assuming the superstructure is painted steel, I would go with gray instead of the red shown, to blend in more with the concrete, rocks and mist.
4. Again, you want them to focus on the deck and above - not below deck.
5. The overlooks, and perhaps cool rails and pedestrian lighting will bring them above deck. I know that cost money and could increase town shares, but don't know the delta to evaluate that feasibility.

Sorry, you know I can't help myself. I actually see these things in my head.

From: Kittredge, Joel [mailto:Joel.C.Kittredge@maine.gov]
Sent: Wednesday, March 16, 2016 4:23 PM
To: shattuck.office@gmail.com
Cc: 'rick.hebert@tylin.com' <rick.hebert@tylin.com>; Folsom, Jeff <Jeff.Folsom@maine.gov>; Frankhauser Jr, Wayne <Wayne.FrankhauserJr@maine.gov>; Myers, Richard E <Richard.E.Myers@maine.gov>
Subject: BRUNSWICK-TOPSHAM FRANK J WOOD 22603.00 - Progress Renderings

Hi John:

FYI, focused distribution, and tomorrow's discussion.

Please see attached progress renderings. These *very preliminary renderings* are views from each end of the bridge that show both the section and elevation and a bird's eye view of both existing and the proposed bridges. We might want views with people on the sidewalks and bikes in the shoulders. We should discuss what improvements and additional view/details might be needed for public displays.

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Meeting goal is to come up with 1 consistent message and an agreed plan on how to get that message out and to what groups.
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- **Local business owners of Fort Andross, the bank, and the Seadog**
- **Town, council, business groups**
- **Bike/ped groups**
- **Lurking issues**
- **Prep for formal public meeting**

Talk to you tomorrow at 1:30!

Thanks---Joel

From:	Van Note, Bruce A.
To:	Kittredge, Joel
Subject:	RE: BRUNSWICK-TOPSHAM FRANK J WOOD 22603.00 - Progress Renderings
Date:	Wednesday, March 16, 2016 4:49:41 PM

Great work as always Joel. When is the meeting? Do you want/need me to soften anyone up?

From: Kittredge, Joel [mailto:Joel.C.Kittredge@maine.gov]
Sent: Wednesday, March 16, 2016 4:23 PM
To: shattuck.office@gmail.com
Cc: 'rick.hebert@tylin.com' <rick.hebert@tylin.com>; Folsom, Jeff <Jeff.Folsom@maine.gov>; Frankhauser Jr, Wayne <Wayne.FrankhauserJr@maine.gov>; Myers, Richard E <Richard.E.Myers@maine.gov>
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- **Prep for formal public meeting**

Talk to you tomorrow at 1:30!

Thanks---Joel

From: Van Note, Bruce A.
To: Kittredge, Joel
Subject: RE: Brunswick-Topsham - Telephone Record
Date: Monday, March 21, 2016 11:36:01 AM

Looks like a very solid process, as I would expect from you. FYI - I may be chatting with John Shattuck soon and will report any significant intel.

In the "two cents" category of things I am sure you have already thought of . . . . .

I defer to you, John and Linda, but I would make the graphics available to the public on or just before your first public unavailing of them – which looks to be before the Brunswick Town Council on 4/19. That is, let the people see them. The press will be asking, and they will be front page news anyway, so you might as well make it easy and have Meg's shop to create a simple website. The website could include a brief project history (perhaps the power point presentation you gave at the Topsham library before), the project purpose and need, the renderings (this will be the biggie, just do this if you don't have time for the other stuff thing), and the timeline for meetings set forth below. The website will generate instant interest. If you want to channel all that interest to the public meetings, that's probably best. Some website viewers will wish they can just send an email, but that would likely create too much work for you. Just tell them, these are preliminary, and you have a chance to give input at public meeting. If the Towns want to put a link to John and Linda's email addresses, that's OK. Let the locals help engage the locals.

At your meetings, you will want to be clear that the engineering decisions for this state-funded bridge (new bridge vs. rehab, piers, superstructure, cross section, basic location) will be ultimately made by State bridge engineers. (No Bucksport replay.) But you want to make those decisions with good local input, and want to incorporate feasible local amenities (overlooks, etc.?).

Bottom line – Get Meg's shop involved early rather than later. This is cool stuff and good news. Being proactive will keep it that way.

Bruce

From: Kittredge, Joel [mailto:Joel.C.Kittredge@maine.gov]
Sent: Monday, March 21, 2016 8:43 AM
To: 'Rick Hebert' <rick.hebert@tylin.com>
Cc: Norman Baker <norman.baker@tylin.com>; Kevin Ducharme <kevin.ducharme@tylin.com>
Subject: RE: Brunswick-Topsham - Telephone Record

Hi Rick:

One edit.

From: Rick Hebert [mailto:rick.hebert@tylin.com]
Sent: Friday, March 18, 2016 4:01 PM
To: Kittredge, Joel

Cc: Norman Baker; Kevin Ducharme
Subject: Brunswick-Topsham - Telephone Record

Joel,
To summarize our earlier telephone discussions, the Department is requesting TYLI prepare the following specific rendering graphics in support of the Public Process:

- Keep the existing bird's eye view of the existing truss bridge
- Complete the three graphics that we have already started (bird's eye view from upstream, deck/elevation from Topsham end & deck/elevation from Brunswick end). Needed additions include the overlook platforms, plain light poles, pedestrian and cyclist graphics & photo backgrounds.
- Add a second bird's eye view from the downstream side that will include the full length of the approach work on the Brunswick side. The upstream view is cut off by the Fort Andros Building.
- Add an elevation perspective view from the area of the Seadog Restaurant**~~/parking lot~~. deck.**
- Detailed pedestrian level view of the overlook platform on the upstream side looking upstream. The platform should be located at the upstream side of Pier 3.
- Detailed pedestrian level view of the overlook platform on the downstream side looking downstream. The platform should be located at the downstream side of Pier 2.
- Size the overlook platforms to extend 5 ft beyond the sidewalk with a non-tapered length of 10 ft. Tapers will be shown for graphic purposes, but specific detailed design will follow.
- Color the steel girder and rail to be a metalized gray color.

Progress prints will be included in the Abutters Meeting scheduled for next week.
The complete graphics package to be ready for inclusion in the series of public process meetings beginning 4/19/16.

As I stated to you in our telephone conversation, I need to check with our staff that will be responsible for this effort to make sure this complete request can be accomplished in the time available. I will let you know as soon as I hear back from them if there are any concerns.

The preparation of rendering graphics was not included in our original scope of work. Norm will be including these efforts within a supplement request proposal that he is planning to pull together as soon possible.

Let me know if I missed anything.

Rick Hebert, PE
T·Y·LIN INTERNATIONAL
207.781.4721 main
207.347.4334 direct

From: Linda Smith [mailto:lsmith@brunswickme.org]

Sent: Thursday, March 17, 2016 8:29 PM
To: John Shattuck <jshattuck@topshammaine.com>; Kittredge Joel <Joel.C.Kittredge@maine.gov>; John Eldridge <jeldridge@brunswickme.org>; Anna Breinich <abreinich@brunswickme.org>; Rich Roedner <rroedner@topshammaine.com>; Rod Melanson <rmelanson@topshammaine.com>; Rick Hebert <rick.hebert@tylin.com>; Adams, Patrick <Patrick.Adams@maine.gov>; Norman Baker <norman.baker@tylin.com>
Subject: Follow-up on 3-17-2016 FJW bridge conference call

Hi all – I told John Shattuck I would briefly summarize the meeting dates we had discussed together this afternoon, as follows:

Wednesday 3/23/2016 or Thursday 3/24/2016
Topsham & Brunswick Town Managers and Eco Dev / Planning staff and MDOT meeting with three major business abutters and Brunswick Downtown Association; John Shattuck and Linda Smith to contact assigned parties; John to get back to Joel @ MDOT; meeting to occur in Brunswick or Topsham – TBD

Tuesday 4/19/2016
MDOT to present preliminary concepts & renderings to Brunswick Town Council (Town Hall)

Thursday 4/21/2016
MDOT to present preliminary concepts & renderings to Topsham SelectBoard (Town Hall)

Monday 4/25/2016
MDOT to present preliminary concepts & renderings to special interest groups from the Towns of Topsham and Brunswick including but not limited to: Riverwalk, Bike-Ped, Village Review Board, Lower Village Board, Brunswick Public Art, and others; Anna has a complete list which she will share separately); to be held in Topsham; John Shattuck to arrange meeting location

Wednesday 4/27/2016
MDOT to present preliminary concepts & renderings via a public hearing for the combined Towns of Topsham and Brunswick; to be held in Brunswick; Linda Smith to explore meeting room options starting with the SMCC Learning Commons

****

From: John Shattuck [mailto:jshattuck@topshammaine.com]
Sent: Wednesday, March 16, 2016 5:06 PM
To: Rich Roedner; John Eldridge; Rod Melanson; Anna Breinich; Linda Smith
Subject: BRUNSWICK-TOPSHAM FRANK J WOOD 22603.00 - Progress Renderings

COLLEAGUES: Here's some supplemental info and an agenda for tomorrow's meeting that I just received from Joel. John

****
From: Kittredge, Joel [mailto:Joel.C.Kittredge@maine.gov]
Sent: March 16, 2016 16:23
To: shattuck.office@gmail.com
Cc: 'rick.hebert@tylin.com'; Folsom, Jeff; Frankhauser Jr, Wayne; Myers, Richard E

Subject: BRUNSWICK-TOPSHAM FRANK J WOOD 22603.00 - Progress Renderings

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- Lurking issues
- Prep for formal public meeting

Talk to you tomorrow at 1:30!

Thanks---Joel

From:	Van Note, Bruce A.
To:	Kittredge, Joel
Subject:	RE: FJW resolutions, etc.
Date:	Monday, May 02, 2016 4:27:49 PM

To confirm our phone chat, MaineDOT is OK with my proposed article, correct?

From: Kittredge, Joel [mailto:Joel.C.Kittredge@maine.gov]
Sent: Monday, May 02, 2016 3:18 PM
To: John Shattuck (jshattuck@topshammaine.com) <jshattuck@topshammaine.com>
Cc: Norman Baker <norman.baker@tylin.com>; Van Note, Bruce A. <bvannote@maineturnpike.com>
Subject: FJW resolutions, etc.

John:

Upper management has approved me to act as MaineDOT point of contact moving forward re council/selectmen and advisory committee activities, continuing business outreach, etc.

If you would please forward any draft resolution language you have developed, we would like the opportunity to simply review and comment.

Would you also please send me the committee list of 15 names and the interest/affiliation that they represent? I believe that you mentioned Bruce would be chair/facilitator.

Really energized and looking forward to continued solid and successful partnership with the towns, leading to a successful bridge project.

Please let me know if you have any questions.

Thanks---Joel

From:	John Shattuck
To:	Kittredge, Joel
Cc:	Soucie, Timothy; Norman Baker; Folsom, Jeff; Frankhauser Jr, Wayne
Subject:	Re: TOPSHAM-BRUNSWICK FRANK J WOOD BRIDGE 22603.00 TRAFFIC CONTROL
Date:	Friday, March 06, 2015 12:00:42 PM

JOEL: Thanks - I'll look forward to talking with you and your team when you think it would be productive. In the meantime, I'm already working with my municipal colleagues in Brunswick to build a consensus in support of closure - no doubt there will be challenges but, so far, we're optimistic. John

On Fri, Mar 6, 2015 at 8:32 AM, Kittredge, Joel <Joel.C.Kittredge@maine.gov> wrote:

> **John:**
>
> **Thanks for your meeting follow-up and suggestion. A number of people on the Topsham side have also expressed willingness to consider the closure approach and that is a good sign. As we advance further into design we will have adequate information to evaluate all options including closure. We certainly will be reaching out to the municipalities and stakeholders for further discussion as we move toward the selected course of action for the structure and traffic control.**
>
> **Thanks again for your interest in this complex project and we look forward to working with you.**
>
> **Joel**
>
> **207-624-3550**
>
> **From:** John Shattuck [mailto:shattuck.office@gmail.com]
> **Sent:** Thursday, March 05, 2015 1:04 PM
> **To:** Kittredge, Joel
> **Subject:** Wood Bridge project
>
> JOEL: This will follow up on our brief conversation after your well-received Wood Bridge presentation in Topsham last WED 02-25. When your schedule permits, I'd be grateful for an opportunity to talk with you in more detail about the project - specifically, to explore the possibility of local support for a closure to enable a quicker, less expensive and higher quality outcome for the project. Thanks, John

--

John Shattuck
Director, Economic & Community Development
Town of Topsham
Certified Business Friendly Community
100 Main Street
Topsham ME 04086

Mobile: (207) 650-0012
Office: (207) 373-5097
Email: shattuck.office@gmail.com

Topsham because: http://youtu.be/Y_luU6wJMOU

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Per 1 MRSA § 402(3), correspondence to/from municipal officers/officials (with limited exceptions) is a public record and available for review by any interested party.

TOWN OF TOPSHAM
BOARD OF SELECTMEN MEETING
JUNE 2, 2016 - 7:00 P.M.

MEMBERS PRESENT: David Douglass
Marie Brillant
Ruth Lyons
William Thompson
Roland Tufts

MEMBER(S) ABSENT: All present

STAFF PRESENT: Town Manager, Richard Roedner

A meeting of the Topsham Board of Selectmen was held on Thursday, June 2, 2016, in the Donald A. Russell Meeting Room, at the Municipal Building, 100 Main Street, Topsham, Maine.

CALL TO ORDER

Chairman Douglass called the meeting to order at 7:00 p.m.

PLEDGE OF ALLEGIANCE/ROLL CALL - All present were invited to stand and recite the Pledge of Allegiance to the Flag. The recording secretary took the roll call and noted that all Selectmen were present.

TOWN MANAGER'S REPORT

This Saturday, June 4, is our annual fishing derby out at the Topsham Ponds at the Transfer Station. The hours are 8:00 a.m. to 11:00 a.m.

Tuesday, June 14 is our primary day. The ballot will include candidates for various State offices, as well as votes on the proposed SAD 75 budget. The last day to vote by absentee ballot is next Thursday, June 9.

Last Friday, we swore in our newest police officer, Garrett Decker. Garrett is slated to attend the Police Academy in August, and in the meantime will be undergoing in-house training. We believe he is a great addition to our force.

BOARD AND COMMITTEE REPORTS AND UPDATES

Presentation on the process of tree harvesting that will happen at the solid waste facility this fall and winter - Jean Bamforth, Chairman of the Tree Committee, introduced Paul Larrivee, Forester from Sappi. Mr. Larrivee talked about the various projects he has done. He has put together a timeline, along with assistance from the Tree Committee to harvest the trees at the solid waste facility. Letters will be forwarded to all abutters and a formal presentation will be given in September. A public walk-thru will be scheduled prior to beginning the project and also during the actual cutting. The Town's liability will be covered under Mr. Larrivee's insurance carrier with proper verification provided to the Town prior to start of the project. Two high tech machines will be used to harvest the trees; no skidders will be used. There will be no chipping and the trees will be carried out, not dragged. The wood will be sold with the best interest of the Town considered. The project will begin in late fall and is scheduled to be completed in early winter.

PUBLIC COMMENT - None noted.

CORRESPONDENCE - Chairman Douglass noted a letter received from Curtis Pickard regarding the Frank Wood Bridge. The letter will be entered into the record during discussion of that item on the agenda.

ADJUSTMENTS TO THE AGENDA - None noted.

CONSENT CALENDAR

1. **Approval of the minutes of the Regular Selectmen Meeting of May 5, 2016**
2. **Approval of Linda Dumont as Warden at the June 14, 2016 election**
3. **Approval to open the polls at 8:00 a.m. on June 14, 2016 for the State of Maine Primary and S.A.D. No. 75 Budget Validation Referendum**
4. **Approval to open and process absentee ballots at the polls during the hours of 10:00 a.m., 1:00 p.m., 3:00 p.m., 7:00 p.m. and 8:00 p.m.**

Motion was made by Selectman Tufts, seconded by Selectman Lyons, and it was unanimously

VOTED
To approve all four items under the Consent Calendar as submitted.

PUBLIC HEARING

16-44 CONSIDERATION AND ANY APPROPRIATE ACTION ON THE APPROVAL OF AN APPLICATION FOR A LIQUOR LICENSE FOR THAI'S CUISINE, 6 FIRST STREET (FORMERLY TOP-SPICE

The Public Hearing was declared open.

Prayad Phousirith told the Board he has purchased the restaurant which was formerly Top-Spice and he wishes to be able to serve beer and wine. He is currently in the process of obtaining the necessary paperwork from the State. A diagram of the floor area of the restaurant was submitted with the application. Town Clerk Linda Dumont noted that necessary letters stating no objection to the application are on file from the Police Chief, Fire Department and Codes Enforcement Officer.

There were no comments to be heard from members of the public and the Public Hearing was declared closed.

Motion was made by Selectman Tufts, seconded by Selectman Thompson, and it was unanimously

VOTED
To approve the application for a liquor license for Thai's Cuisine at 6 Front Street.

UNFINISHED BUSINESS - None noted.

OLD BUSINESS - None noted.

NEW BUSINESS -

16-45 CONSIDERATION AND ANY APPROPRIATE ACTION ON THE FIRE AND RESCUE DEPARTMENT TO SPEND $5,500 ON PROTECTIVE EQUIPMENT

Chief Stockdale told the Board that over the past several years the department has experimented with several different gear manufactures and distributors and find Globe gear from Bergeron Protective Equipment to be the best. The gear has held up well and the service from Bergeron has been excellent. Chief Stockdale asked for the Board's approval to spend $5,500 on three sets of jackets and pants. This gear is expected to last approximately 10 years.

Motion was made by Selectmen Tufts, seconded by Selectman Lyons, and it was unanimously

VOTED

To approve the Fire and Rescue Department to spend $5,500 for protective equipment.

16-46 CONSIDERATION AND ANY APPROPRIATE ACTION ON MAINE DOT PROPOSAL FOR REPLACING THE FRANK WOOD BRIDGE

Economic Development Director, John Shattuck, opened the discussion on this agenda item saying this is the 7th public meeting held on the Frank J. Woods Bridge. The Maine Department of Transportation has completed their study and both Topsham and Brunswick agree with MDOT that the bridge should be replaced.

Chairman Douglass asked how we arrived at naming Mr. Shattuck (our Economic and Development Director) as the Town's representation in the 106 Process. The Town Manager responded that the Town has a seat if we want one and it seemed easiest to have Mr. Shattuck represent the Town dealing with both historic and environmental purposes rather than several other department heads.

Although not a Public Hearing, the meeting was opened at this point to receive comments from members of the public. Several individuals spoke, including:

Scott Hanson - Mr. Hanson spoke on behalf of the group "Friends of the Frank J. Wood Bridge." He said the organization is registered with the State and has a facebook page also. Mr. Hanson spoke at length saying the group feels the MDOT decision to replace the bridge is premature and the 106 Process can demand that MDOT do further research. The group has 764 followers on facebook. The group prepared a booklet entitled "Frank J. Wood Bridge Improvement Project Considerations" and Mr. Hanson asked the Board to review the information it contained. (A copy is filed with these minutes.) The group questions the validity of the report done by T.Y.Lin. Mr. Hanson urged the Board to not take any action on this agenda item. Mr. Hanson said the Federal Highway Administration will fund the 106 Process.

Phiney White, Bridge Street - Mr. White displayed enlarged color photographs of three bridges in Massachusetts built in 1931 by Boston Bridge Works - same company that build the Frank J. Wood Bridge. They were rehabilitated in 2012. One was built in 1883 and rehabilitated in 2013.

He said rehabilitation of a bridge is not foreign to large firms. Mr. White said that T.Y. Lin's figures are not accurate. Wants to see the bridge rehabilitated.

Paul Loveless, 36 Williams Drive - Said he was here in Topsham during the last rehab. Said it will take more time and more money to rehab. Spending dollars to save this bridge is not a good idea. If one is stopped on the bridge when a big truck goes by, the bridge rocks back and forth. Bridge needs to be replaced.

Curt Neufeld, 14 Merrymeeting Drive - In favor of new bridge. Said bridges are being taken down because they need to be replaced. Bridge was built in 1932 for cars and trucks built in 1932 which are no comparison to cars and trucks of today. Agreed that the bridge is a hero, but should be replaced. Urged the Board not to throw good money after bad.

Don Russell, 80 Winter Street - Urged the Board to make a recommendation to MDOT relevant to replacing the bridge. You need to do that based on what you have heard. The one thing I did hear, I want to thank Scott for the work they did. In favor of proceeding with the 106 Process.

John Graham, Pleasant Street - In favor of restoring the bridge. Have walked across it many times. It is a historical structure and should be saved. The Town should have appointed the Historic District Commission to handle the 106 process, not a person in the town office.

Ann Carroll, Summer Street - Plea is emotional. It was insulting that no one in our neighborhood was notified of the meetings. It was like we didn't count. Urged the Board to take the human element into account. Thanked Don Russell for spending money to keep his property up. When you drive by Don's house you have a piece of history.

Jill Raymond, 25 Summer Street - I have never come to a meeting. I did not get a notice of these meetings. It is offensive that I heard nothing. Want to see a restoration project, not a new bridge. Does a village have a super highway?

Charles Carroll, Summer Street - This is a neighborhood built 200 years ago. Our house was built in 1825. This is a neighborhood 200 years old. People socialize on this bridge. We are closest to the bridge. Have lived there for 6,000 nights. I look at the bridge every single day. The folks that built the bridge gave it much thought. I don't feel that way about the design of the new bridge. It seems nonsensible for you as a Board to take a position. The better part of wisdom would be for you to say "No, we don't need to take a position."

Arlene Morris, 13 Main Street - Loves Topsham. Urged the Board not to vote one way or another. There is no hurry.

John Shattuck - Brief statement. When a public outreach is done, some people will be missed. However, the papers were plastered with announcements of these meetings. This is a process that has been on-going for over 14 months. The 106 Process will continue over the next 6 or 7 months.

Steve Stern, 13 Main Street - Said he has degrees in Civil and Structural Engineering from Maine and MIT. Is not unfamiliar with some of the issues being brought up. This bridge is safe. It has been deemed safe by the DOT. There are mistakes made in any profession. As an engineer, he can attest to some of the mistakes. TY Lin is the largest engineering firm in the world. They have about a $3 billion overrun on a bridge that is now rusting. Some of the smaller projects they get…they are not as screened as they possibly should be. We are trying to save this historic bridge. Save money and make everybody happy. All we are asking, is…it is obvious we don't have all the information. If you go ahead and endorse the DOT's recommendations…we intend to have meetings with Joyce Taylor, the Chief Engineer at DOT. She is a reasonable person. I think you have to be very careful, because you can look very bad if you make the wrong decision here tonight.

Josey Seamore, Summer Street - Want to see the bridge saved. It is an important part of my life, my children's lives and my grandchildren's.

Having heard comments from all who wanted to speak, the Board entered into a lengthy discussion with each Board member contributing. Chairman Douglass read the letter mentioned earlier from Curtis Pickard speaking in favor of the new bridge. Some on the Board were not aware of the 106 Process and statement was made that that process will determine what will finally happen. Statement was made that the State does not take proper care, maintenance wise, and if the bridge is rehabilitated, would they let its care lapse.

Following discussion, motion was made by Selectman Tufts, seconded by Selectman Thompson, and it was unanimously

VOTED

> To approve the Maine DOT proposal for replacement of the Frank J. Wood Bridge and to adopt the resolution regarding the Topsham-Brunswick Bridge.

16-47 <u>CONSIDERATION AND ANY APPROPRIATE ACTION ON APPOINTING MEMBERS TO A JOINT TOPSHAM/BRUNSWICK DESIGN ADVISORY COMMITTEE FOR THE NEW BRIDGE</u>

John Shattuck noted that MDOT has clearly communicated that it has completed its engineering and safety assessment of the Frank J. Wood Bridge and that it intends to proceed with its recommendation to replace the existing bridge. They have presented renderings of the preliminary bridge design recommendations, but have indicated that these design recommendations are not final. They have informed the Towns of Topsham and Brunswick that it would be helpful for them to work with a joint Design Advisory Committee (DAC) which would be appointed by both towns and that they (MDOT) would be receptive to input and suggestions from that committee. Brunswick will act on their resolutions at a meeting on June 6.

The following individuals were recommended to serve on a Joint Design Advisory Committee:

Bruce Van Note, representing the Planning Board
Nancy Randolph, representing the Swinging Bridge Committee
Doug Bennett, representing the Lower Village Development Committee
Don Spann, representing the Topsham Development, Inc. and the Planning Board
Jim Howard, representing the Lower Village Development Committee (LVDC) & bridge abutter
Gary Smart, representing the Historic District Commission and LVDC
Victor Langelo, representing the Topsham Community Fund and Conservation Commission
Cathy Lamb, Chair of the Riverwalk Committee - member at large for both towns

Following Mr. Shattuck's presentation, Scott Hanson said he had respect for Jim Howard but felt it would be better to have a representative from the Friends of the Frank J. Wood Bridge on the committee. Recommendation was also made to have an individual from Summer Street to be included. Not being able to decide on the spot, motion was made by Chairman Douglass, seconded by Selectman Lyons, and it was unanimously

VOTED

To table item 16-47 to the June 16, 2016 Selectmen's Meeting.

16-48 CONSIDERATION AND ANY APPROPRIATE ACTION ON APPOINTMENTS TO THE MCEDD BOARD OF DIRECTORS

John Shattuck told the Board that the bylaws of the Midcoast Economic Development District require that the Town appointment to its Board of Directors be renewed annually. Past practice has been to appoint the Town Manager and Economic and Community Development Director to the MCEDD board. Because of the heavy schedule of the Town Manager, this year it is recommended that the Selectmen appoint the Economic and Community Development Director and the Planning Director to the MCEDD Board.

Following Mr. Shattuck's presentation, motion was made by Selectman Tufts, seconded by Selectman Lyons, and it was unanimously

VOTED

To appoint John Shattuck, Topsham Economic & Community Development Director, and Rod Melanson, Topsham Planning Director to serve on the Board of Directors of the Midcoast Economic Development District.

16-49 CONSIDERATION AND ANY APPROPRIATE ACTION TO CHANGE TRAFFIC CALMING METHODS ON GREEN STREET

John Shattuck spoke to this agenda item saying the Lower Village Development Committee (LVDC) is happy with the success of last year's traffic calming measures and is recommending the same calming measures be implemented again this year but with the following changes:

- Restriping of the sidewalk to locate it on the easterly side for the full length of Green Street
- Elimination of the mid-street crosswalk that supported switching the sidewalk from one side of the street to the other
- Consultation with the Public Works Director regarding the usefulness of additional speed signage
- Use of temporary pylons, planters or other objects to reduce speeds after drivers have negotiated the entrance striping and pylons

With regard to the use of temporary pylons, planters or other objects to reduce speeds after drivers have negotiated the entrance striping and pylons, the LVDC will return to the Selectmen with a detailed plan before seeking their approval for implementation on this method.

Mr. Shattuck said the LVDC would also like the Selectmen's approval to proceed with research and planning of a "pop-up" park in the Green Street Triangle parking lot. Such pop-up demonstrations are intended to raise public awareness and understanding of potential enhancements to the design and use of public space and would remind Topsham residents of the LVCD's ultimate goal of establishing a waterfront public park abutting the Green Street Triangle, and to re-engage public interest and support for this goal. LVDC proposes to create such a pop-up park one in mid-summer, when being on the waterfront is particularly attractive and again in the fall to celebrate the opening of the Town Landing Trail.

Motion was made by Selectman Tufts, seconded by Selectman Lyons, and it was unanimously

VOTED

To approve the proposed changes to traffic calming methods on Green Street.

16-52 <u>CONSIDERATION AND ANY APPROPRIATE ACTION ON REVIEW OF TOWN HOURS</u>

The Town Manager spoke to this item saying tracking of visits to the various offices began in August. A printout of the responding numbers through May was included in the Board package. The numbers for Thursday evenings was much larger than for Wednesday mornings. The Planning Office has been successful is doing passport work in the evenings for folks who couldn't get in during the regular day hours. Mr. Roedner said the staff has mostly gotten used to the new hours and appreciate leaving early on Friday.

Motion was made by Chairman Douglass, seconded by Selectman Tufts, and it was unanimously

VOTED

To continue on a permanent basis with the Town office hours as they are now:

Monday through	Wednesday	8:30 a.m. to 4:30 p.m.
	Thursday	8:30 a.m. to 6:00 p.m.
	Friday	8:30 a.m. to 3:00 p.m.

16-53 <u>CONSIDERATION AND ANY APPROPRIATE ACTION ON THE APPROVAL OF LABOR CONTRACTS WITH IAMAW SUPERVISORY AND OPERATIONS</u>

Town Manager Roedner said the final contacts are in their hands and that business representatives are expected to vote next week, so there is no action to be taken on this item.

Chairman Douglass noted that on February 22, 2016 a tentative agreement was reached and we have gone through an entire budget process. If the contract is not ratified, it puts the town in a significant financial crisis. There are certain time lines we have to make decisions by. He proposed that we request that the Town Manager put through a plan that if this is not ratified by July 1st, how we are going to deal with this. Any offsets we need to make due to added health care costs due to this come from personnel costs associated with all positions in the labor agreements.

Motion was made by Chairman Douglass, seconded by Selectman Tufts, and it was unanimously

VOTED

To direct the Town Manager to create a plan that, should the contracts fail to be ratified or not attempted to be ratified by July 1st, that a plan be in place for the Board to look at June 16th, strictly utilizing personnel costs from those units.

EXECUTIVE SESSION

16-54 CONSIDERATION AND ANY APPROPRIATE ACTION TO ENTER INTO EXECUTIVE SESSION TO DISCUSS TAX ACQUIRED PROPERTY PER TITLE 1 405 (6) (F)

At 9:40 p.m., motion was made, seconded, and it was unanimously **VOTED** to move into Executive Session to discuss tax acquired property per Title 1 405 (6) (F).

At 10:08 motion was made, seconded, and it was unanimously **VOTED** to come out of Executive Session and to return to regular session.

Motion was made by Chairman Douglass, seconded by Selectman Tufts, and it was unanimously

VOTED

To instruct the Town Manager to accept payments from the tax foreclosed property owner, as discussed, but to leave the 30-Day Termination Order in place, to be acted upon if the owner misses any of the payments agreed to.

ADJOURN

Motion was made by Selectman Tufts, seconded by Chairman Douglass, and it was unanimously

VOTED

To adjourn the meeting at 10:10 p.m.

Respectfully submitted,

____

Patty Williams, Recording Secretary

From:	Folsom, Jeff
To:	Foster, James; Kittredge, Joel
Subject:	RE: Frank J Wood
Date:	Monday, July 11, 2016 10:28:34 AM

I believe the definition for structurally deficient states that the structural evaluation code must be a 2
Or the condition ratings for deck, superstructure, or substructure be a 4

Sent from my iPhone managed by BlackBerry Enterprise Service

---- Original Message ----

From: Kittredge, Joel <Joel.C.Kittredge@maine.gov>
Date: July 11, 2016, 9:15 AM EDT
To: Foster, James <James.Foster@maine.gov>
CC: Folsom, Jeff <Jeff.Folsom@maine.gov>
Subject: RE: Frank J Wood

Any other reason??

From: Foster, James
Sent: Friday, June 03, 2016 12:17 PM
To: Kittredge, Joel
Subject: Frank J Wood

Joel,

FYI …

The Frank J Wood Bridge is Structurally Deficient (contrary to the Friends of … report) and is eligible for federal funding for rehab or replacement due to Structural Evaluation code = 4.

Jim

James A. Foster, P.E.
Bridge Management Engineer
Results and Information Office
Maine Department of Transportation
16 SHS, Augusta, ME 04333-0016
Office: 207-624-3267 Cell: 207-446-6842
Email: james.foster@maine.gov

From:	Frankhauser Jr, Wayne
To:	Kittredge, Joel
Cc:	Chamberlain, Kristen; Folsom, Jeff; Pulver, William; Gardner, David
Subject:	RE: Brunswick-Topsham, Frank J Wood Bridge, WIN 22603.00: Summary of Alternatives 3/10/2017
Date:	Tuesday, March 14, 2017 8:27:27 AM

Thanks.

I'm good with the summary

From: Kittredge, Joel
Sent: Tuesday, March 14, 2017 8:20 AM
To: Frankhauser Jr, Wayne
Cc: Chamberlain, Kristen; Folsom, Jeff; Frankhauser Jr, Wayne; Pulver, William; Gardner, David
Subject: RE: Brunswick-Topsham, Frank J Wood Bridge, WIN 22603.00: Summary of Alternatives 3/10/2017

Wayne:

Please see responses.

From: Frankhauser Jr, Wayne
Sent: Monday, March 13, 2017 5:27 PM
To: Kittredge, Joel
Subject: RE: Brunswick-Topsham, Frank J Wood Bridge, WIN 22603.00: Summary of Alternatives 3/10/2017

not including real cost of bridge in alternatives

I've only got a few comments/questions on items that I may have missed along the way:

- The summary says that the replacement will have 5' sidewalks, 5'and 11' lanes. Haven't we agreed to wider sidewalks? **Only presented at the DAC, ot as part of the "original" proposal. If we start talking about what has changed or progressed (including cost) as a result of the DAC, we start down a slippery slope as many conversations and possibilities have been discussed.**
- I'm good with the bare deck option they've highlighted on PG 11 as long as we use corrosion free reinforcing **Noted.**
- I don't recall discussing changing Alt 3 (rehab with one sidewalk) to say that it meets the purpose and need even though it only has one sidewalk. Was this a TYLin change or a group decision**? This was a change by Cassie. See attached email.**

Wayne

From: Kittredge, Joel
Sent: Monday, March 13, 2017 8:52 AM
To: Chamberlain, Kristen; Gardner, David; Folsom, Jeff; Frankhauser Jr, Wayne; Pulver, William
Subject: FW: Brunswick-Topsham, Frank J Wood Bridge, WIN 22603.00: Summary of Alternatives 3/10/2017

For your review and comment prior to it being posted.

STEPHEN F. HINCHMAN
ATTORNEY AT LAW

August 15, 2016

Cheryl Martin
Assistant Division Administrator
Federal Highway Administration – Maine Division
40 Western Ave
Augusta, ME 04330

Joel Kittredge
Maine DOT
16 State House Station
Augusta, ME 04333-0016

RE: Frank J. Wood Bridge Section 106
Consulting Parties Meeting

Dear Ms. Martin and Mr. Kittredge:

On behalf of the Friends of the Frank J. Woods Bridge ("Friends"), I am pleased to provide the following comments in response to the Section 106 Consulting Parties Meeting held on July 11, 2016 in Topsham regarding the pending Frank J. Wood Bridge improvement project.

The Frank J. Wood Bridge ("Bridge") is a steel truss bridge built in 1932 spanning the Androscoggin River and carrying US Route 201 between the towns of Brunswick and Topsham. As you are aware, the Maine Department of Transportation ("MDOT") is proposing to demolish this historic bridge and replace it with a $13 million concrete slab bridge on a new upstream alignment over the lower falls of the Androscoggin River.

The Friends are providing the following initial comments on this proposal. These comments primarily address (1) the proposed the FHWA and MDOT's preliminary determination regarding project compliance with the National Environmental Policy Act ("NEPA"), 42 U.S.C.A. § 4331 *et seq*., (2) the identification of alternatives to the proposed project that must be considered pursuant to Section 106 of the Historic Preservation Act, NEPA and other federal and state statutes, (3) the Area of Potential Effect under the Section 106 Review, and other issues.

I. FRIENDS OF THE FRANK J. WOOD BRIDGE.

The Friends of the Frank J Wood Bridge is a Maine non-profit corporation dedicated to the preservation of the historic Frank J. Wood Bridge between Brunswick and Topsham, Maine. The board and membership of the Friends is made up of residents of both towns who feel strongly that preservation of the bridge is important to the identity, economy, and quality of life of our communities. The Friends' Facebook group has more than 1,000 supporters as of July 2016. This number has been growing steadily since the page was established in May and continues to grow daily. We have sought the input of experts in engineering, historic preservation, and environmental and administrative law to assist us in our efforts, and will be submitting

The Law Offices of Stephen F. Hinchman, LLC
537 Fosters Point Road, West Bath, Maine 04530
207.837.8637 | SteveHinchman@gmail.com

information during the federal and state review process. The Friends intends to be an active participant in both local discussions on the proposed bridge demolition and the Federal Section 106 review and other federal review proceedings.

II. MDOT'S PROPOSED ALTERNATIVE FOR BRIDGE REPLACEMENT IS NOT ELIGIBLE FOR A CATEGORICAL EXCLUSION UNDER NEPA.

At the July 11th meeting, FHWA indicated that MDOT and FHWA plan to apply a "Categorical Exclusion" ("CE") to exempt the proposed project from review under the National Environmental Policy Act. In FHWA's July 18th follow up email, Ms. Chase stated,

> At the Section 106 consulting parties meeting, a question was asked as to what type of National Environmental Policy Act (NEPA) document would be prepared. Based on the scope of work (bridge improvement), FHWA and MaineDOT made the initial determination that the appropriate class of action for this project would be a Categorical Exclusion, as stated under 23 CFR 771.117(c)(28).[1]

The Friends agree that rehabilitation of the existing bridge in place would likely meet the requirements of 23 C.F.R. §§ 771.117(c)(28) and 771.117(e). However, MDOT's preferred alternative to tear down the historic bridge and replace it with a new bridge on an upstream alignment is expressly ineligible for a categorical exclusion, for several reasons. While § 771.117(c)(28) provides a CE for certain bridge rehabilitation or replacement projects, § 771.117(e) prohibits the application of a CE for bridge replacement projects in the following circumstances – all of which would apply to the MDOT preferred alternative:

> (2) An action that … does not meet the terms and conditions of a U.S. Army Corps of Engineers nationwide or general permit under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899;
>
> (3) A finding of "adverse effect" to historic properties under the National Historic Preservation Act, the use of a resource protected under 23 U.S.C. 138 or 49 U.S.C. 303 (section 4(f)) except for actions resulting in *de minimis* impacts, or a finding of "may affect, likely to adversely affect" threatened or endangered species or critical habitat under the Endangered Species Act;
>
> (4) Construction of temporary access, or the closure of existing road, bridge, or ramps, that would result in major traffic disruptions;

Based on the Historic and Architectural Survey conducted by FHWA and MDOT, there appears to be no dispute that the Bridge and the affected properties surrounding the Bridge are historic properties protected under the National Historic Preservation Act and SAFETY-LU. Destruction,

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[1] Email of Cassandra Chase, FHWA Maine Division, regarding the *Frank J. Wood Bridge Section 106 Consulting Parties Meeting* (July 18, 2016 at 8:25 am).

removal, relocation and alteration of a historic property are *per se* adverse effects, 36 C.F.R. § 800.5(a)(2), any one of which requires full NEPA compliance. 23 C.F.R. § 771.117(e).

Likewise, historic properties are protected resources under SAFETY-LU, Section 4(f). A finding of an adverse affect to a historic property is, by definition, not a *de minimus* impact, 23 C.F.R. § 774.17(5)(1) and requires full NEPA compliance. 23 C.F.R. § 771.117(e).

Under the US Army Corps of Engineers Maine General Permit ("GP"), projects that adversely affect historic sites are ineligible for the GP and projects that "may affect" endangered species – including specifically Atlantic salmon or shortnose sturgeon – or that are in Essential Fish Habitat, are categorically ineligible for the Category 1 GP and may require an individual permit [2]

The project area contains known habitat for several endangered and threatened fish species. New construction of bridge abutments would likely result in at least a "may affect" (if not more significant) finding during an Endangered Species Act Section 7 consultation. Additionally, MDOT has identified the potential for significant traffic disruptions.

Any one of the above factors would negate the use of the Categorical Exclusion. Here all five appear to be present. Accordingly, the Friends request that FHWA reconsider its initial NEPA determination and restart the process using the appropriate procedures under NEPA – starting with full public notice and a formal scoping process. 23 C.F.R. § 771.111.

III. IDENTIFICATION OF ALTERNATIVES.

The Friends believe the following alternatives should be considered as part of the FHWA review process under NEPA[3], the Clean Water Act,[4] Section 4(f) of the DOT Act of 1966,[5] and Section 106 of the Historic Preservation Act.[6]

The purpose and need for the project is to provide safe crossing of the Androscoggin River for vehicles, pedestrians and bicycles – that is, rehabilitation or replacement of the existing bridge. The alternatives reviewed should seek to address issues related to historic preservation, solutions

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[2] Department of the Army General Permit State Of Maine, §§ V(8) & V(10) and V(11).

[3] Under NEPA, 42 U.S.C.A. § 4332(c), the federal regulations require review of all reasonable alternatives, including alternatives not under the jurisdiction of the lead agency. 40 C.F.R. § 1502.14.

[4] The Clean Water Act rules require review of all reasonable alternative and selection of the Least Environmentally Damaging Practicable Alternative. *See* 33 U.S.C.A. § 1334(b) and 40 C.F.R. § 230.

[5] Section 4(f) rules require selection of feasible and prudent alternative that can avoid or mitigate adverse impacts. See 23 C.F.R. § 774.3(a)(1).

[6] See alternatives review requirement at 36 C.F.R. §§ 800.6 and 800.8.

to reduce traffic impacts during construction, and long-term maintenance and inspection improvements to reduce traffic impacts and costs. With that in mind, the Friends suggest the following variations on the basic alternatives considered to date:

Rehabilitation Alternatives:

1. Perform deferred maintenance, fix any weakened steel, paint all steel, perform a load test to verify the actual current load capacity and determine whether there is in fact a need for full bridge rehabilitation or replacement.

2. Full rehabilitation using historic materials.

3. Full rehabilitation but using modern materials and technologies, including, for example:

    - a lightweight road deck with drainage to improve project life and to reduce corrosion of the lower superstructure;

    - engineered coatings over historic materials that can increase the usable life of materials, thereby reducing the cost and traffic impacts of future maintenance; and/or

    - use of concrete, composites, carbon, or other modern materials in place of riveted steel for the deck and substructure (i.e. a hybrid or replica that retains the historic look of the existing bridge but with rust resistant long-lived deck and substructure).

4. Rehabilitation with the following configurations:

    - Narrow drive lanes to 10 feet to accommodate five-foot bike lanes in both directions;

    - Eliminate the proposed DOT sidewalk on the northbound side; and/or

    - Restore and repurpose the historic bridge for pedestrian and bicycle use, and as a public historic park. Build a new bridge on alternative alignment.

Future Maintenance and Inspections:

- Evaluate use of electronic surveillance techniques to minimize cost and traffic impacts from future inspection and maintenance events, including

    - Load testing devices to enable real time monitoring; and/or

    - Fixed or moveable cameras or drones to allow visual inspection without bridge closures and at less cost.

<u>Traffic Pressure During Construction</u>:

- Evaluate feasibility of using the existing Route 196 connector/bypass bridge to minimize traffic disruptions during rehabilitation, including;
    - Closure of one lane of the Frank J Wood Bridge, with either north or south bound traffic detoured to Route 196; and
    - Detour trucks only to Route 196.
- Evaluate feasibility of using a temporary one or two lane bridge on upstream alignment to minimize traffic disruptions during rehabilitation.
- Evaluate other traffic mitigation strategies.

IV. AREA OF POTENTIAL EFFECT.

The Friends request that the area of potential effect ("APE") be expanded from the draft presented to the review committee meeting on July 11th to include the nearby historic districts in Brunswick and Topsham.

In addition, the Friends request that an analysis be undertaken to determine whether or not demolition of the Bridge and construction of the new bridge will affect the National Register eligibility of other properties, particularly the Cabot Mill and historic neighborhood on Summer Street.

The Cabot Mill has been determined eligible in combination with the Frank J. Wood Bridge and the Bowdoin Mill across the river. Removal of the historic bridge would eliminate the historic connection between mills, forcing an evaluation of whether or not Cabot Mill is individually eligible (a higher bar). The mill complex has already lost its historic office building, storehouse, power house, and dam and had its context disturbed by the construction of the Route 1 underpass in the 1960s. Any approach to a new bridge will require further impacts on the east and north sides of the property. This is a critical assessment. National Register eligibility provides the owner access to state and federal historic tax credits totaling 45% of rehabilitation costs for work done on the historic building.

V. DATA REQUEST

The Friends request FHWA and/or MDOT provide a matrix showing the maintenance history of the Frank J. Wood Bridge, showing the dates and maintenance activities performed on the bridge over the last 30 years, or longer if additional data is available.

VI. CONCLUSION.

In light of the need to comply with NEPA, the fact that FHWA and MDOT have not yet even identified – let alone reviewed – potential alternatives under the above listed statutes, and that no study of impacts of any alternative has yet been conducted and no results disclosed, it is premature for MDOT to seek public support and endorsements for its preferred alternative. It is particularly inappropriate for MDOT to solicit resolutions endorsing its preferred alternative from the towns of Brunswick and Topsham, the chambers of commerce and the general public.

Rather, under NEPA the agencies have a legal obligation to inform the towns and the interested public regarding the full NEPA process, opportunities to participate at each stage in the process, and the timing and availability of documents documenting project alternatives and evaluating the impacts of each alternative. 33 C.F.R. § 1506.5. MDOT's premature public advocacy for its preferred alternative is a direct violation of the NEPA process, which seeks to ensure that comprehensive and scientifically accurate information is made available prior to decision making:

> NEPA procedures must insure that environmental information is available to public officials and citizens *before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA.*

33 C.F.R. § 1500.1(b) (emphasis added).

Accordingly, Friends request that FHWA and MDOT withdraw and suspend all pending requests for the Brunswick and Topsham governments to support MDOT's so-called preferred alternative and that instead the agencies initiate the full NEPA scoping process and inform the Towns regarding the opportunity to participate in that process – including the ability to identify potential alternatives, to review and comment on a draft EA or EIS, and to see the full comparison of alternative and impacts of each alternative – before being asked to submit their comments.

The Friends believe that this process, if done fairly, openly and fully, will help the public, local communities and agencies better understand the reasonable alternatives and potential impacts, and will help lead to the best outcome for our communities. We look forward to further participation and thank you for the opportunity to comment.

Sincerely,

Stephen F. Hinchman, Esq., counsel for
Friends of the Frank J. Wood Bridge

Cc: Gregory G. Nadeau, Administrator, FHWA
David Bernhardt, Commissioner MaineDOT

Sen. Angus King
Sen. Susan Collins
Rep. Chellie Pingree
John Eldredge, Town Manager, Town of Brunswick
Richard Roedner, Town Manager, Town of Topsham

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
16 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0016

Paul R. LePage
GOVERNOR

David Bernhardt
COMMISSIONER

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TTY Users dial Maine Relay 711

September 1, 2016

Stephen F. Hinchman, Esq.
The Law Offices of Stephen F. Hinchman, LLC
537 Fosters Point Rd.
West Bath, ME 04530

Dear Mr. Hinchman:

Thank you for the comments regarding our Frank J. Wood Bridge project included in your August 15, 2016 letter to Project Manager Joel Kittredge and Cheryl Martin of the Federal Highway Administration (FHWA). I understand that FHWA has responded directly to you, addressing the topics in the letter that are under their jurisdiction, including the Area of Potential Effect, and what process and documents will be completed to satisfy the National Environmental Policy Act (NEPA). Many of these topics were also discussed at the project's Section 106 meeting in Brunswick on August 18, 2016, which you attended.

Your letter included a request for our maintenance records for the bridge. Those records are attached.

In April of this year, MaineDOT presented for stakeholder and public comment our alternative analysis and a preliminary recommendation based on conceptual design, cost analysis, and municipal input to that point. Since then, we have been working closely with FHWA as the project alternatives are considered through their Section 106 consultation process. We plan to revise and broaden our alternative analysis to account for the findings of our recent bridge inspection and for the additional alternatives desired for the Section 106 alternative matrix. MaineDOT's current project activity is focused on further consideration of alternatives, listening to comments and concerns, and responding to questions of interested parties including FHWA, the Section 106 consulting parties, municipal officials and committees, and your organization.

To make an important clarification, the efforts by the towns of Topsham and Brunswick to adopt resolutions and form a Design Advisory Committee (DAC) were initiated and sponsored by municipal officials, not by MaineDOT. Contrary to your letter, MaineDOT does not have any pending requests for the municipalities to support a specific alternative. MaineDOT has considerable experience with the federal NEPA process and a long history of compliance. Rest assured that we will cooperate with and contribute to FHWA's alternative analysis as it progresses through Section 106, 4(F) and NEPA completion process. Environmental agencies and members of the public will have every opportunity to provide input as well.

Feel free to contact me with any questions or concerns.

Sincerely,

Toni L Kemmerle

Toni L. Kemmerle
Chief Counsel
Office of Legal Services

TLK/jas

Enclosures

cc: Cheryl B. Martin, Assistant Division Administrator, Federal Highway Administration
w/o enclosures
William Pulver, Director, Bureau of Project Development
w/o enclosures

John Graham
Friends of the Frank J. Wood Bridge
10 Pleasant Street
Topsham, ME 04086
Friendsofjwb@gmail.com

July 23, 2016

Dear John:

It is my understanding that the MaineDOT has recommended that the Frank J. Wood Bridge be replaced rather than rehabilitated, and that this decision is supported by their consultant TYLIN; and that this decision is being contested by a group of local residents -the Friends of the Frank J. Wood Bridge (FJWB) - who believe that "..MDOT"S recommendation …is premature, and has been made without full consideration of the possibility of rehabilitation." (Ref 6)

I have reviewed the documents that you have provided and other information and documents that I have gathered. These documents form the basis of my observations and comments. They are listed under "References" at the end of this letter.

From the review of documents and information in hand it is my professional opinion that it would be both feasible and prudent to rehabilitate rather than replace the FJWB; and that current life-cycle analyses , cost estimates and rehabilitation alternatives have enough questions that it is recommended that further study should be done.

This opinion is based on the current structural condition as reported in ref 7 "Structural Inventory and Appraisal Report" and other referenced documents where all structural condition ratings are fair to good, 5 or above, and bridge roadway alignment and deck geometry meets or exceeds minimum criteria, and the interpretation of such structural and functional condition to judge whether or not rehabilitation is feasible and prudent by:

- the 2003 Maine DOT Historic Bridge Management Plan for the Frank J. Wood Bridge. (Ref 1)
- the TRB 2007 Guidelines for Historic Bridge Rehabilitation and Replacement (Ref 3)

The Committee Recommendation in the MaineDOT Historical Bridge Management was "…that it is prudent and feasible to preserve the bridge for its current usage .." Currently, the condition of the bridge compared to that in 2003 is essentially the same functionally, and very similar structurally. Nothing significant has changed that would affect their recommendation. The committee was composed of four members of MaineDOT and one member of the Maine Historic Preservation Commission.

The TRB Guidelines for Historic Bridge Rehabilitation and Replacement are intended to be used as protocol for defining feasible and prudent, and the application of decision making thresholds to determine when rehabilitation of historic bridges can be considered prudent and feasible. Based on adequacy thresholds bridges are placed in Groups I through VI , with bridges in Group I all having rehabilitation potential and those in Group VI very unlikely to have to have potential. The FJWB is firmly in Group I having adequate superstructure, substructure geometry and load carrying capacity- with structural condition ratings of 5 or greater, adequate travel way and alignment matching or exceeding that of approaches.

Engineering judgments should be balanced with costs, both initial and life cycle, to support the appropriate decision. It is not possible with materials in hand to comment on the life-cycle analysis that has been performed by TYLIN (ref 8). This document supplies the results of the analysis and does not list all assumptions and inputs. However, the assignment of a thirty year life to the rehabilitated bridge and a 75 year life to the replacement bridge is not supported by any information in hand, including the TYLIN cost estimates in ref 9. Life expectancy for a new structure can reasonably fall in the range of 50 to 100 years. By proper selection of deficient structural elements for rehabilitation and the use of durable materials and methods – in conjunction with proper maintenance –it is reasonable to expect life expectancy of a rehabilitated FJWB to well exceed 30 years.

There are individual issues with the cost estimates that could be studied further, but it is important for making decisions that the methods and assumptions for both the replacement and rehabilitation estimates are similar.

One example of where they are not similar, and how such affects cost comparisons, is with the current assignment of contingencies. The TYLIN PDR Structural Cost Estimates (ref 9) indicate widely divergent contingencies of 34% for the rehabilitation (Alt 6) and 6% contingency for Replacement (Alt 4) The TYLIN Cost Summary (ref 8) attached to the life-cycle analysis indicates contingencies of 15% and 4% respectively.

At this stage of project is standard practice in many State DOT's to place a contingency on new or rehabilitation construction of 25% plus or minus depending upon the type of structure, foundation work, type of rehabilitation and the extent of inspection, soil exploration etc.. Should a 25% contingency be placed on both replace and rehab, the construction costs would be $9.3 vs $15 million, Rehab vs Replace for the PDR Cost Estimate and $10.8 vs $15.4 million for the Life-Cycle Cost Summary.

Best Regards,

Robert J. Shulock P.E.

References

1. Historic Bridge Management Plan, Bridge #2016, Frank J. Wood, Maine Department of Transportation, Dec 1, 2003

2. Preliminary Engineering Study, Androscoggin River Bridge over Androscoggin River, Brunswick, Maine, J. A. Foster, 1984

3. Guidelines for Historic Bridge Rehabilitation and Replacement, Final Report - Transportation Research Board, March 15, 2007

4. National Bridge Inventory Data Sheet, HistoricBridges.org, Frank J. Wood Bridge, 2011 Inventory

5. Brunswick-Topsham Bridge, Respecting the past and moving toward an exciting future, PPT, MaineDOT and TYLIN International, 2015 (est)

6. Frank J. Wood Bridge Improvement Project Considerations, Friends of the Frank J. Wood Bridge, June 2, 2016

7. Structural Inventory and Appraisal Report, Frank J. Wood (ANDROSCOG), MaineDOT, December 2013

8. Life Cycle Cost Analysis and Cost Summary, Brunswick-Topsham, F.J.Wood Bridge, RMH, TYLIN November 13, 2015

9. PDR Structural Cost Estimates, Brunswick-Topsham-F.J. Wood Bridge, Alternate 4 (Replace) and Alternative 6 (Rehabilitate), RMH, TYLIN, October, 2015

10. Rehabilitation Alternate Existing Steel Truss Bridge, Transverse Section, MaineDot and TYLIN International, 2015 (est)

From: Norman Baker
To: Kittredge, Joel
Subject: RE: Frank J Wood
Date: Monday, July 11, 2016 10:46:40 AM

Joel
If it's the language, I can change it from 'Structural Deficiencies' to Structural Needs'. This would not confuse the terminology.

Norm

From: Kittredge, Joel [mailto:Joel.C.Kittredge@maine.gov]
Sent: Monday, July 11, 2016 10:31 AM
To: Norman Baker <norman.baker@tylin.com>
Subject: FW: Frank J Wood

Fyi

Still have not nailed it down.

For sure, the ratings will be dropped in follow-up to the recent inspections.

From: Folsom, Jeff
Sent: Monday, July 11, 2016 10:29 AM
To: Foster, James; Kittredge, Joel
Subject: RE: Frank J Wood

I believe the definition for structurally deficient states that the structural evaluation code must be a 2
Or the condition ratings for deck, superstructure, or substructure be a 4

Sent from my iPhone managed by BlackBerry Enterprise Service

---- Original Message ----

From: Kittredge, Joel <Joel.C.Kittredge@maine.gov>
Date: July 11, 2016, 9:15 AM EDT
To: Foster, James <James.Foster@maine.gov>
CC: Folsom, Jeff <Jeff.Folsom@maine.gov>
Subject: RE: Frank J Wood

Any other reason??

From: Foster, James
Sent: Friday, June 03, 2016 12:17 PM
To: Kittredge, Joel
Subject: Frank J Wood

Joel,

FYI …

The Frank J Wood Bridge is Structurally Deficient (contrary to the Friends of … report) and is eligible for federal funding for rehab or replacement due to Structural Evaluation code = 4.

Jim

James A. Foster, P.E.
Bridge Management Engineer
Results and Information Office
Maine Department of Transportation
16 SHS, Augusta, ME 04333-0016
Office: 207-624-3267 Cell: 207-446-6842
Email: james.foster@maine.gov

Federal Definitions for Final Design/Preliminary Design:

FINAL DESIGN:

Title 23, CFR, Section 636.103 (23 CFR §636.103), defines the term "Final Design" as follows:

> (1) "*Final design* means any design activities following preliminary design and expressly includes the preparation of final construction plans and detailed specifications for the performance of construction work."

Further guidance from FHWA Directive 6640.1A: What activities are considered final design for purposes of this Directive?

a. The activities in the definition of *final design* are considered to be final design. Other activities constituting final design include final plans, project site plan, final quantities, and final engineer's estimate for construction.

PRELIMINARY DESIGN:

Title 23, CFR, Section 636.103 (23 CFR §636.103), defines the term "Preliminary Design" as follows:

> (2) "*Preliminary design* defines the general project location and design concepts. It includes, but is not limited to, preliminary engineering and other activities and analyses, such as environmental assessments, topographic surveys, metes and bounds surveys, geotechnical investigations, hydrologic analysis, hydraulic analysis, utility engineering, traffic studies, financial plans, revenue estimates, hazardous materials assessments, general estimates of the types and quantities of materials, and other work needed to establish parameters for the final design. Prior to completion of the NEPA review process, any such preliminary engineering and other activities and analyses must not materially affect the objective consideration of alternatives in the NEPA review process."????

Further guidance from FHWA Directive 6640.1A: Additional activities listed for preliminary design.

2. Other activities: design and engineering activities to be undertaken for the purposes of defining project alternatives; completing the NEPA alternatives analysis and review process; complying with other related environmental laws and regulations; environmental justice analyses; supporting agency coordination, public involvement, and permit applications; development of environmental mitigation plans; development of typical sections, grading plans, geometric alignment (horizontal alignment, vertical alignment and any clearances necessary to meet approved design criteria), noise wall justifications, bridge type/size/ location studies, temporary structure requirements, staged bridge construction requirements, structural design (substructure and superstructure), retaining wall design, noise wall design, design exceptions, guardrail length/layout, existing property lines, title and deed research, soil borings, cross sections with flow line

elevations, ditch designs, intersection design/configuration, interchange design/ configuration, pavement design, storm/sanitary sewer design(plan/profile), culvert design, identification of removal items, quantity estimates, pavement details/ elevation tables, and preliminary traffic control plans to be maintained during construction.

FHWA Determinations:

It is important to note that FHWA has the authority to determine certain activities should not proceed until NEPA is complete. "In making this determination, division administrators may consider and balance any relevant factors, including: "

(1) The actual bias on the part of the decisionmaker that the proposed preliminary design activity to be advanced will create with respect to any alternative under consideration;

DAC ???

(2) The perception of bias on the part of the community at large with respect to the advancement of the proposed preliminary design activity;

(3) The extent to which the proposed preliminary design activity is specific to only one alternative under consideration;

(4) The degree of preliminary design activities advanced for any given alternative relative to other alternatives under consideration;

(5) The estimated cost of the proposed preliminary design activity standing alone is substantial; and

(6) The degree to which the proposed preliminary design activity relates to any specific point of controversy regarding an alternative under consideration.

Ms Martin informed us it was "inappropriate"

From: Pulver, William
To: Frankhauser Jr, Wayne; Kittredge, Joel; Folsom, Jeff
Cc: Crawford, Richard
Subject: RE: DAC Info Request
Date: Thursday, August 04, 2016 4:18:55 PM

I spoke with Cheryl Martin today. She is OK with our attendance at the next DAC meeting to answer technical or procedural questions. I have informed Bruce. He still would like to meet with Joel and Norm or whoever for some pre-DAC mtg to get answers to some technical questions already asked by the DAC, and so that he can be better prepared as chair the DAC. He is willing to come here for that meeting, which is my preference. Whenever we are asked to discuss a new bridge, I ask that we reiterate that no final decision has been made regarding new or rehab. That decision will be made by FHWA as a result of the ongoing 106 process.

I plan on attending the next 106 meeting (out of interest) on 8/18.

Thanks -Bill

From: Pulver, William
Sent: Wednesday, August 03, 2016 12:36 PM
To: Frankhauser Jr, Wayne; Kittredge, Joel; Folsom, Jeff
Subject: Re: DAC Info Request

I will be speaking Cheryl after lunch to discuss.

Sent from my BlackBerry 10 smartphone on the Verizon Wireless 4G LTE network.

From: Frankhauser Jr, Wayne
Sent: Wednesday, August 3, 2016 12:10 PM
To: Kittredge, Joel; Pulver, William; Folsom, Jeff
Subject: RE: DAC Info Request

I'm ok with you and TYLin meeting with Topsham to discuss the info request below as long as they understand that the information we'll be sharing is draft and that the final decision on rehabilitation or replacement can't be made until the 106 process is complete.

Wayne

From: Kittredge, Joel
Sent: Wednesday, August 3, 2016 10:15 AM
To: Folsom, Jeff; Frankhauser Jr, Wayne; Pulver, William
Subject: FW: DAC Info Request

Good morning:

Please let me know how/when you would like to proceed.

Thanks---Joel

From:	Chase, Cassandra (FHWA)
To:	Kittredge, Joel; Hopkin, Megan M; Chamberlain, Kristen
Cc:	Martin, Cheryl (FHWA)
Subject:	FW: Frank J. Wood Bridge Project - Request for Comments on Section 106 Documents
Date:	Wednesday, December 07, 2016 8:12:34 AM

FYI.

From: MaryAnn Naber [mailto:mnaber@achp.gov] → ACHP - * Ignored
Sent: Monday, December 05, 2016 4:53 PM
To: Chase, Cassandra (FHWA)
Subject: Re: Frank J. Wood Bridge Project - Request for Comments on Section 106 Documents

Hi, Cassie-

I realized when I saw your response to Mr. Graham's comments that I had never followed up our later discussion with written comments. I have concerns about both the preliminary assessment of effects and the manner in which alternatives were considered.

The overview of eligibility upon which the assessment of effects was based is inadequate to consider the full range of effects to the historic resources identified. The statements of eligibility should include a more complete discussion of all the contributing elements and the relative aspects of integrity in order that project effects may be assessed by applying the criteria of adverse effect. Integrity is not limited to "essential" physical features. It should be noted that the criteria of effect is based on the potential that a project "may alter, directly or indirectly, <u>any</u> of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association." In addition, the regulations at 36 CFR 800.5 state, "Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register." Accordingly, it may be necessary to re-visit, update, and expand the original determinations of eligibility to ensure all contributing features of the properties are identified and may be taken into account. The overview of resource eligibility is not adequate to capture the full range of potential impacts to the historic properties, in particular with regard to indirect impacts such as those to setting, feeling, and association. Furthermore, these aspects of integrity seem to have been discounted if they were at all previously "compromised." For example, the presence of a parking lot is implied to have negated any aspect of the integrity of setting. However the relationship of the mills with the source of water power which gave rise to both and the water crossing between them are nevertheless significant features of the respective settings of each of those elements, and may yet be diminished by removal of the historic bridge.

I am also concerned with the order and weight given the various alternatives. Both Section 106 and Section 4(f) set a higher bar for selecting an alternative which would replace the Frank J. Wood Bridge. As a historic property, the approaches which would preserve the bridge must be given additional weight in evaluating the available alternatives. Cost and the degree to which the alternative meets the identified purpose and need are but two of the factors that should evaluated in selecting the alternative. The rehabilitation alternatives that preserve the bridge to the greatest degree should first be considered fairly and eliminated before determining that replacement with a new bridge is the only prudent alternative. I am also concerned that the firm providing the initial evaluation seems to have a bias toward new construction and does not have the experience with rehabilitating historic bridges to make a full and fair assessment of the rehabilitation potential for the Wood Bridge. I recommend that you seek a second opinion from a firm with historic bridge experience to evaluate the rehabilitation alternatives from that perspective.

Thank you for the opportunity to provide comments on the preliminary effects assessment and draft alternatives matrix. I look forward to our next meeting and discussing the project in further detail.

MARYANN NABER
Senior Program Analyst, FHWA Liaison
Advisory Council on Historic Preservation

On Fri, Nov 4, 2016 at 8:56 AM -0400, "Chase, Cassandra (FHWA)" <Cassandra.Chase@dot.gov> wrote:

Good Morning,

Thank you all for attending the October 27th Section 106 Consulting Party Meeting for the Frank J. Wood Bridge Project. As mentioned at the meeting, we apologize for providing the materials just prior to the meeting. We were still working on compiling all of the information right up until the meeting, but we understand and recognize that this does not provide you with an adequate opportunity to review and come prepared to the meeting. In the future, we are committed to providing you with all documents to be discussed at future Section 106 consulting party meetings at least two weeks prior to the meeting.

Additionally, to ensure you are able to review and provide input on the draft alternatives matrix summary, the draft alternatives matrix, and the preliminary effect determinations, we are accepting and would appreciate any comments you have by COB on December 2, 2016. Please send your comments to both me (cassandra.chase@dot.gov) and Joel Kittredge (joel.c.kittredge@maine.gov). If you'd like to send your comments by mail, please either mail them to my attention at the Federal Highway Administration, Edmund S. Muskie Federal Building, 40 Western Avenue, Room 614, Augusta, Maine 04330; or Joel's attention at the Maine Department of Transportation, 16 SHS, Augusta, ME 04333-0016. We are currently working on addressing the comments received at last week's consulting party meeting. After we receive all of your comments by December 2nd, we will begin reviewing, addressing and considering those comments as well. You can expect to see another e-mail from me, in response to your comments particular to the Section 106 process, sometime in mid-December.

In addition to attaching the October 27th sign-in sheet, the draft alternatives matrix summary, draft alternatives matrix, and the preliminary effect determination presentation, I have attached a copy of the Cabot Mill Historic Survey, which indicates that the Cabot Mill is individually eligible for listing under the National Register of Historic Places. This was requested at the October 27th meeting. Also requested at the Section 106 consulting parties meeting was a link to view the architectural survey no proof of bike/ped use

From: Adams, Patrick
To: Kittredge, Joel
Cc: "norman.baker@tylin.com"
Subject: RE: Brunswick-Topsham Frank J. Wood Bridge 22603.00
Date: Friday, April 17, 2015 11:20:22 AM

I was under the impression that the BikePed numbers on this bridge were very low. The majority of those walkers and bicyclists in the area use the nearby bridge for the multiuse trail.

When I was talking with the town last week, we were discussing the potential for a new sidewalk taking people from the ramp and the Parkway Rd intersection to just up past the Dunkin Donuts where it will tie in to the multiuse path.

I was under the impression that your bridge would only have shoulders as the accommodation. Were you thinking something else?

Patrick D. Adams
Bicycle and Pedestrian Program Manager
MaineDOT - Multimodal Planning Division
16 State House Station
Augusta, ME 04333-0016
Direct Line: (207) 624-3311
Cell Phone: (207) 592-0873
Office: (207) 624-3300
Fax: (207) 624-3099
Web: http://www.maine.gov/mdot/bikeped/

From: Kittredge, Joel
Sent: Friday, April 17, 2015 8:49 AM
To: Adams, Patrick
Cc: 'norman.baker@tylin.com'
Subject: Brunswick-Topsham Frank J. Wood Bridge 22603.00

Hi Patrick;

Thanks for introducing yourself when we met in Bethel last week.

We are in preliminary design working toward structure recommendations for the above referenced project.

Do we have any ped/bike counts for the bridge. We all know it is heavily used, but actual counts are always helpful in reports and public discussion.

Can you help us out in getting some numbers?

Thanks---Joel

No proof a second sidewalk is needed

From:	Hanscom, Ed
To:	Frankhauser Jr, Wayne
Cc:	Kittredge, Joel
Subject:	Pedestrian traffic at Frank Wood Bridge
Date:	Monday, November 07, 2016 4:17:36 PM

Wayne,

As I mentioned earlier in response to your question, I am not aware of any actual pedestrian counts on the bridge itself. There are pedestrian counts for the crosswalks parallel to Maine Street at the US 1 SB off-ramp and at Cabot Street (Fort Andross). They were collected in July 2006 as part of a 12-hour turning movement count. Here are the raw numbers:

	Cabot St	US 1 SB off
12-hour count	199	31
Peak-hour count	38	8
Pedestrian peak hour	1-2 pm	6-7 am

Much of this pedestrian traffic may be generated by Fort Andross and not use the bridge, but we can say there is pedestrian traffic near the bridge. The crosswalk at the US 1 SB off, which has less pedestrian traffic, leads to the Maine Street crosswalk at the Fort Andross building. !?

Edward W. Hanscom, P.E.
Head of Transportation Analysis Section
Bureau of Planning
Maine Department of Transportation
State House Station 16
Augusta, ME 04333-0016

(207) 624-3320
ed.hanscom@maine.gov

237 - 12 hours people

Not all even used bridge

T·Y·LIN INTERNATIONAL

MaineDOT

Bernard Lown Peace Bridge

Public Meeting

February 23, 2017
WIN 22599.00

Bernard Lown Peace Bridge

- 723 ft, three-span steel truss
- Built in 1936, pier 2 repair 1995, deck replacement 1996

Auburn Approach

Lewiston Approach

Project Background Information

- Superstructure and Substructure rated "Satisfactory"

- Deck rated "Good"
- Most of paint "Good"

Project Background Information

- Bridge has significant life remaining
- Preliminary Design:
  - Rehabilitation vs. Replacement
  - Compare impacts
  - Compare costs

Preliminary Design Options

- Rehabilitation
- Replacement:
  - Adjacent
  - Conceptually: downstream locations (per New Auburn Village Center study)

Rehabilitation Needs


Superstructure over Pier

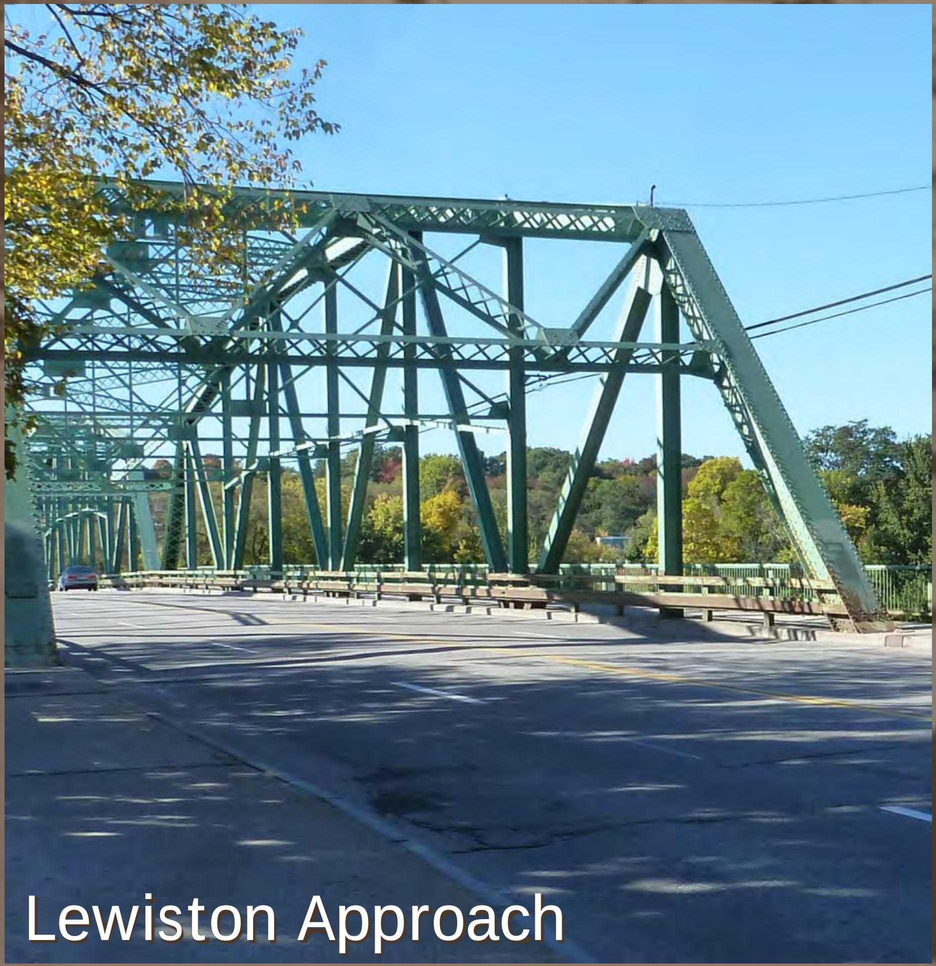
- Paint
- Wearing surface
- Joint repairs
- Minor steel repairs

Rehabilitation Needs


Pier 1

- Minor abutment repairs
- Pier 1 repair at waterline
- Pier 2 pier cap repair
  - Was repaired in 1995
  - (Pier 1 pier cap recently repaired)

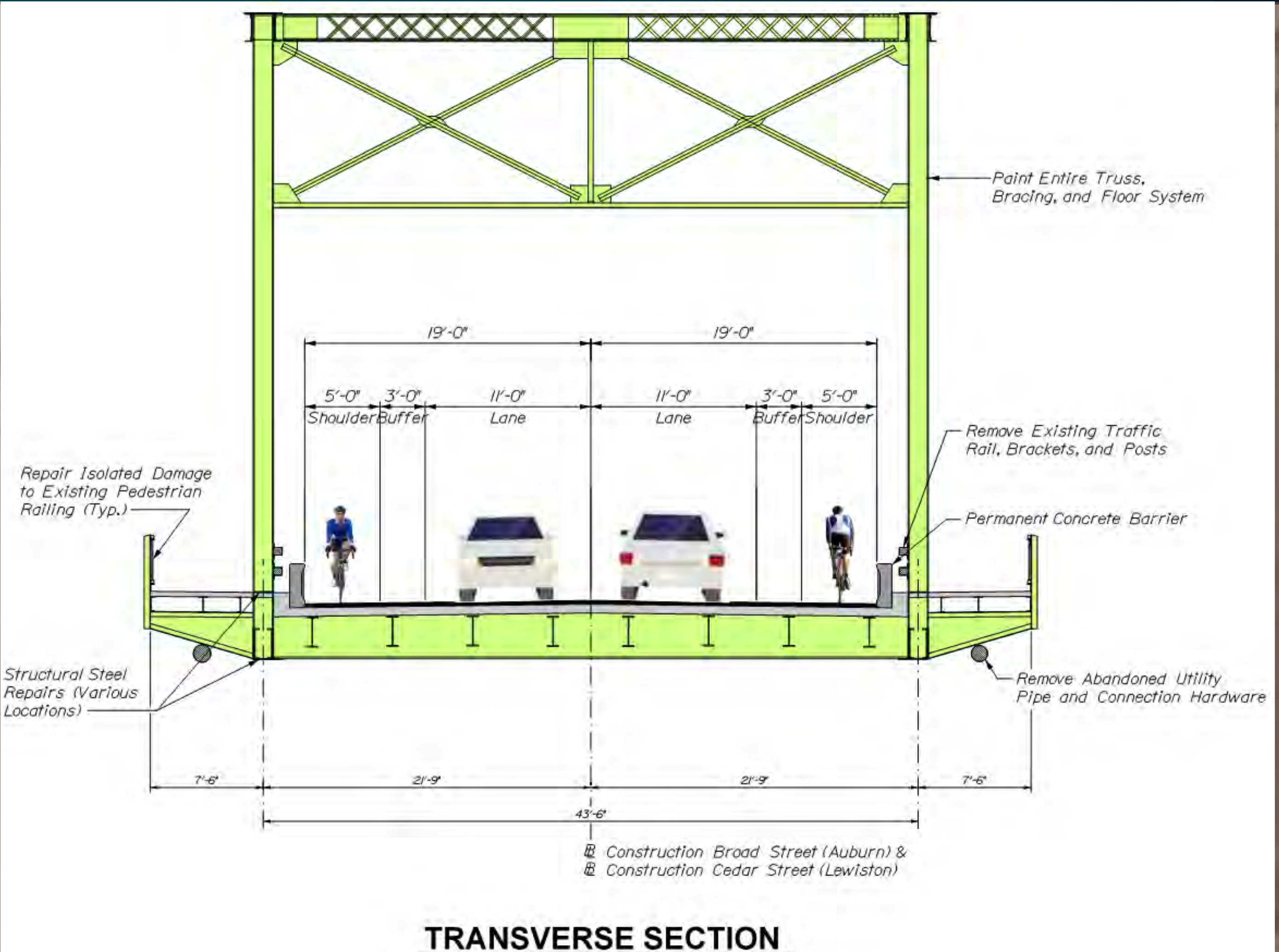
Rehabilitation Needs



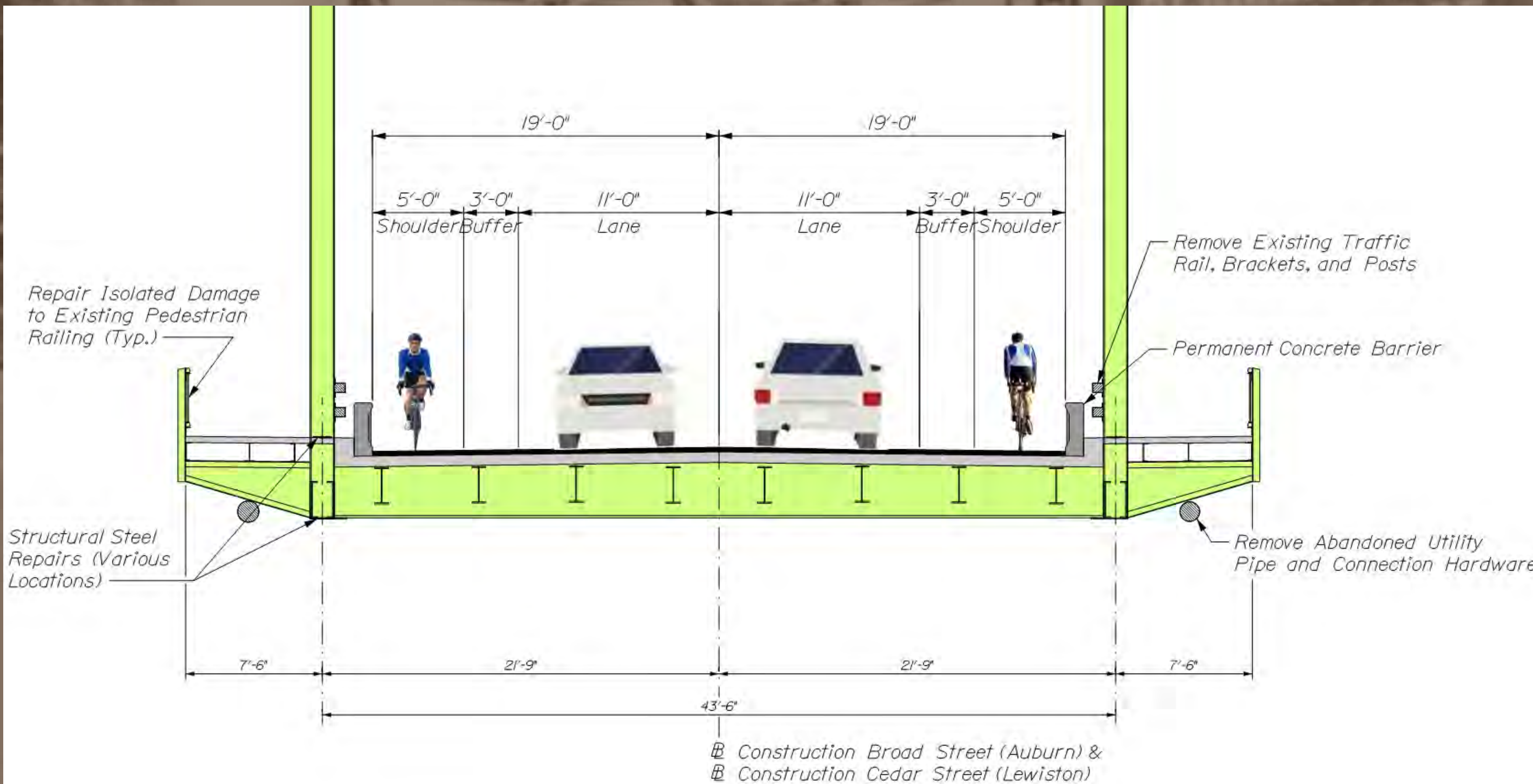
Lewiston Approach

- 40'-0" width
- Reduce to 2 striped lanes
  - Traffic volume easily fits in 2 lanes
  - Much safer
  - Better bicycle accommodation
  - Fits cities' plans

Rehabilitation Section



Rehabilitation Section



Rehabilitation Option

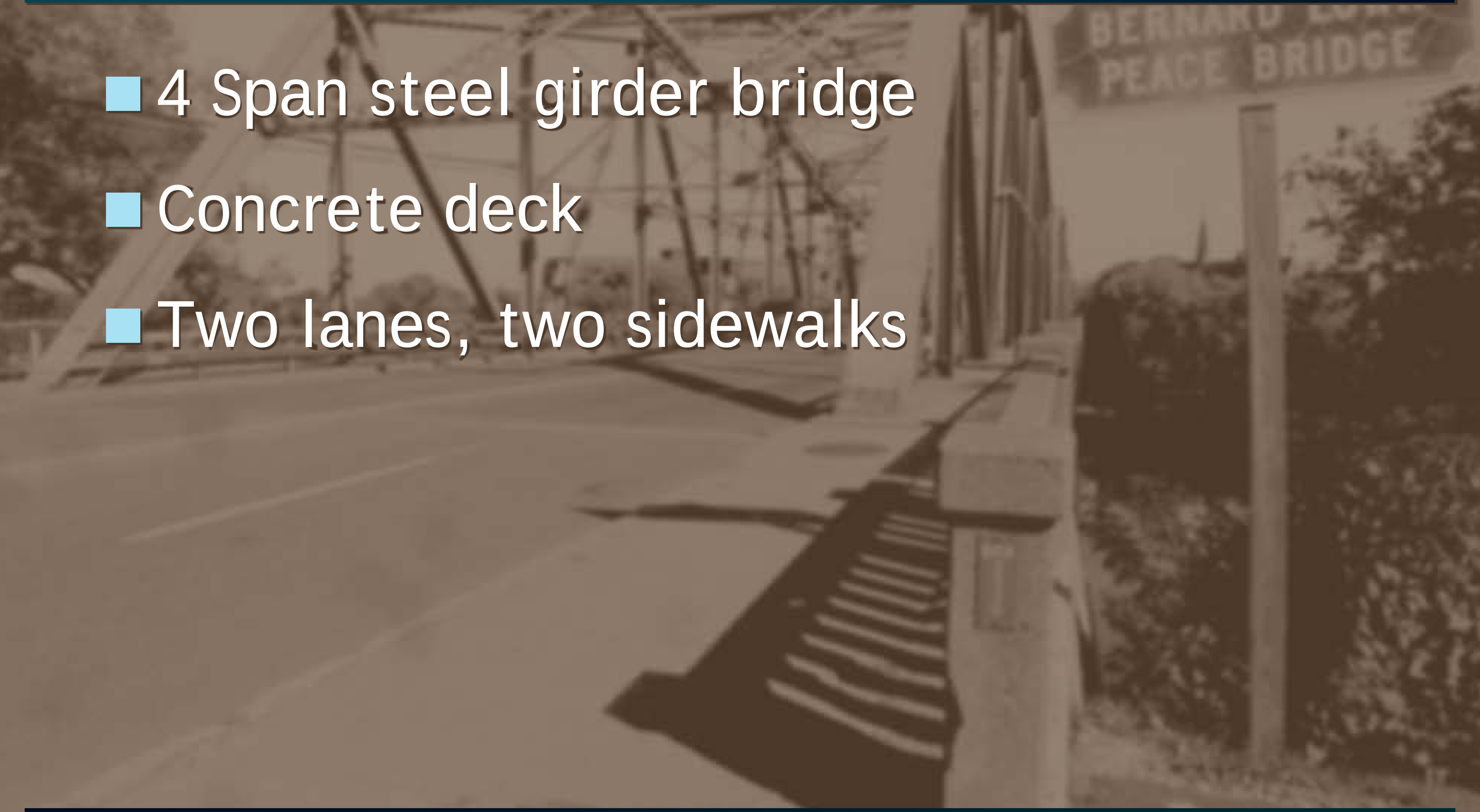
- Target 30 more years of life
- Improved safety
- Minimal impacts
- Initial cost $8,300,000

Replacement Options

- Replacement Option
  - Adjacent Downstream
  - Lowest Cost Replacement
  - Moderate impacts
- Other Conceptual Option
  - Downstream: Mill St. Intersection (per New Auburn Village Center study)

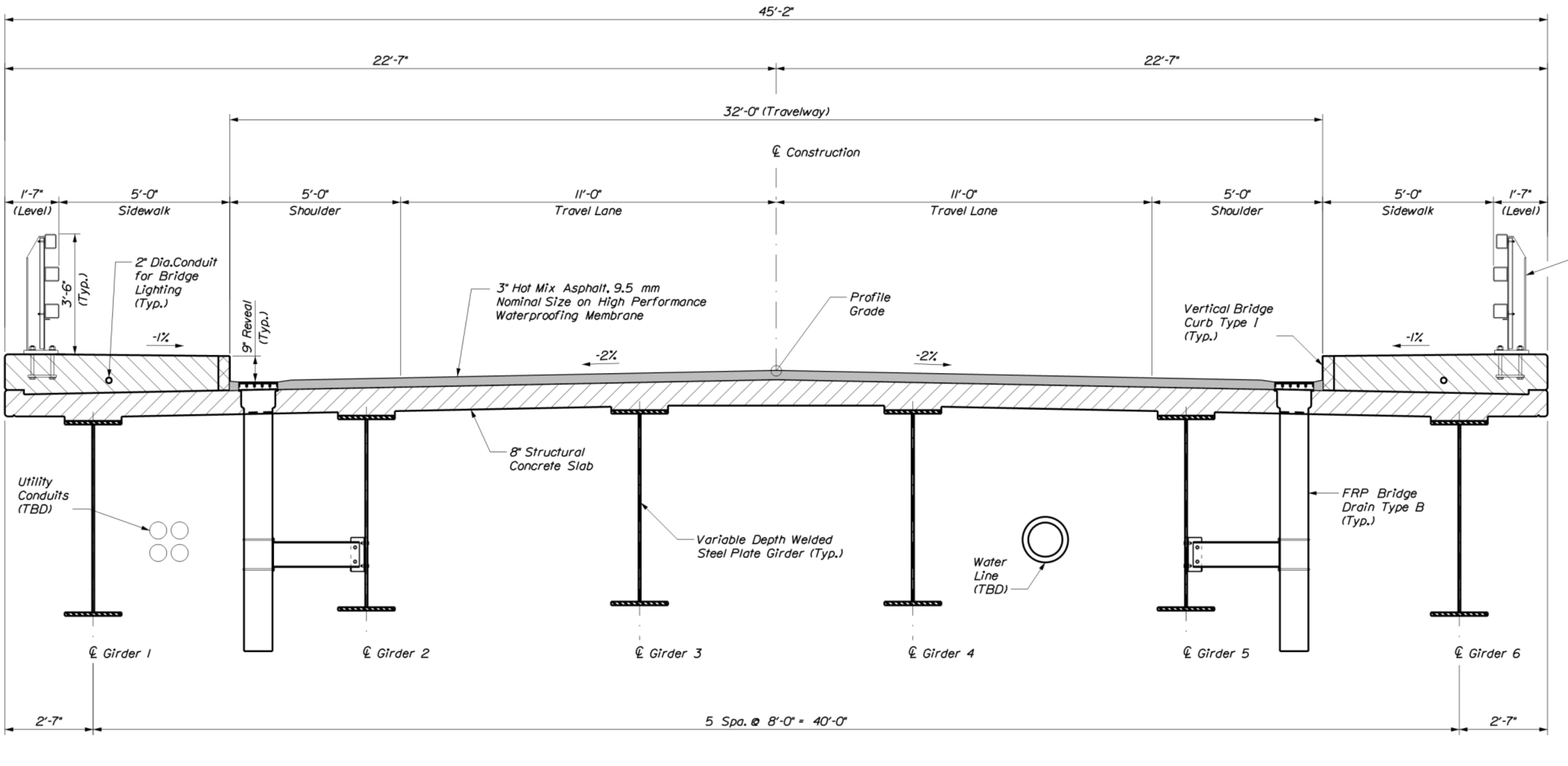
Replacement Option

- 4 Span steel girder bridge
- Concrete deck
- Two lanes, two sidewalks



Replacement Alignment

Replacement Section

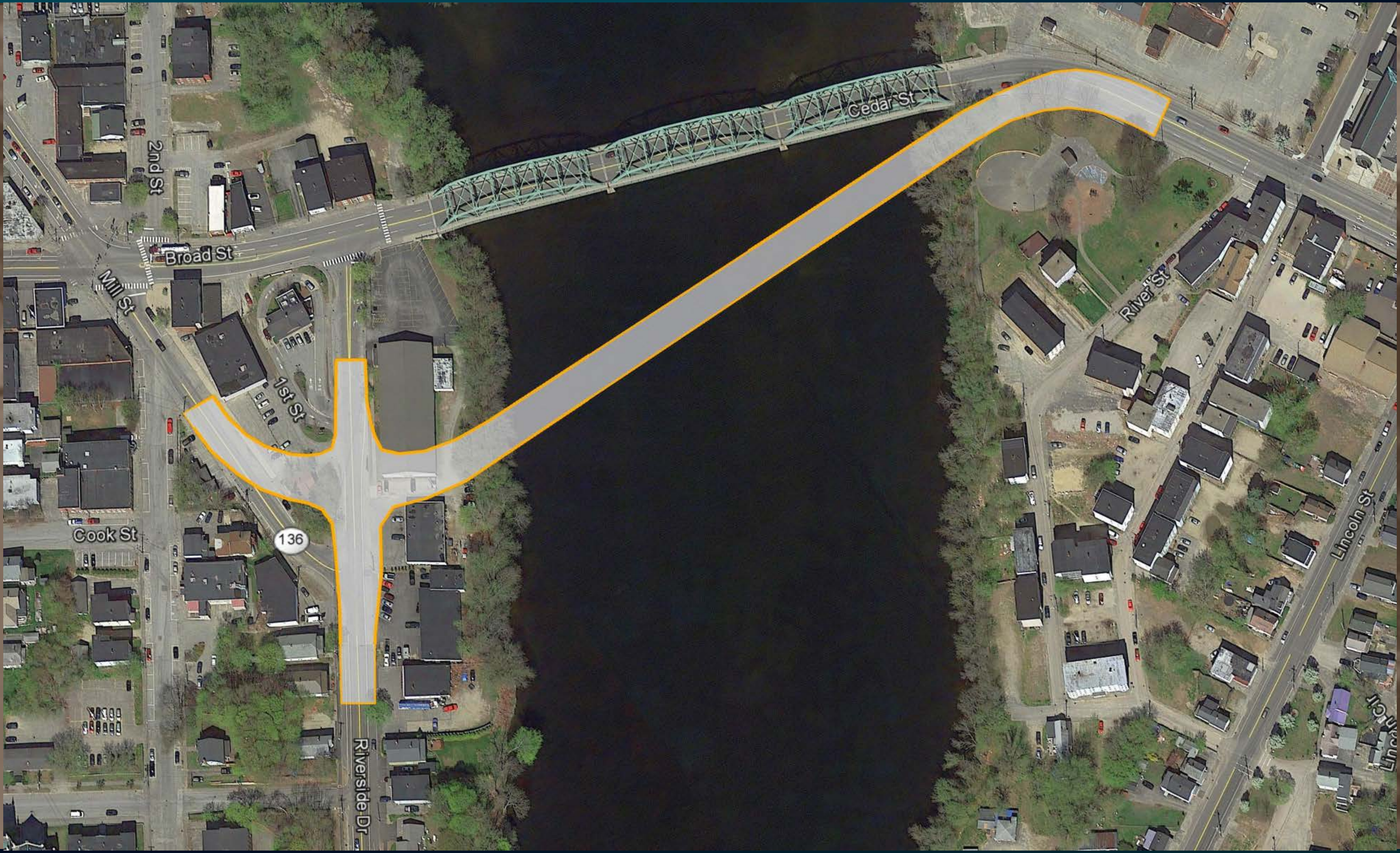


TRANSVERSE SECTION

Replacement Option

- Target 100 years of life
- Impacts:
  - Right-of-Way: Lionel Potvin Park, Rollodrome
  - Environmental: impacts to river
  - Historic: removal of truss
- Initial cost $16,700,000

Replacement: Downstream



Downstream Option

- Conceptual analysis
- Impacts:
  - Right-of-Way: Lionel Potvin park, multiple businesses, multiple residential occupants
  - Environmental: impacts to river
  - Historic: removal of truss
- $21,000,000 initial cost

Replacement Alternatives

- Adjacent, low-cost option developed
- Downstream alternative conceptually studied
- In-depth environmental study would be required

Comparison of Options

	Rehab	Replacement
Right of Way	Minimal	Park, 1 Business
Environmental	Minimal	New piers in river
Historic	Minimal	Remove truss
Cost	$8,300,000	$16,700,000
Long Term Cost	Rehab less	

Recommended Option

- Rehabilitate existing truss
- Maintain two lanes of traffic and one sidewalk at all times
- Detour trucks during truss painting
- Two construction seasons

Other Considerations

- Adjacent projects in Lewiston & Auburn
- Bridge Improvements:
  - Colored pavement
  - Decorative parapet
  - Bridge Lighting

Colored Pavement

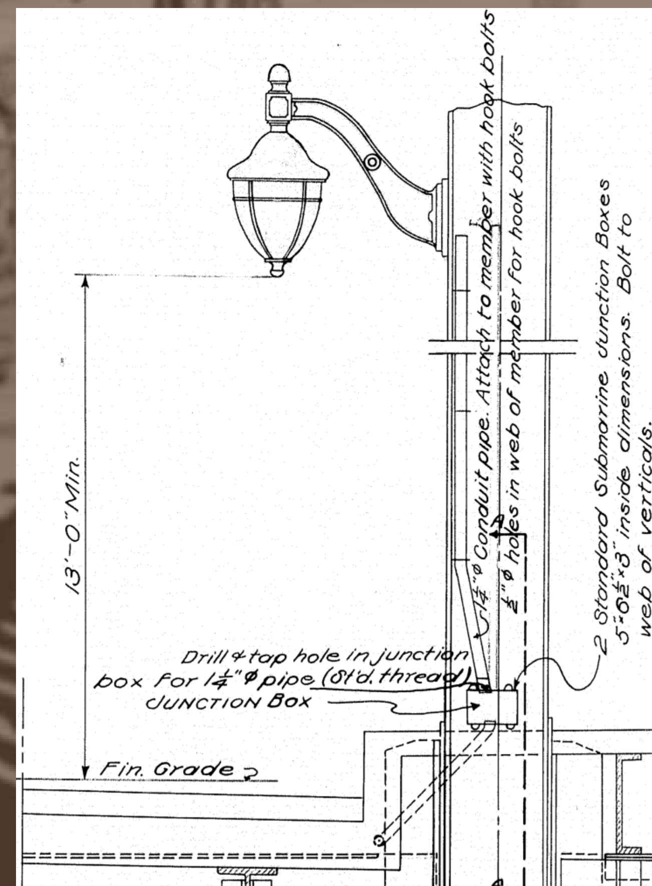
Decorative Parapet

- Concrete parapet added for safety & maintenance
- Emulate style of approach parapet

Bridge Lighting

- Currently 6 lights

- 1936 Plans:



Bridge Rendering

Questions/Comments

Preliminary Design Report

Bernard Lown Peace Bridge #3330
over
Androscoggin River

Lewiston - Auburn, Maine

STP-2259(900)
WIN 22599.00

Maine Department of Transportation
Bridge Program

TABLE OF CONTENTS

BACKGROUND INFORMATION

TOWN	Lewiston - Auburn	**WIN**	22599.00	**BRIDGE NO.**	3330
BRIDGE	Bernard Lown Peace Bridge			**STATE ROUTE**	--

FUNDING: Federal/State

PROGRAM SCOPE: Bridge Rehabilitation

PROGRAM DESCRIPTION: Bernard Lown Peace Bridge (No. 3330) over the Androscoggin River. Located on the Lewiston - Auburn city line.

PROJECT BACKGROUND: This bridge was constructed in 1936, had pier repairs in 1995, a deck replacement in 1996, and substructure repairs and rehabilitations in 1997 and 2014. It is in need of a rehabilitation to prolong its useful life. The project is funded in the 16/17/18 Work Plan.

		JURISDICTION	State Highway	**NHS**	Yes
		FUNCTIONAL CLASSIFICATION	Principal Arterial	**CORRIDOR PRIORITY**	2
		URBAN/RURAL	Urban	**FHWA SUFFICIENCY RATING**	51.2
		LOAD POSTING	Not Posted	**POSTED SPEED**	25 mph
TRAFFIC:	2018	**AADT**	14,920	**ACCIDENT DATA, CRF**	0.70
	2038	**AADT**	17,900	**DHV**	1790

EXISTING BRIDGE

YEAR BUILT 1936 **SPAN LENGTHS** 235'-235'-235' **CURB TO CURB WIDTH** 40'

TYPE OF SUPERSTRUCTURE: Three-span painted steel through-truss, cast-in-place deck with a bituminous wearing surface, two 6' clear cantilevered sidewalks, and painted steel traffic and pedestrian rails.

GENERAL CONDITION: Steel superstructure is in satisfactory condition. Paint is generally in good condition (75% condition state 1), but areas near the travelway have moderate rusting. Concrete deck is in good condition. Wearing surface is deteriorated (rutting, patching). Traffic rail is rusting and bent in many areas. Pedestrian rail shows some rust and some bent verticals.

TYPE OF SUBSTRUCTURE: Reinforced concrete counterfort wall abutments on timber piles, reinforced concrete mass piers on piles.

GENERAL CONDITION: Substructure is in satisfactory condition. Abutments have scattered scaling, spalling and delamination. East abutment bearings have rocked significantly. West pier cap has been rehabbed, in good condition, but shaft has heavy spalling and exposed rebar at the waterline. East pier has deep nested cracking with soft concrete around bearing areas.

LOAD RATINGS:

	OPERATING	INVENTORY
HL-93 Truck	47.88 Tons	36.72 Tons
Rating Factor	1.33	1.02

	LEGAL LOADS
Controlling Configuration: N/A	N/A Tons
Rating Factor	N/A
Controlling Member:	Gusset Plate Bottom Chord L4 and Gusset Plate Upper Chord U3

Note: These ratings are apparent values based on the 2012 Report and the 2017 Addendum. See Appendix E for load rating summary

STRUCTURALLY DEFICIENT No **FUNCTIONALLY OBSOLETE** Yes

MAINTENANCE PROBLEMS: Deteriorated wearing surface, repeated substructure repairs.

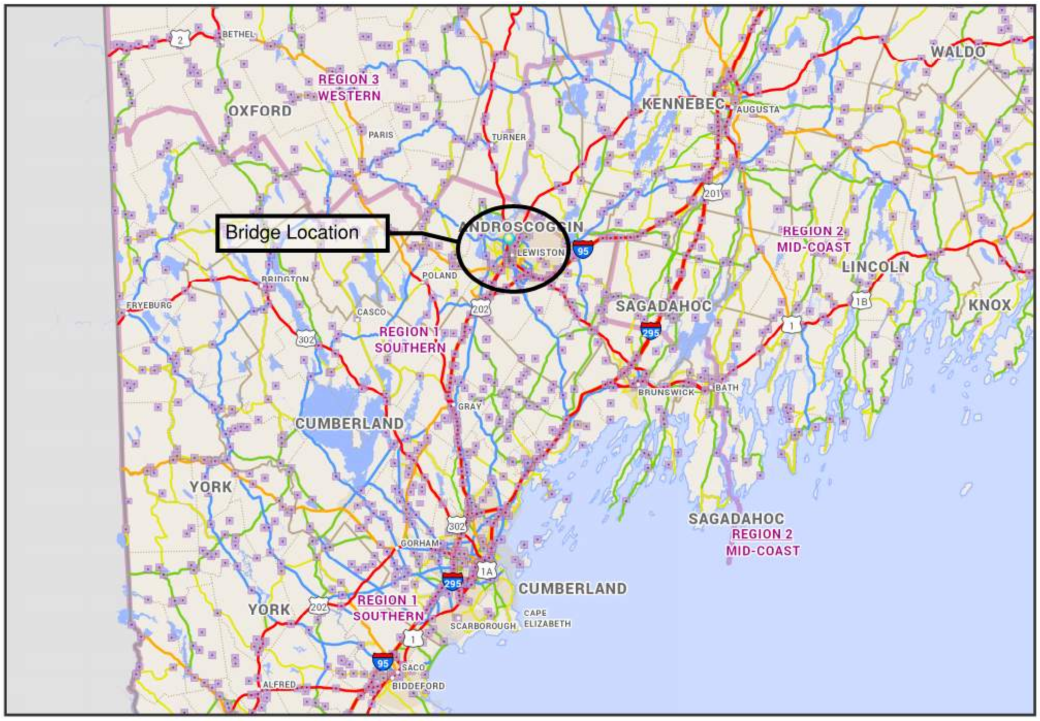
MAINTENANCE WORK: Repeated repairs of substructure (last in 2014) and wearing surface, periodic repairs of superstructure (last in 2014). Deck replaced in 1996. Pier repair in 1995.

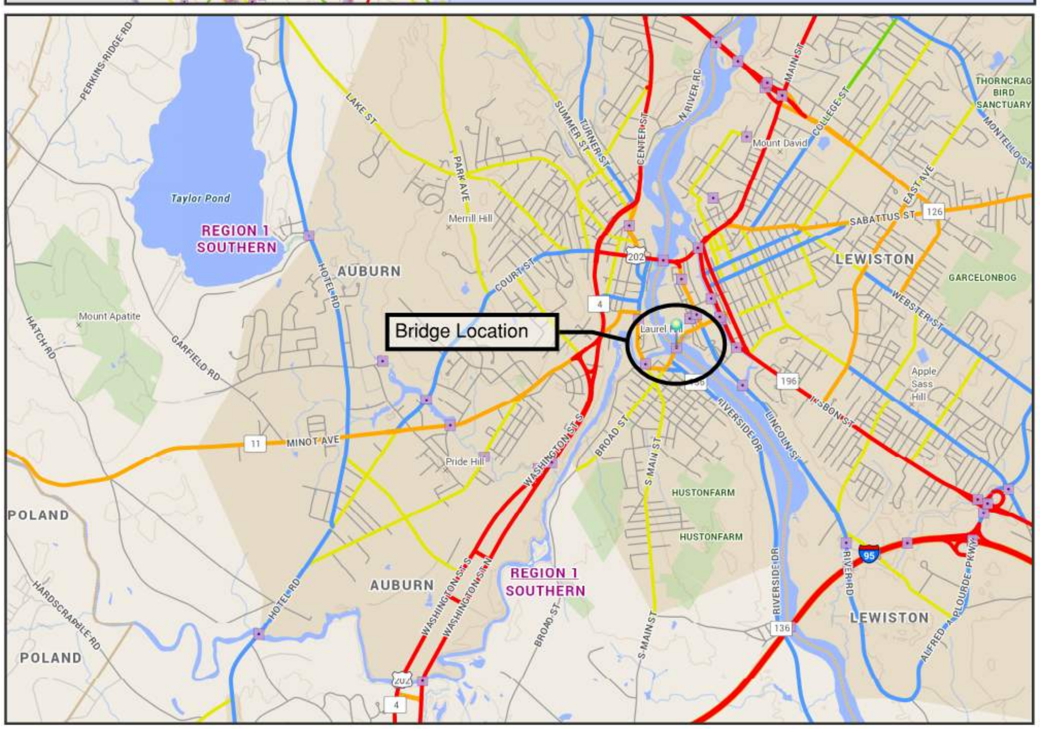
PREVIOUS STRUCTURE: Seven span steel pony truss on split stone piers and abutments.

OTHER COMMENTS: The existing bridge is eligible for the National Register of Historic Places.

LOCATION MAP

Lewiston - Auburn, Bernard Lown Peace Bridge #3330, WIN 22599.00
over Androscoggin River





Latitude: 44° 05' 22.11" N, Longitude: 70° 13' 16.77" W

BRIDGE RECOMMENDATION FORM

TOWN	Lewiston - Auburn	**BRIDGE**	Bernard Lown Peace Bridge	**BRIDGE NO.**	3330
DESIGNED BY	D. Myers	**DATE**	2/8/2017	**WIN**	22599.00
APPROVED BY	JSF	**DATE**	5-3-2017		
APPROVED BY	JK	**DATE**	5-3-2017		

PROJECT: Bridge Rehabilitation with 50 ft transitions on each end.

ALIGNMENT DESCRIPTION: Maintain existing alignment - tangent on bridge.

APPROACH SECTION: The bridge will be striped for two lanes rather than the existing four. Each approach will have 50 ft of mill and overlay. The Auburn approach will be restriped from Mill Street to the bridge. A 100 ft left turn lane from Lewiston will be developed at the Riverside Drive intersection. New ADA ramps will be constructed for all crosswalks at this intersection.

The Lewiston approach will be restriped to River Street. A short left turn lane will be added to the former mill building across from the park. Striping will be coordinated with concurrent Lewiston crosswalk and striping project.

SPANS	235'-235'-235'	**SKEW**	0° ahead on left
LOADING	Existing condition maintained	**DESIGN SPEED**	25 mph

SUPERSTRUCTURE: Remove existing bituminous wearing surface and replace with a new bituminous wearing surface and high performance membrane. Repair deteriorated deck concrete on the top and bottom surfaces of the deck. Restripe to two 11'-0" lanes with 3'-0" buffers and 5'-0" shoulders each side. Replace the expansion joint seals and patch the concrete joint headers. Paint all structural steel. Replace deteriorated rivets in floorbeam to truss connections and conduct other minor steel repairs. Remove the existing traffic rail and replace with an aesthetic permanent concrete barrier. Replace existing lighting with aesthetic lights emulating original 1936 lights.

ABUTMENTS: Repair deteriorated concrete on all exposed surfaces.

PIERS: At pier 1, jacket the pier from elevation 110.0 to elevation 118.0 with an 8" thick reinforced concrete jacket. At pier 2, jacket and post-tension the pier cap similarly to the pier 1 2014 cap rehabilitation.

OPENING AND CLEARANCE	**EXISTING**	**PROPOSED**
TOTAL OPENING	N/A SF	N/A SF
TOTAL OPENING AT ELEVATION N/A FT	N/A SF	N/A SF
FREEBOARD CLEARANCE AT Q50 ELEVATION	N/A FT	N/A FT

AVAILABLE SOILS INFORMATION: N/A

ADDITIONAL DESIGN FEATURES: N/A

MAINTENANCE OF TRAFFIC: Maintain one lane of traffic in each direction on the bridge for all work. During truss painting detour heavy truck traffic over Longley Bridge (Court St. in Auburn, Main St. in Lewiston). Maintain one sidewalk for pedestrian traffic at all times.

CONSTRUCTION SCHEDULE: Two construction seasons: the first construction season would likely include the deck, pier, and abutment rehabilitations. The pier 1 repair schedule will be limited by the July 15 – September 30 in-stream work window. The second construction season would likely include the painting and repair of the structural steel. These two seasons can be split into two separate construction contracts.

ADVERTISING DATE: December 2017

		Program Amount	Available Funding	Estimated Project Cost	Shortfall/ Surplus
	Preliminary Engineering	$400,000	$400,000	$490,000	*-$90,000*
	Right-of-Way	$20,000	$20,000	$10,000	*$10,000*
Construction [	**Structure**	$5,000,000	$5,000,000	$7,390,000	*-$2,390,000*
	Approaches			$20,000	*-$20,000*
	Construction Engineering	$380,000	$380,000	$490,000	*-$110,000*
	Total	**$5,800,000**	**$5,800,000**	**$8,400,000**	**-$2,600,000**

ADDITIONAL BORINGS REQUIRED? No

ADDITIONAL GEOTECHNICAL EVALUATIONS REQUIRED? No. A long-term monitoring plan is recommended to periodically verify that Abutment 2 is remaining stationary.

APPROVED DESIGN EXCEPTIONS: No

COMMENTS BY ENGINEER OF DESIGN:

SUMMARY OF EXPECTED IMPACTS

RIGHT OF WAY Number of: Property Owners 1

Buildings to Be Taken 0

Type of Acquisitions: ☐ Fee Simple ☐ Easement

☒ Temporary Rights ☐ Temporary Road

UTILITIES: FairPoint Communications (duct bank on bridge), Oxford Networks (on bridge), Time Warner Cable (Charter Communications) (on bridge), Unitil (on bridge), Central Maine Power (above ground), Lewiston Water and Sewer / Auburn Sewer and Water (jointly owned water line on bridge)

COAST GUARD PERMIT NEEDED? No **FAA PERMIT NEEDED?** No

ENVIRONMENTAL COORDINATION

Team Member: Kristen Chamberlain

NEPA	Preliminary Recommendation: Programmatic Categorical Exclusion 771.117c28
STIP Dates:	PE/ROW- 4/7/16; Construction: ____
Section 106	Section 106 Resources: -Bernard Lown Peace Bridge -Continental Mill, 2-44 Cedar Street, Lewiston -15 Broad Street Additional review of permanent concrete barrier required to determine its effects on Section 106 Resources.
Section 4(f)	-If railing results in Adverse Effects to the bridge, Programmatic Section 4(f) required. -Cedar Street Park is Section 4(f) resource. Impacts to this property should be avoided and minimized and will require Section 4(f) Documentation.
Endangered Species	Atlantic salmon- Formal Consultation required. **Construction methods will determine eligibility for Programmatic Consultation:** 1. in-water work completed July 15-September 30 2. fill causeways that extend across >25% BFW of stream and river are not eligible for Programmatic Consultation 3. Impact pile driving for temporary trestle: -round piles $\leq$ 30 inches in diameter H-piles $\leq$ 14 inches - Hydroacoustic Monitoring Required - Bubble Curtain required 4. containment of concrete required 5. fish evacuation required if cofferdams are used

	Northern Long-Eared Bat: Streamlined 4(d) Consultation required.
Essential Fish Habitat	EFH Consultation required.
Fish Passage	No change
In-Stream Window	July 15-September 30
Hazardous Material	Continental Mill and Cedar Park in Lewiston and 15 Broad Street in Auburn are brownfield sites. Impacts to these properties [for temporary access] will additional review.
Dredge Material	No dredge anticipated.
Stormwater/MS4	N/A
DEP/LUPC	DEP Exempt 38 M.R.S.A. 480Q2d
ACOE	Individual
Mitigation	

Avoidance & Minimization: MaineDOT best practices will be used for containment and disposal of hazardous material during painting operations. No impact pile driving will be permitted for the temporary trestle. Fill causeways extending beyond 25% of the BFW of the river will not be allowed. New concrete parapet will mimic the historic concrete pedestrian railing on the approaches. Existing bridge lighting will be replaced with lighting that emulates the original 1936 lighting.

SUMMARY OF PRELIMINARY DESIGN

BACKGROUND

The Bernard Lown Peace Bridge (#3330) is located between the cities of Lewiston and Auburn and carries Cedar Street/Broad Street over the Androscoggin River. Originally called the South Bridge, it is the southernmost of the three Androscoggin River crossings between the urban areas of Auburn and Lewiston. It carries nearly 15,000 vehicles a day along with numerous pedestrians. Built in 1936 after the flood damaged the previous structure, it is a 718 foot, three-span steel truss bridge with three equal 235 foot truss spans. The trusses are supported on reinforced concrete counterfort abutments and reinforced concrete mass piers. All of the substructures are founded on driven timber piles. The 2012 Load Rating Report showed a minimum operating load rating of 0.72 on the exterior stringers; the interior stringers and floorbeams also show operating ratings below 0.90. However, additional research has shown that shear connectors were added to these elements in 1996. With that additional capacity, all inventory load ratings appear to be above 1.0 (See Appendix E). The bridge is not currently posted. The bridge currently carries 4 lanes of traffic on a 40’-0” clear travelway, with only 41’-0” clear within the truss itself. The structure is considered functionally obsolete because of its narrow width for the 4 lanes. The bridge also carries two 6-foot sidewalks cantilevered on the outside of the trusses.

In February 1995, the cap of the northeast pier (Pier 2) failed. The downstream bearing of the span 3 truss lost support as the concrete beneath it gave way. While the truss did not collapse, the corner of the truss dropped about a foot. That failure caused several top diagonals of the span 3 truss to bend. That damage has not been repaired. A repair was done to the pier itself, replacing concrete and adding post-tensioning bars beneath each pier bearing. That is now showing signs of deterioration.

In 1996, the deck was replaced on the structure. The new deck has an asphalt wearing surface and expansion joint seals at the end of each span. The deck appears to still be in good condition with very little cracking visible. However, deterioration is evident around the deck openings for the truss verticals, diagonals, and rail posts.

The truss paint is currently in satisfactory condition. There is very little pack rust evident on the structure. There are some areas of paint failure in the spray zone near the travelway, and there are isolated areas of more aggressive corrosion on some below-deck portions of the truss framing.

The substructures are rated to be in satisfactory condition, but are in need of some repairs. There has been several concrete repairs required in addition to the 1995 failure and repair. In 2014 the cap of the southwest pier (Pier 1) was jacketed with concrete. The jacket was about 1-6” thick and 9’-0” tall, and 34 post tension rods were run through. In addition to this repair, other concrete repairs to the abutments and piers have been required in previous years. Pier 1 currently has significant concrete deterioration around the waterline and the abutments have deterioration on the exposed vertical surfaces and bridge seats.

PURPOSE AND NEED

The purpose for this project is primarily to improve the condition and long-term maintainability of the Bernard Lown Peace Bridge over the Androscoggin River and secondarily to improve safety where possible.

Many components of the bridge have progressing deterioration, including the wearing surface, deck, joints, piers, and the paint system. The bridge is rated “Functionally Obsolete” due to inadequate deck geometry for the four traffic lanes. Additional safety concerns include inadequate bridge rail transitions and lack of shoulders on the bridge.

MAINTENANCE OF TRAFFIC

The maintenance of traffic for this project will depend on the selected alternative as detailed below:

Alternative 1: Do nothing

This alternative requires no maintenance of traffic.

Alternative 2: Bridge Rehabilitation

For the bridge rehabilitation alternative, traffic control is primarily required for the wearing surface replacement, deck patching, and painting of the truss. Due to an AADT of approximately 14,920 vehicles per day and significant traffic volumes during the daytime hours, one lane of traffic must be available in both directions from 6 AM to 8 PM. Short term closure of an additional lane or of the bridge is an acceptable option between 8 PM and 6 AM.

The available detour route, the James B. Longley Memorial Bridge (Main Street in Lewiston and Court Street in Auburn), currently has an estimated AADT of 32,000 vehicles per day and four traffic lanes. An hourly analysis of the traffic volumes on these two bridges and how their combined volumes compare to the current peak hourly volume on the Longley Bridge is located in Appendix F. The combined traffic volume from the two bridges would exceed the current peak hourly volume on the Longley Bridge for most of the daytime hours. Therefore, reducing the Bernard Lown Bridge to less than two lanes of traffic is not feasible during daytime hours.

Access is required to the middle of the existing travelway to complete deck repairs, limiting the available travelway width on one side to about 18’-0”, which will only accommodate one lane of traffic. To maintain two lanes, traffic could be split, with work occurring between lanes of traffic. However, for the majority of the deck work more of the travelway can be open allowing for two adjacent lanes of traffic.

During painting operations it would be possible to remove heavy vehicles from the structure to utilize two phases. The traffic currently carried by the bridge is only 1% heavy trucks, or approximately 150 heavy trucks per day. Detouring that traffic will not adversely impact traffic conditions on the 1.8 mile detour route over the Longley Bridge. With heavy truck traffic detoured, two phases could be used and 24’-0” of travelway would be available during each phase. To access the center of the truss portals, a work platform would be suspended from the truss. This would reduce the vertical clearance on the bridge by several feet from the current 15’-6”. This two-phase painting sequence would be significantly cheaper and faster than the three-phase sequence necessary for the deck work because each set up for painting containment is a costly and time-consuming process. Short-term nighttime closures are not a viable option for maintenance of traffic because of the cost of set up of painting containment.

For all maintenance of traffic options, pedestrian traffic will be maintained on at least one sidewalk at all times.

Given these constraints, there are several maintenance of traffic options for the rehabilitation alternative.

- Deck Repair Maintenance of Traffic Options:
  - Option A: Two phases of two-lane traffic would be used for the majority of the work with a nighttime closure of one additional lane on the bridge. The lane closure would be in the form of either one-way alternating flow or a one lane detour to Longley Bridge.
  - Option B: Two phases of two-lane traffic would be used for the majority of the work and nighttime full closure of the bridge with a full detour to the Longley Bridge.
  - Option C: Three phases of two-lane traffic for all of the work, maintaining one lane of travel in either direction at all times. During the third phase, traffic would be split and work would occur in the center of the existing travelway. This would require additional time for the additional phase of work, and require both a tight work area and tight travel lanes on each side.

- Painting Maintenance of Traffic Options:
  - Option D: Use three phases of two-lane traffic similar to Option C. This would require three phases of paint containment set up. The phase with containment between split lanes of traffic would be difficult to construct.
  - Option E: Maintain two phases of two-lane traffic, with a full heavy truck detour. This would require the fewest paint containment and maintenance of traffic setups.

For the deck repair portion of the rehabilitation, maintaining two-lane traffic for all phases of the work with a third phase requiring split traffic (Option C) is the recommended option.

For the painting portion of the project, two phases of two-lane traffic with heavy trucks excluded from the bridge (Option E) is the recommended option.

Alternative 3: Bridge Replacement

For a bridge replacement, traffic would be maintained on the existing structure while the new structure is constructed. Traffic would then be shifted onto the new structure and the existing truss would be demolished. It is anticipated that two-lane traffic would be maintained through all phases of construction.

UTILITIES

The bridge rehabilitation alternative would have no significant utility impacts. The existing abandoned water line on the downstream side of the bridge and its supports would be removed.

The bridge replacement alternative would have major utility impacts, as there are five utilities carried on the bridge: FairPoint Communications (duct bank on bridge), Oxford Networks (cable on bridge), Time Warner Cable/Charter Communications (cable on bridge), Unitil (cable on bridge), and Lewiston Water and Sewer / Auburn Sewer and Water (a jointly owned water line on bridge). Also within bridge replacement work limits are aerial Central Maine Power facilities.

With a bridge replacement, these facilities would need to be relocated. The overhead utilities would need to transition to underground in the approaches close to the replacement bridge ends. The overhead utilities and the waterline would be carried on the bridge below the bridge deck, between girders, out of sight.

RIGHT OF WAY

A bridge rehabilitation would have no permanent property impacts. It would require temporary impacts to a property on the Auburn side of the river to provide access to the river.

This access would most likely be via the adjacent Rollodrome parking lot, requiring temporary right-of-way on this property.

An adjacent bridge replacement would have permanent property impacts to 3 properties. On the Auburn side, there would be significant impacts to the Rollodrome parking lot (likely requiring taking the parcel) and minor impacts to the Dunkin Donuts parcel. On the Lewiston side, there would be significant impacts to the Lionel Potvin City Park.

SUMMARY OF ALTERNATIVES

The following alternatives were considered for the Bernard Lown Peace Bridge:

1. Do Nothing
2. Bridge Rehabilitation
3. Bridge Replacement with a Parallel Structure
4. Bridge Replacement with a Downstream Structure

Alternative 1: Do Nothing

The first alternative is to do nothing to the bridge. Overall the structure is generally in satisfactory condition and there is some life left without rehabilitation.

The paint is intact over much of the structure, but has deterioration in areas where salt spray from the travelway is common. The wearing surface has been patched many times. There are a few areas where steel components have deteriorated; in some cases they have significant section loss from the corrosion. Deterioration at both piers is anticipated to accelerate if not addressed. Concrete is scoured and rebar is exposed on Pier 1, and the 1995 pier cap repair on Pier 2 is showing significant cracking and deterioration.

Though there is some life left, the bridge is showing signs of deterioration that could affect stability and capacity, and this deterioration will likely accelerate without significant repair. This accelerating deterioration will lead to major problems for the structure even though many other elements of the bridge will still be in satisfactory condition.

If nothing is done to the bridge, it is anticipated that in about 10 years serious problems will arise as deterioration of the truss members accelerates. Also, the risk of another substructure failure similar to what happened in 1995 would increase.

This alternative does not fulfill the condition, long-term maintainability, or safety parts of the Purpose and Need statement for this project.

Alternative 2: Bridge Rehabilitation

The second alternative is a rehabilitation of the existing bridge with the objective of getting 30 more years of service life out of the structure. This target lifespan will better utilize the remaining life of the structure than a "do nothing" alternative.

A bridge rehabilitation with a target life of 30 years would include the following:

- painting the truss
- a new wearing surface with high performance membrane waterproofing
- deck repairs
- new joint seals
- miscellaneous steel repairs
- protection for the blunt ends of the truss
- abutment concrete repairs
- Pier 1 concrete repair (jacketing) at the waterline
- Pier 2 pier cap concrete repair and post-tensioning
- Replacing the existing traffic rail with a new aesthetic permanent concrete barrier
- Replacing the existing lighting with ornamental bridge lighting similar to the original 1936 lights

The rehabilitation would also include restriping the bridge and approaches to two lanes.

While 75% of the paint system is rated in "Good" condition, some areas, primarily those affected by salt and moisture from the roadway, have significant paint system failure (see Photos 16 to 18 in Appendix B). It is expected that new paint would last for up to 30 years. If the truss is to remain longer than approximately 30 years, it should be repainted in about 20 years.

There are a variety of minor issues with the steel on this bridge:

- On the bottom chord, at least one of the flange splice plates has a hole from corrosion (see Photo 19). This and any other splice plates with significant section loss would be repaired; several of the splice plates have already been repaired in previous maintenance projects.
- Several of the closure plates shielding the bottom chord gusset connections from debris from the deck have significant section loss or holes (see Photo 20). These would be replaced.
- The latest bridge inspection noted that some rivets in the floorbeam connections to the bottom chord have significant section loss; a few rivets have 100% loss (see Photo 21). All rivets with significant section loss at these locations would be

replaced with bolts. All floorbeam connection angles with significant section loss would be replaced as well. This can be done under traffic, one piece of angle at a time.

- A few of the balusters on the pedestrian rail are bent or damaged (see Photo 22). These would be repaired or replaced.

Several steel issues have been identified that are not recommended for repair in this rehabilitation:

- Six of the top diagonals in span 3 are bent (see Photo 23). This damage likely occurred when the Pier 2 pier cap supporting one of the span 3 bearings failed in 1995. These diagonals are purely tension members, so their lack of straightness does not affect their designed load capacity. It is not recommended that these be repaired.
- The bottom lateral bracing has some deterioration. Several of the gussets have significant corrosion and section loss, as do a few of the lateral bracing angles (see Photo 24). However, this lateral bracing takes no load with the concrete deck in place; the concrete deck is much stiffer than the lateral bracing and will attract all lateral load in the lower part of the truss. Given that this lateral bracing is effectively redundant, it is not recommended that it be replaced. If in the future the deck is replaced, this bottom lateral bracing should be replaced at that time as well.
- Several of the portals over the roadway have been hit and are bent somewhat (see Photo 25). In general, the damage does not appear to have caused a loss of capacity, so it is not recommended that any repair be done.

The wearing surface on the bridge has significant deterioration and has been patched repeatedly (see Photo 10). It would be replaced with a new hot mix asphalt wearing surface and a high-performance waterproofing membrane. While the wearing surface is removed, the concrete deck would be evaluated and repaired. Inspection indicates there will not likely be much deck repair work (there is very little cracking or efflorescence), but there are a few areas visible from beneath the deck that are in need of repair (see Photo 11). In conjunction with this work, the exposed concrete headers adjacent to the expansion joints would be repaired (see Photo 15). The seals in the expansion joints would be replaced as well.

Currently the bridge has a travelway width of 40’-0” with four lanes crowded into that narrow width (see Photos 7, 9, and 12). The bridge rail and truss are only 6” from the edge of the outside lane. Traffic generally either uses the middle lane or crowds to the inside edge of the outside lanes to avoid being so close to the rail and truss. The bridge is considered “Functionally Obsolete” because of these geometric conditions and the deck geometry is rated a 2 or “Intolerable.” However, the design hourly traffic volumes for the site do not warrant two lanes in each direction. The primary approach on the Auburn side of the bridge does not have four lanes—it has two lanes going toward Auburn and one lane going toward Lewiston. Therefore, it is recommended the bridge be restriped to two lanes. This would provide better driving conditions on the bridge, with better lane widths and shoulders, and would also improve safety for bicyclists. The configuration would be two 11’-0” lanes with 3’-0” buffers and 5’-0” shoulders. The buffers would be colored to enhance the aesthetics of the bridge and to improve visibility. Restriping the bridge to two lanes will improve the deck geometry rating and remove the “Functionally Obsolete” designation from the bridge.

The substructures all need some level of repair. The abutments are generally in satisfactory condition, but there is deterioration of the bridge seats and some of the vertical faces (see Photo 26). This would be repaired where accessible.

There is some evidence that Abutment 2 has shifted or tilted toward the river. Survey found that Abutment 2 is about 4.5 inches closer to Pier 2 than the 1936 as-builts show. The abutment 2 rocker bearings have rocked back toward the backwall a similar amount (see Photo 27) and the end diaphragm is much closer to the backwall than the 1936 plans show. However, the expansion joint at Abutment 2, which was installed in 1996, is not closed. This indicates that the movement occurred prior to 1996. For this project, no action is recommended for this abutment movement. A long-term monitoring plan is recommended to periodically verify that the abutment is remaining stationary.

Pier 1 was rehabilitated in 2014 when the pier cap was jacketed with a 9’-0” tall by about 1’-6” thick post-tensioned reinforced concrete jacket (see Photo 28); this repair is in good condition. However, there is significant deterioration at the waterline level. Much of the rebar is exposed and there are some holes deeper in the pier. The nose armor is detached from the concrete for several feet (see Photo 29).

The recommended repair is to jacket the Pier 1 above and below waterline. Adding an 8” thick reinforced concrete jacket would be a more resilient repair than any simple patching in this high-abrasion area. Jacketing the pier from about elevation 110.0 (near streambed elevation) to elevation 118.0 will capture the damaged area. Repairing this area will require a cofferdam and access to the pier (possibly via a wet road or work trestle from the Auburn shoreline). The water depth under span 1 under normal flow conditions is in the range of 2-4 feet, though there is a deeper channel or scour hole just beyond Pier 1.

Pier 2 has very little water depth under normal flow conditions, and shows very little deterioration at the waterline elevation. The pier cap, however, is in need of repair. It was this pier that failed in 1995, when the bearing area under the downstream Span 3 bearing failed. The pier cap was repaired immediately after that failure. New concrete was added to replace the failed areas under each bearing and post-tensioning rods were added to help hold the cap together. That 1995 repair of the Pier 2 pier cap is now deteriorating, with many cracks (see Photos 30 to 33). It is recommended that this cap be jacketed in the same manner as the Pier 1 cap was jacketed in 2014: a 9'-0" high jacket with about 25 post-tensioning rods through the pier.

The existing traffic rail does not meet current crash standards, is deteriorating, and allows salt and water easy access to the truss. It is composed of steel channels and angles riveted together and attached to the steel truss members, and has surface corrosion in many areas. The rail and some of the support posts are bent in various places. The face of rail is flush with the top chord of the truss at the ends of the spans, though it is offset in front of all of the inner truss verticals and diagonals (see Photos 13 and 14). Since it is recommended that the bridge be converted from four lanes to two, there is sufficient width to add permanent concrete barrier in front of the truss verticals. A new concrete barrier would provide the additional benefit of limiting debris, water, and salt access to the truss members and deck penetrations. The deck openings for the existing rail posts would be closed. The recommended new permanent concrete barriers would each take 1'-0" of the current travelway, reducing the overall curb-to-curb width to 38'-0". This width would still be adequate to carry three lanes of traffic if that were needed in the future.

To fit in with the historic nature of the truss, the proposed concrete barrier would be formed to mimic the existing approach concrete pedestrian rail (see Photo 12). It would be as short as possible to maximize views for the traveling public.

The ends of the existing truss are not currently protected (see Photo 12). Adding a new concrete barrier in front of the truss verticals would allow a modern transition barrier to be added as well. Given the constraints of the site and the low traffic speed, a sloped concrete end treatment is recommended.

The existing bridge lighting (currently six standard cobra head or similar sodium lights) would be replaced with lights more suitable to the truss (see Photo 34). The original 1936 bridge was lit with 12 pendant luminaires suspended off of the truss verticals. The new lighting for the bridge rehabilitation would mimic these original fixtures as far as possible, while meeting modern lighting standards.

This alternative has minimal impacts—no permanent right-of-way impacts, no significant historical or cultural impacts, and minimal impacts to the waterway. Temporary access to Pier 1 for repairs is the primary impact of the project; this includes a cofferdam and may require a temporary wet road or work trestle. Construction is anticipated to take two construction seasons. This alternative will have more ongoing inspection and maintenance costs than a new structure.

This alternative addresses the condition, long-term maintainability, and safety portions of the Purpose and Need statement.

This Bridge Rehabilitation alternative is estimated to cost about $8,400,000, including engineering and right-of-way costs. For comparison to the replacement alternative, a life cycle cost was calculated. Using a comparison time horizon of 100 years, a discount rate range of 5% to 3%, and assuming the bridge is replaced after 30 years, this alternative has a life-cycle comparison cost range of $13,100,000 to $16,200,000.   For more information on the cost estimates, see Appendix H.

Figure 1: Replacement Alternative Alignment

Alternative 3: Bridge Replacement with a Parallel Structure

While there are many potential bridge replacement options possible at this site, the most cost-effective solution would be to build a new steel girder structure immediately downstream of the existing truss. Such a location would minimize approach costs and right-of-way impacts (See Figure 1).

It is possible that other alignments or bridge configurations could be superior options when considering the needs of the cities. However, this low-cost and limited impact replacement alternative adequately represents the advantages and disadvantages of a replacement structure for this project.

This parallel replacement alternative would be a 155’-200’-200’-155’ steel girder bridge with a composite concrete deck. It would have two 11’-0” travel lanes, 5’-0” shoulders, and 5’-0” sidewalks on each side. The bridge would be flared on the Auburn end to accommodate a left-turn lane for Riverside Drive. The new abutments would be situated immediately downstream of the existing bridge abutments. Three concrete shaft piers would be constructed on steel H-pile foundations. To achieve appropriate clearance above flood elevations the both ends of the bridge would be raised about 2.5’ higher than the existing truss bridge.

On the Auburn end of the bridge, reverse curves would transition from the end of the bridge to the existing alignment. The approach roadway would miss the Dunkin Donuts drive-through but would take a significant part of the Rollodrome parking lot, likely requiring taking that property. On the Lewiston side, the approach would continue on a tangent until curving into the existing roadway beyond the Lionel Potvin City Park. Retaining walls would be used where appropriate to limit impacts.

This alternative would significantly impact one business on the Auburn side of the river and impact the park on the Lewiston side of the river. It would remove the existing truss bridge, which is eligible for the National Historic Register of Historic Places. It would also impact the waterway below, with significant in-water work and three new piers. With such impacts, a more difficult and time-consuming NEPA process would be required than for a rehabilitation.

Construction would take at least three construction seasons. However, this alternative would have much lower ongoing inspection and maintenance costs than the rehabilitation alternative.

This alternative addresses the condition, long-term maintainability, and safety portions of the Purpose and Need statement.

This Bridge Replacement alternative is estimated to have a total project cost (including engineering and right-of-way) of about $16,700,000. For comparison to the rehabilitation alternative, a life cycle cost was developed. Using a comparison time horizon of 100 years, a discount rate range of 5% to 3%, and assuming this replacement bridge has a design life of 100 years, this alternative has a life-cycle comparison cost range of $16,800,000 to $16,900,000. For more information on the cost estimates, see Appendix H.

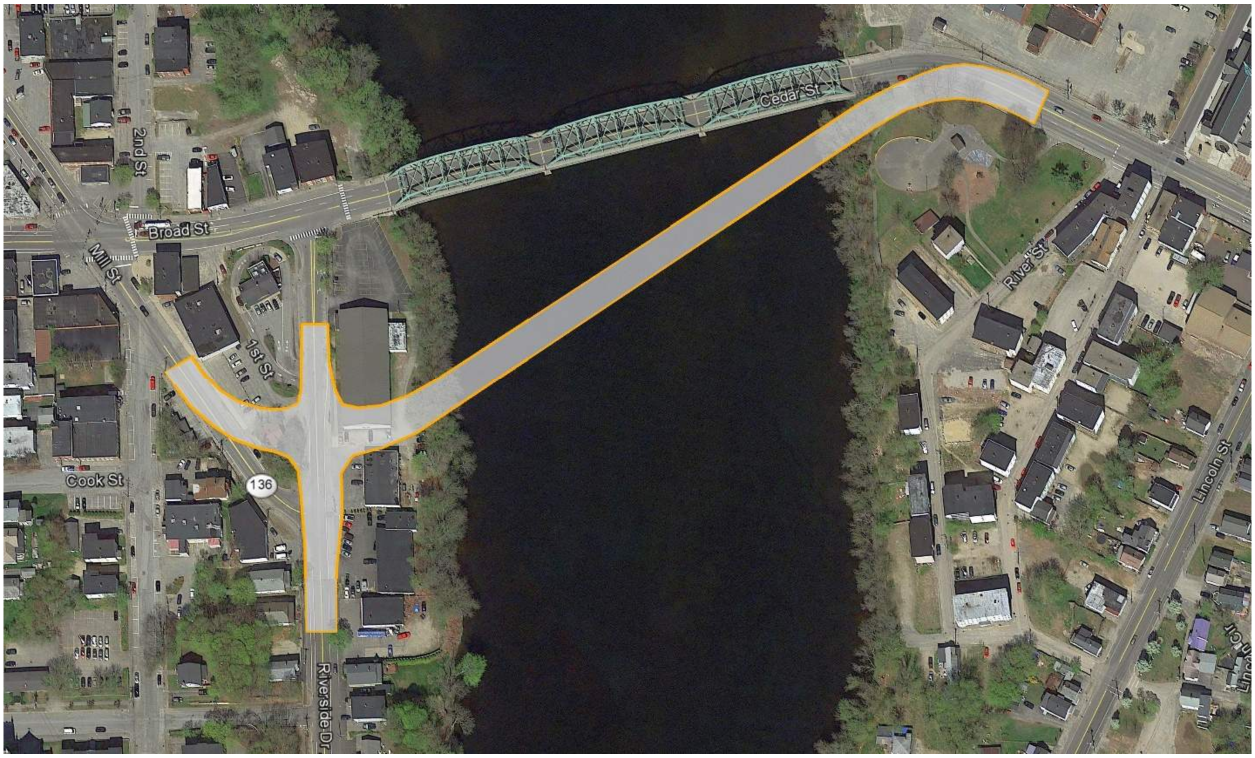


Figure 2: Downstream Conceptual Alignment

Alternative 4: Bridge Replacement with a Downstream Structure

For comparison, a conceptual cost was developed for a further downstream bridge location in accordance with the City of Auburn's *New Auburn Village Center Study (August 2014)* recommendations. In this alignment, the Auburn end of the bridge would land near the intersection of Mill Street and Riverside Drive. This has the benefit of better connecting to the Auburn street network. On the Lewiston side of the river, the bridge would still land adjacent to the existing bridge.

This downstream bridge would have significantly more right-of-way impacts on the Auburn side of the river—at least 5 businesses and multiple homes would likely be taken. In addition, the park would still be impacted on the Lewiston side of the river. These impacts, together with environmental impacts to the river and historical impacts from removing the truss, would require a higher-level NEPA process.

A replacement bridge on this alignment would be about 100 feet longer than on the parallel alignment; this additional 100 feet would add about $2,200,000 to the construction cost. The existing grade on the Auburn side in this location is considerably lower than near the existing structure. The additional roadway work would add about $1,100,000. The additional right-of-way would cost about an additional $1,000,000 over the parallel alignment. Together, this downstream bridge would cost about $4,300,000 more than the parallel replacement bridge, for a total project cost of about $21,000,000.

PROPOSED ALTERNATIVE: BRIDGE REHABILITATION

Given the current condition of the Bernard Lown Peace Bridge and the costs and impacts of a replacement structure, a bridge rehabilitation of the current truss bridge with the intent to maintain the current truss bridge in service for another 30 years is the proposed alternative for this project. The rehabilitation alternative has lower initial cost, lower life-cycle cost, and lesser impacts than the replacement alternative.

A rehabilitation alternative utilizes the remaining life of the existing bridge, and restriping the bridge will remove the current "Functionally Obsolete" designation. The rehabilitation alternative fulfills the Purpose and Need well for this project while having lower costs and impacts than a replacement alternative.

As discussed above, the proposed rehabilitation alternative will entail painting the structural steel, some minor steel repairs, a new wearing surface with a high-performance membrane waterproofing and deck patching, new joint seals, minor abutment repairs, significant rehabilitations of the two piers, adding a new concrete parapet, and improving the bridge lighting.

The overall aesthetics of the bridge will be enhanced through the new paint, the new pavement and colored pavement treatment, the ornamental concrete parapet, and the new lighting reminiscent of the original luminaires. Figure 3 is a rendering of the rehabilitated truss.

Figure 3: Rendering of Rehabilitated Bridge

The most significant change for the traveling public will be the change from four lanes on the bridge down to two lanes. Anticipated traffic volumes on the bridge will operate acceptably with two lanes. The existing four lanes are each only 10’-0” wide and have no shoulders. Using two 11’-0” lanes, 3’-0” buffers, and 5’-0” shoulders will greatly improve the geometrics and will remove the current “Intolerable” deck geometry rating.

This project will span two construction seasons. It is anticipated that the deck and substructure work would be done in the first construction season and the steel repair and painting in the second. These two seasons of work could be split into two separate construction projects if desired. For an estimated construction schedule, see Appendix G.

Given the traffic constraints at this site, the proposed maintenance of traffic will maintain two lanes of traffic. For the deck work, it will use three phases of two-lane, two-way traffic. The first two phases will shift both lanes to the edges of the travelway and the final phase will require the lanes to be split, with a work area between the lanes in the center of the deck. While this is not an ideal configuration, maintaining two lanes of traffic on this bridge is very important.

During the painting portion of the project, two lanes of traffic would be maintained at the site as well. Two phases would be used, and the vertical height of vehicles using the bridge during the painting would be restricted. This would allow a temporary work platform to be used to facilitate painting the portals above the roadway.

The preliminary cost estimate for this alternative, including engineering, is $8,400,000. For more information on costs please see Appendix H.

APPENDIX A: PRELIMINARY PLANS

- **ALTERNATIVE 2 (REHABILITATION ALTERNATIVE) PRELIMINARY PLANS**

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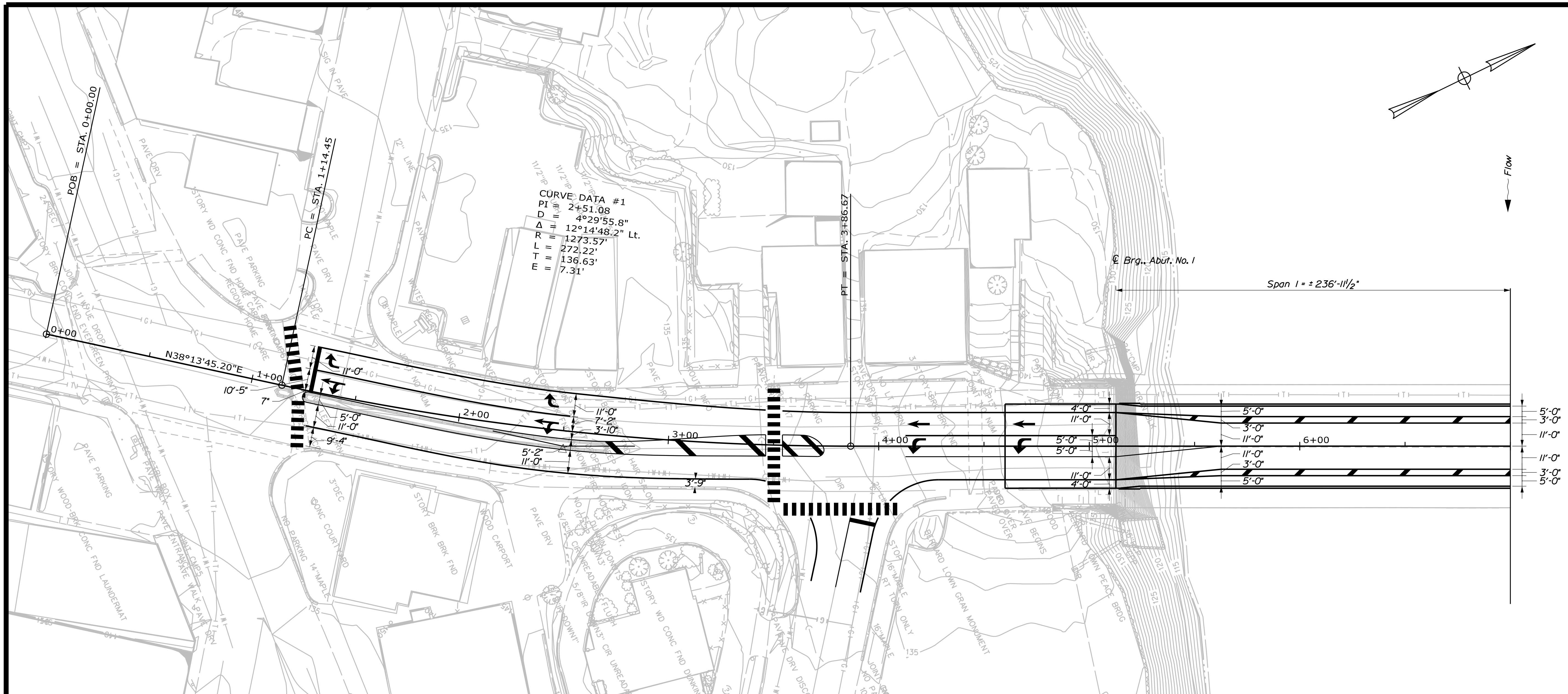


PLAN

25 0 25 50

Scale of Feet

SPECIFICATIONS

Design: Load and Resistance Factor Design per AASHTO LRFD Bridge Design Specifications, Seventh Edition and Interim Specifications through 2016.

DESIGN LOADING

Live Load .... HL - 93 Modified for Strength I (Truck only increased 25%)

TRAFFIC DATA

Current (2018) AADT	14,920
Future (2038) AADT	17,900
DHV - % of AADT	10%
Design Hour Volume	1,790
Heavy Trucks (% of AADT)	1%
Heavy Trucks (% of DHV)	1%
Directional Distribution (% of DHV)	60%
18 kip Equivalent P 2.0	69
18 kip Equivalent P 2.5	66
Design Speed (mph)	25 mph

UTILITIES

Oxford Networks
Fairpoint Communications
Central Maine Power
Unitel
Time Warner Cable
Lewiston Water and Sewer
Auburn Water and Sewer

MATERIALS

Concrete:
- Barriers & Transition Barriers .... Class "LP"
- All Other .... Class "A"

Reinforcing Steel .... ASTM A 615/A 615M, Grade 60

Structural Steel Repairs:
- All Material (except as noted) .... ASTM A 709, Grade 50 (painted)
- High Strength Bolts .... ASTM A 325, Type 1

MAINTENANCE OF TRAFFIC

Maintain two lanes of traffic (one in each direction) over the existing bridge and approaches during construction.

BASIC DESIGN STRESSES

Concrete .... f 'c = 4,350 psi
Reinforcing Steel .... f y = 60,000 psi
Structural Steel:
- ASTM A 709, Grade 50 .... F y = 50,000 psi
- ASTM A 325 .... F µ = 120,000 psi

PRELIMINARY

TYLIN INTERNATIONAL

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-2859(900)

BRIDGE NO. 3330 WIN 22599.00 BRIDGE PLANS

PROJ. MANAGER	Heath Cowan	BY	DATE
DESIGN-DETAILED	TSK	TSK	01/2017
CHECKED-REVIEWED	JRH	JRH	01/2017
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

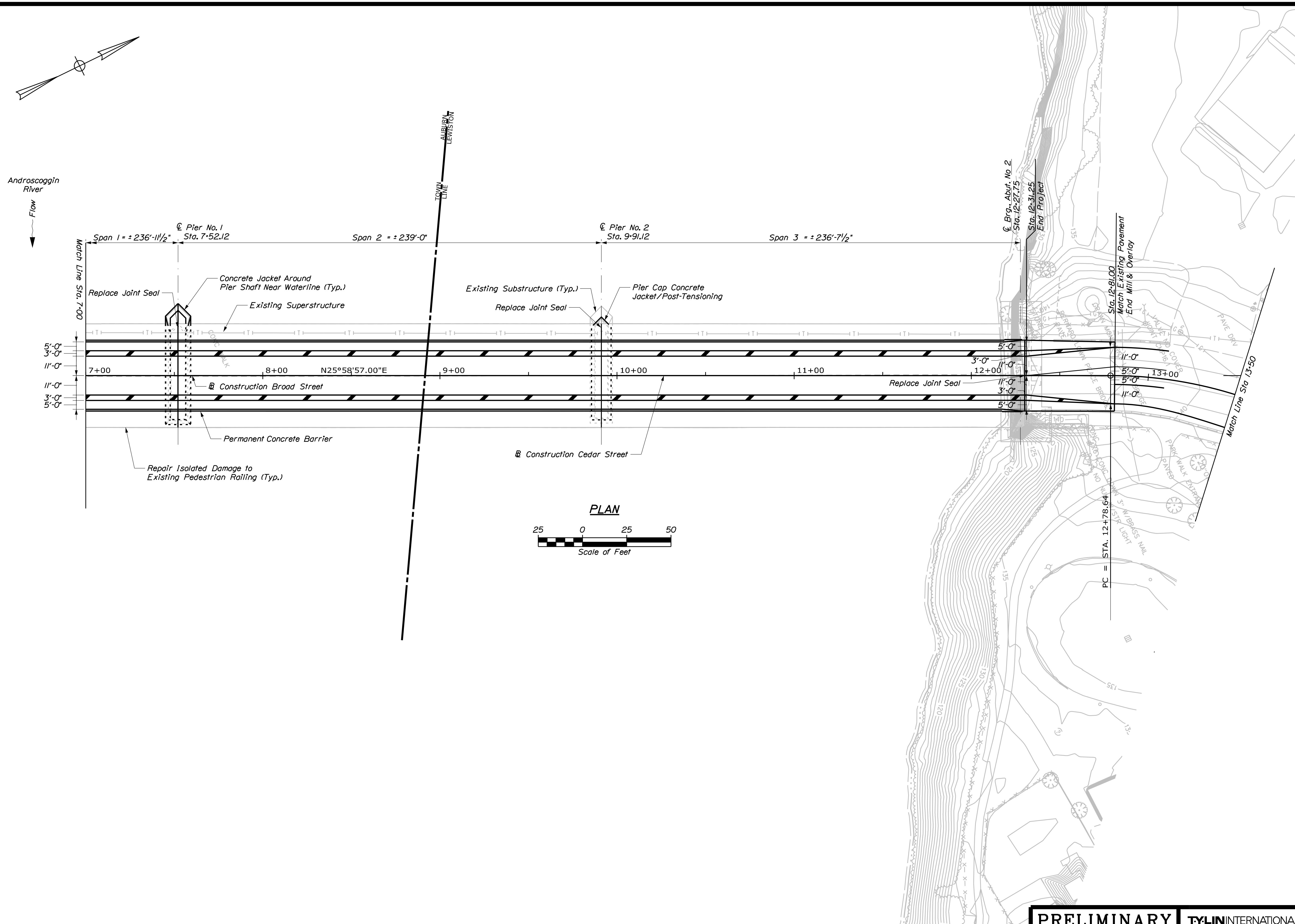
DATE

BERNARD LOWN PEACE BRIDGE
ANDROSCOGGIN RIVER
AUBURN-LEWISTON ANDROSCOGGIN CO.

PLAN
SHEET 1 OF 3

SHEET NUMBER

1



Filename: ...\HIGHWAY\MSTA\002_Plan_02.dgn   Division: HIGHWAY   Username: Date:2/28/2017

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-2859(900)

BRIDGE NO. 3330 | WIN 22599.00 | BRIDGE PLANS

		BY	DATE
PROJ. MANAGER	Heath Cowan		
DESIGN-DETAILED	TSK	TSK	07/2017
CHECKED-REVIEWED	JRH	JRH	07/2017
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

BERNARD LOWN PEACE BRIDGE
ANDROSCOGGIN RIVER
AUBURN-LEWISTON ANDROSCOGGIN CO.

PLAN
SHEET 2 OF 3

PRELIMINARY

TYLIN INTERNATIONAL

SHEET NUMBER
2

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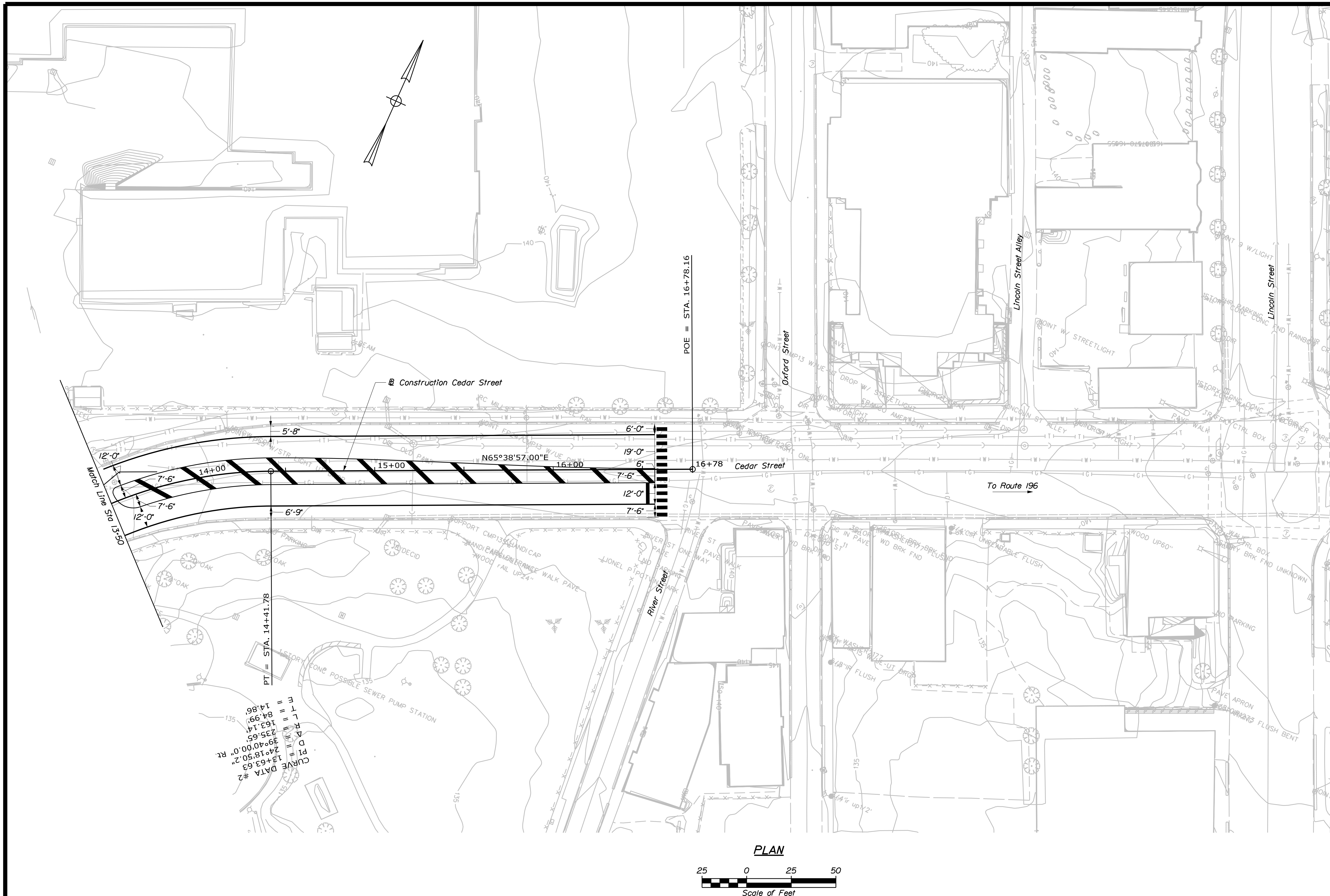


PRELIMINARY

TYLININTERNATIONAL

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-2859(900)

BRIDGE NO. 3330

WIN 22599.00

BRIDGE PLANS

		BY	DATE
PROJ. MANAGER	Heath Cowan		
DESIGN-DETAILED	TSK	TSK	07/2017
CHECKED-REVIEWED	JRH	JRH	07/2017
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

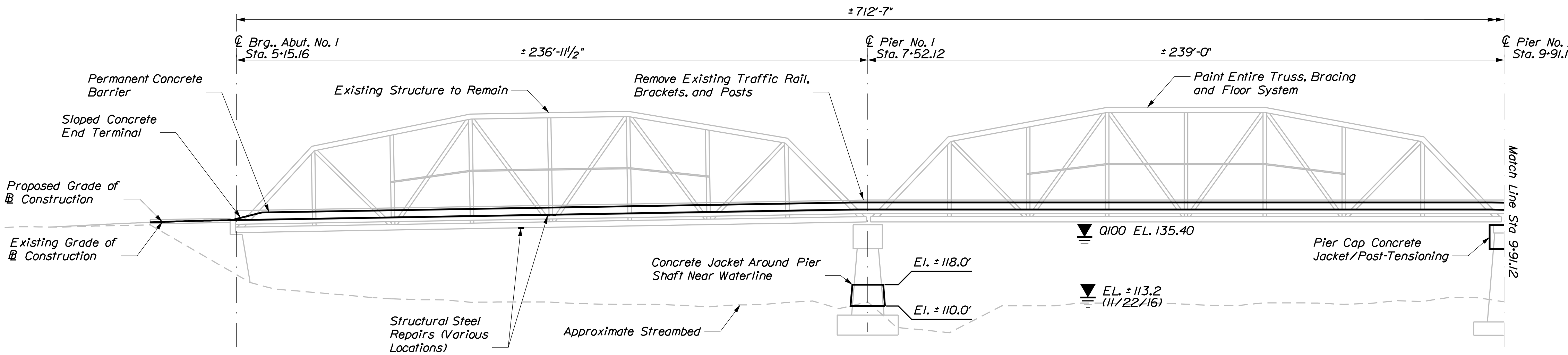
DATE

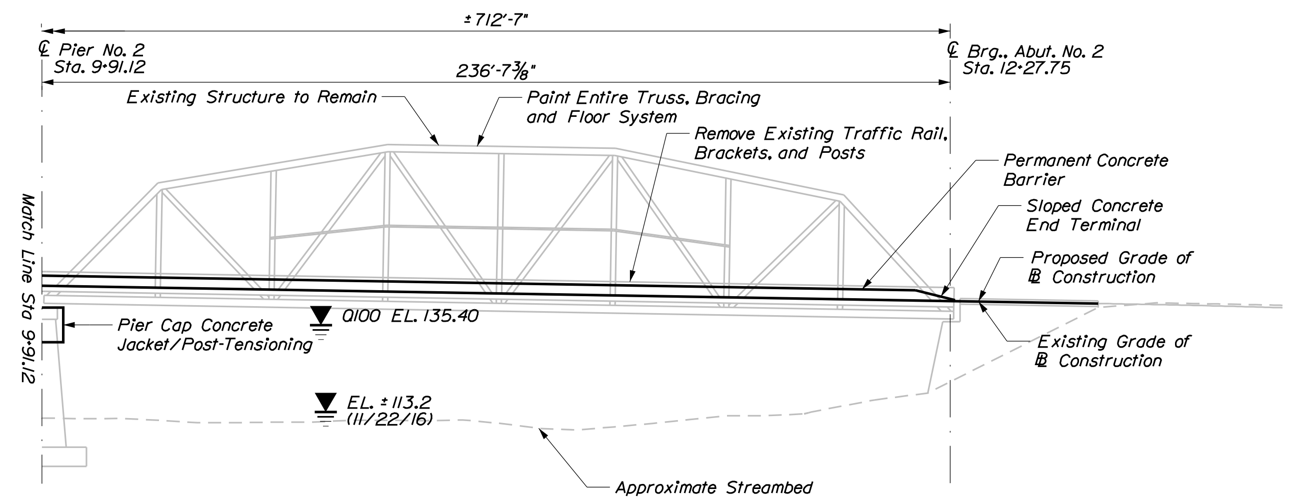
BERNARD LOWN PEACE BRIDGE
ANDROSCOGGIN RIVER
AUBURN-LEWISTON ANDROSCOGGIN CO.

PLAN
SHEET 3 OF 3

SHEET NUMBER

3





ELEVATION

25 0 25 50
Scale of Feet

Filename: ...\00\BRIDGE\MSTA\004_Elev_01.dgn Division: HIGHWAY Username: Date:2/28/2017

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-2859(900)

WIN 22599.00

BRIDGE NO. 3330

BRIDGE PLANS

PROJ. MANAGER	Heath Cowan	
	BY	DATE
DESIGN-DETAILED	DSM	BLT 01/2017
CHECKED-REVIEWED	NLB	DSM 01/2017
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

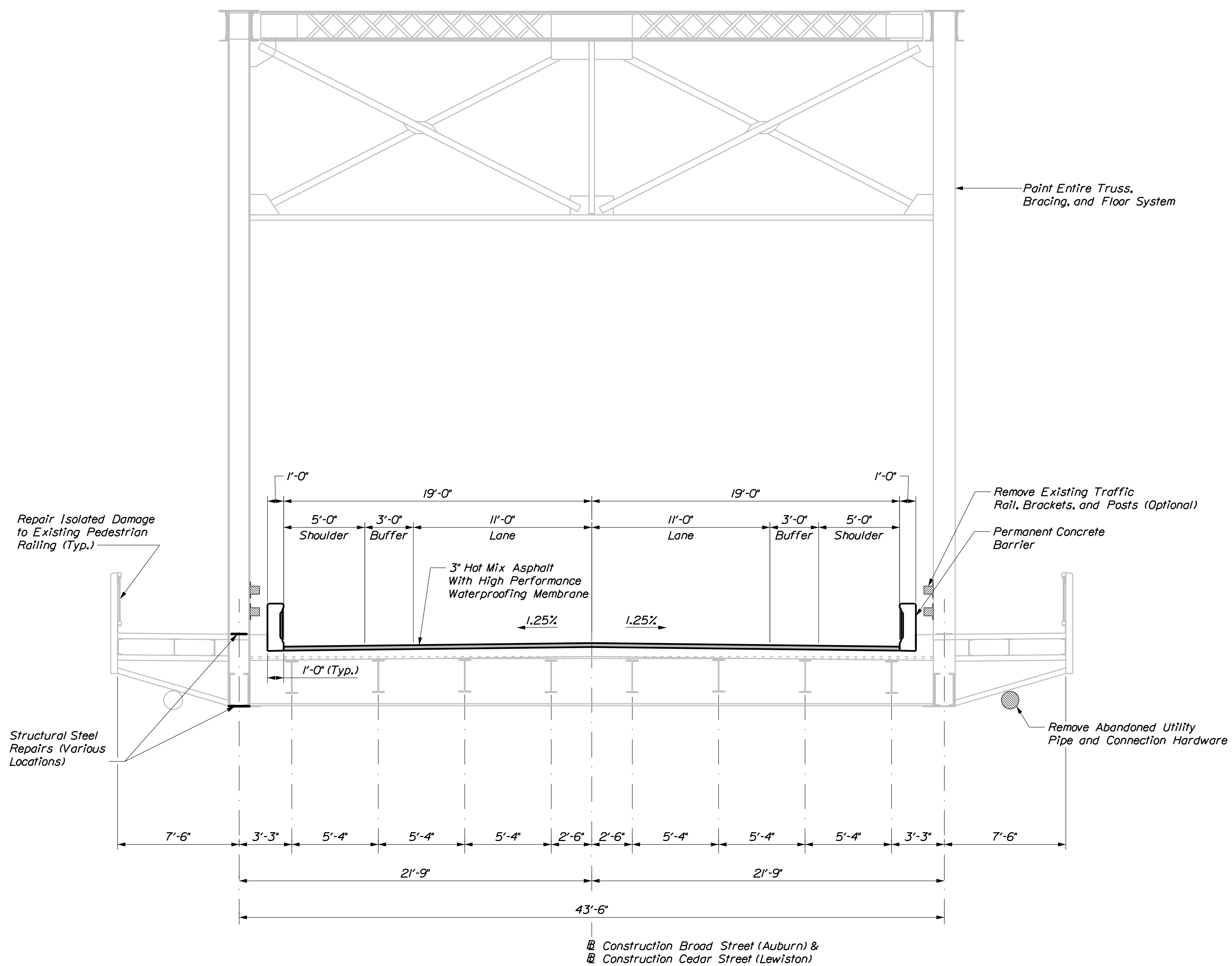
BERNARD LOWN PEACE BRIDGE
ANDROSCOGGIN RIVER
AUBURN-LEWISTON ANDROSCOGGIN CO.

ELEVATION

SHEET NUMBER
4
4 OF 5

PRELIMINARY

TYLIN INTERNATIONAL



TRANSVERSE SECTION

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-2859(900)

BRIDGE NO. 3330

WIN 22599.00

BRIDGE PLANS

		BY	DATE
PROJ. MANAGER	Heath Cowan		
DESIGN-DETAILED	DSM	BLT	01/2017
CHECKED-REVIEWED		DSM	01/2017
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

BERNARD LOWN PEACE BRIDGE
ANDROSCOGGIN RIVER
AUBURN-LEWISTON ANDROSCOGGIN CO.

TRANSVERSE SECTION

SHEET NUMBER

5

5 OF 5

PRELIMINARY

TYLININTERNATIONAL

Filename: ...\005_Transverse_Section_01.dgn Division: HIGHWAY Username: Date:2/28/2017

APPENDIX B: PHOTOGRAPHS

Bernard Lown Peace Bridge site plan for orientation

PHOTOGRAPH SOURCES:

- Drone footage (June 15, 2016): photos 1-4, 28.
- Bridge Inspection – Routine Fracture Critical (June 14, 2016): photos 10, 11, 18, 19, 21, 24, 26, 27, 32, 33.
- Site Visit (October 6, 2016): photos 7-9, 12-17, 20, 22, 23, 25, 29-31.
- Other sources listed beneath the respective photos

Photo 1: Panorama of Bernard Lown Peace Bridge (looking upstream)

Photo 2: Elevation view (looking upstream)

Photo 3: Auburn Approach (looking Southwest)

Photo 4: Lewiston Approach (Looking Northeast)

Photo 5: Auburn Approach, Bird's eye view (facing West)
(From Bing Maps, © 2016 Microsoft - Picometry Bird's Eye © 2016 MDA Geospacial Services Inc.)

Photo 6: Lewiston Approach, Bird's eye view (facing East)
(From Bing Maps, © 2016 Microsoft - Picometry Bird's Eye © 2016 MDA Geospacial Services Inc.)

Photo 7: Auburn Approach (looking Northeast)

Photo 8: Auburn Approach (looking Southwest)

Photo 9: Lewiston Approach (looking Southwest)

Photo 10: Wearing surface patches

Photo 11: Deck delaminations (isolated areas – this area is around a deck penetration for a traffic rail post)

Photo 12: Unprotected end of truss (typical for all corners; this view from Lewiston approach)

Photo 13: Traffic rail (view over a pier)

Photo 14: Traffic rail (view at truss vertical)

Photo 15: Joint and concrete header (view over a pier)

Photo 16: Typical paint condition near travelway

Photo 17: Typical paint condition of floor system

Photo 18: Typical paint condition of truss superstructure

Photo 19: Hole through bottom chord bottom flange splice plate (downstream side of truss, near the end of Span 2)

Photo 20: Bottom chord closure plate

Photo 21: Floorbeam connection with deteriorated rivets

Photo 22: Sidewalk railing showing bent ballusters

Photo 23: Bent top diagonals (Span 3 truss)

Photo 24: Bottom lateral bracing connection plate (worst case section loss)

Photo 25: Damaged portal

Photo 26: Abutment 2 (Lewiston end) concrete deterioration

Photo 27: Abutment 2 (Lewiston end) bearings rocked out of plumb (high temperature of 73 degrees on the day this was taken)

Photo 28: Pier 1 elevation view showing 2014 pier cap repair and deterioration at water line

Photo 29: Pier 1 water line deterioration

Photo 30: Pier 2 elevation showing 1995 emergency repairs

Photo 31: Pier 2 pier cap close-up showing 1995 failure location and deteriorating repair

Photo 32: Pier 2 downstream end of pier

Photo 33: Pier 2 pier cap cracking and soft concrete

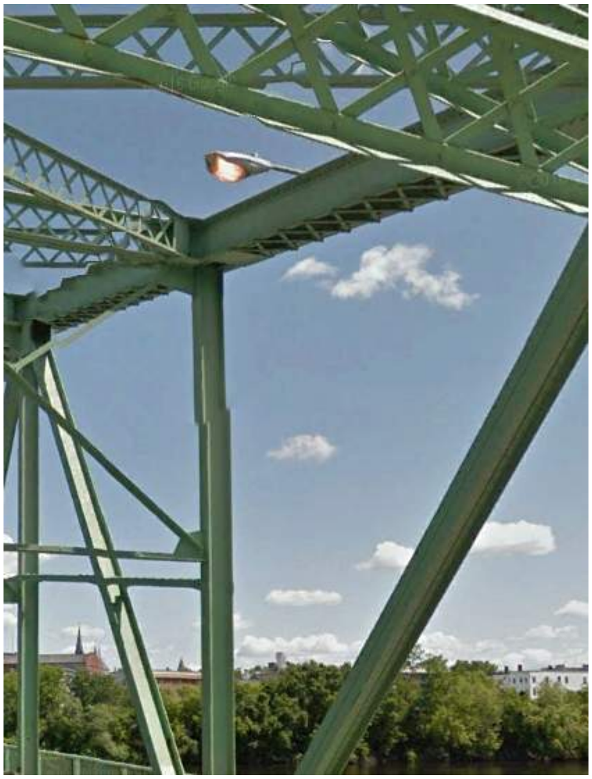


Photo 34: Existing bridge lighting
(From Google Streetview)

APPENDIX C: INSPECTION REPORTS

- **STRUCTURAL INVENTORY AND APPRAISAL SHEET (4/8/2016)**
- **FRACTURE CRITICAL BRIDGE INSPECTION REPORT (6/14/2016)**

Structure Inventory and Appraisal Sheet

Bridge Key: 3330 Agency ID: 3330 SR: 51.2 SD/FO: FO

IDENTIFICATION

State 1:	23 Maine	Struc Num 8:	3330
Facility Carried 7:	CEDAR STREET	Location 9:	TOWNLINE
Rte.(On/Under)5A:	Route On Structure	Rte. Signing Prefix 5B:	3 State Hwy
Level of Service 5C:	0 None of the below	Rte. Number 5D:	00000
Directional Suffix 5E:	0 N/A (NBI)	% Responsibility :	0
SHD District 2:	01 Southern	County Code 3:	001 Androscoggin
Place Code 4:	01010 Auburn	Kilometer Post 11:	04.8 km
Feature Intersected 6:	ANDROSCOGGIN RIVER		
Latitude 16:	44d 05' 22"	Longitude 17:	070d 13' 17"
Border Bridge Code 98:	Not Applicable (P)		
Border Bridge Number 99:	n/a		

INSPECTION

Frequency 91:	24 months	Inspection Date 90:	3/3/2015	Next Inspection:	03/03/2017
FC Frequency 92A:	024 months	FC Inspection Date 93A:	4/22/2014	Next FC Inspection:	4/22/2016
UW Frequency 92B:	60 months	UW Inspection Date 93B:	10/1/2014	Next UW Inspection:	10/1/2019
SI Frequency 92C:	NA	SI Date 93C:	NA	Next SI:	NA
Element Frequency:	24 months	Element Inspection Date:	03/03/2015	Next Elem. Insp. Due:	03/03/2017

CLASSIFICATION

Defense Highway 100:	0 Not a STRAHNET hwy	Parallel Structure 101:	No || bridge exists
Direction of Traffic 102:	2 2-way traffic	Temporary Structure 103:	Not Applicable (P)
Highway System 104:	1 On the NHS	NBIS Length 112:	Long Enough
Toll Facility 20:	3 On free road	Functional Class 26:	14 Urban Other Princ
Defense Hwy 110::	0 Not a STRAHNET hwy	Historical Significance 37:	2 Br eligible for NRHP
Owner 22:	**01** State Highway Agency		
Custodian 21:	**01** State Highway Agency		

STRUCTURE TYPE AND MATERIALS

Number of Approach Spans 46: 0 Number of Spans Main Unit 45: 3

Main Span Material/Design 43A/B:

3 Steel 10 Truss-Thru

Deck Type 107:	1 Concrete-Cast-in-Place
Wearing Surface 108A:	6 Bituminous
Membrane 108B:	2 Preformed Fabric
Deck Protection 108C:	None

CONDITION

Deck 58:	7 Good	Super 59:	6 Satisfactory	Sub 60:	6 Satisfactory
Culvert 62:	N N/A (NBI)	Channel/Channel Protection 61:	7 Minor Damage		

LOAD RATING AND POSTING

Inventory Rating Method 65:	3 LRFR Load & Res. Fa	Operating Rating Method 63:	3 LRFR Load & Res. Fac
Inventory Rating 66:	MS10.0	Operating Rating 64:	MS13.1
Design Load 31:	4 M 18 (H 20)	Posting 70:	5 At/Above Legal Loads
Posting status 41:	A Open, no restriction		

AGE AND SERVICE

Year Built 27:	1936	Year Reconstructed 106:	1996
Type of Service on 42A:	5 Highway-pedestrian		
Type of Service under 42B:	5 Waterway		

Lanes on 28A: 4 Lanes Under 28B: 0 Detour Length 19: 2.4 km

ADT 29: 14,624 Truck ADT 109: 5 % Year of ADT 30: 2014

APPRAISAL

Bridge Rail 36A:	1 Meets Standards	Approach Rail 36C:	0 Substandard
Transition 36B:	0 Substandard	Approach Rail Ends 36D:	0 Substandard
Str. Evaluation 67:	4 Minimum Tolerable	Deck Geometry 68:	2 Intolerable - Replace
Underclearance, Vertical and Horizontal 69:	N Not applicable (NBI)		
Waterway Adequacy 71:	9 Above Desirable	Approach Alignment 72:	7 Above Min Criteria
Scour Critical 113:	8 Stable Above Footing		

GEOMETRIC DATA

Length Max Span 48:	71.62 m	Structure Length 49:	220.37 m
Curb/Sdwlk Width L 50A:	1.83 m	Curb/Sidewalk Width R 50B:	1.83 m
Width Curb to Curb 51:	12.38 m	Width Out to Out 52:	12.68 m
Approach Roadway Width 32:(w/ shoulders)	12.19 m	Median 33:	0 No median
Deck Area:	2,794.30 m²		
Skew 34:	0.00 °	Structure Flared 35:	0 No flare
Vertical Clearance 10:	04.75 m	Horiz. Clearance 47:	12.19 m

Minimum Vertical Clearance Over Bridge 53:	04.75 m
Minimum Vertical Underclearance Reference 54A:	N Feature not hwy or RR
Minimum Vertical Underclearance 54B:	00.00 m
Minimum Lateral Underclearance Reference R 55A:	N Feature not hwy or RR
Minimum Lateral Underclearance R 55:	99.90 m
Minimum Lateral Underclearance L 56:	99.90 m

PROPOSED IMPROVEMENTS

Bridge Cost 94:	NA	Type of Work 75:	Unknown (P)
Roadway Cost 95:	Unknown	Length of Improvement 76:	
Total Cost 96:	Unknown	Future ADT 114:	20,474
Year of Cost Estimate 97:	Unknown	Year of Future ADT 115:	2034

NAVIGATION DATA

Navigation Control 38:	0 Permit Not Required		
Vertical Clearance 39:	0.00 m	Horizontal Clearance 40:	0.00 m
Pier Protection 111:	Not Applicable (P)	Lift Bridge Vertical Clearance 116:	0.00 m

ELEMENT CONDITION STATE DATA

Str Unit	Elm/Env	Description	Units	Total Qty	% in 1	Qty. St. 1	% in 2	Qty. St. 2	% in 3	Qty. St. 3	% in 4	Qty. St. 4	% in 5	Qty. St. 5
1	14/2	P Conc Deck/AC Ovly	sq.m.	3,560	0 %	0	100 %	3,560	0 %	0	0 %	0	0 %	0
1	113/2	Paint Stl Stringer	m.	3,085	60 %	1,851	20 %	617	10 %	309	10 %	309	0 %	0
1	121/2	P/Stl Thru Truss/Bot	m.	441	70 %	309	15 %	66	10 %	44	5 %	22	0 %	0
1	126/2	P/Stl Thru Truss/Top	m.	441	85 %	375	7 %	31	3 %	13	5 %	22	0 %	0
1	152/2	Paint Stl Floor Beam	m.	342	75 %	257	10 %	34	10 %	34	5 %	17	0 %	0

Structure Inventory and Appraisal Sheet

Str Unit	Elm/Env	Description	Units	Total Qty	% in 1	Qty. St. 1	% in 2	Qty. St. 2	% in 3	Qty. St. 3	% in 4	Qty. St. 4	% in 5	Qty. St. 5
1	210/2	R/Conc Pier Wall	m.	25	45 %	11	47 %	12	8 %	2	0 %	0	0 %	0
1	215/2	R/Conc Abutment	m.	25	70 %	18	18 %	5	8 %	2	4 %	1	0 %	0
1	218/2	Undefined Wall Elem.	m.	37	30 %	11	60 %	22	10 %	4	0 %	0	0 %	0
1	300/2	Strip Seal Exp Joint	m.	55	70 %	38	30 %	16	0 %	0	0 %	0	0 %	0
1	302/2	Compressn Joint Seal	m.	18	60 %	11	40 %	7	0 %	0	0 %	0	0 %	0
1	311/2	Moveable Bearing	ea.	12	85 %	10	15 %	2	0 %	0	0 %	0	0 %	0
1	334/2	Metal Rail Coated	m.	881	19 %	167	25 %	220	25 %	220	30 %	264	1 %	9
1	362/2	Traf Impact SmFlag	ea.	1	100 %	1	0 %	0	0 %	0	0 %	0	0 %	0
1	363/2	Section Loss SmFlag	ea.	1	0 %	0	100 %	1	0 %	0	0 %	0	0 %	0
1	383/2	Wear.Surf- AC+Membr.	sq.m.	2,727	80 %	2,182	20 %	545	0 %	0	0 %	0	0 %	0
1	388/2	Paint	sq.m.	14,220	75 %	10,665	10 %	1,422	10 %	1,422	5 %	711	0 %	0

Highway Bridge Inspection Report

BERNARD LOWN PEACE
CEDAR STREET
over
ANDROSCOGGIN RIVER

Asset Code:	3330
Inspection Date:	06/14/2016
Inspected By:	Pete DeRocher
Inspection Type(s):	Routine Fracture Critical

TABLE OF CONTENTS

National Bridge Inventory

Status:	2 - FO	Bridge Name:	**BERNARD LOWN PEACE**	Sufficiency Rating:	51.3

Inspections

(90) INSPECTION DATE & (91) DESIGNATED INSPECTION FREQUENCY		24	06/14/2016
(92) CRITICAL FEATURE INSPECTION & (93) CFI DATE			
(92A) FRACTURE CRITICAL DETAIL	Y	24	4/22/2014
(92B) UNDERWATER INSPECTION	Y	60	10/1/2014
(92C) OTHER SPECIAL INSPECTION	N	24	6/4/2012

Identification

(1) STATE CODE	231 - Maine
(8) STRUCTURE NUMBER	3330
(5) INVENTORY ROUTE	
(5A) RECORD TYPE	1: Route carried "on" the structure
(5B) ROUTE SIGNING PREFIX	3 - STATE HIGHWAY
(5C) DESIGNATED LEVEL OF SERVICE	0 - None
(5) INVENTORY ROUTE	0
(5) INVENTORY ROUTE	0 - NOT APPLICABLE
(2) HIGHWAY AGENCY DISTRICT	01 - Southern
(3) COUNTY CODE	001 Androscoggin
(4) PLACE CODE	02060
(6) FEATURES INTERSECTED	ANDROSCOGGIN RIVER
(7) FACILITY CARRIED	CEDAR STREET
(9) LOCATION	TOWNLINE
(11) MILEPOINT	2.990
(12) BASE HIGHWAY NETWORK	Inventory Route is on the Base Network
(13) LRS INVENTORY ROUTE, SUBROUTE	
(13A) LRS INVENTORY ROUTE	0000110047
(13B) SUBROUTE NUMBER	00
(16) LATITUDE	44.089391666 6667
(17) LONGITUDE	70.221355555 5556
(98A) BORDER BRIDGE CODE	
(98B) PERCENT RESPONSIBILITY	0
(99) BORDER BRIDGE STRUCT NO.	n/a

Structure Type and Material

(43) STRUCTURE TYPE, MAIN	
(43A) KIND OF MATERIAL/DESIGN	3 - Steel
(43B) TYPE OF DESIGN/CONSTR	10 - Truss - Thru
(44) STRUCTURE TYPE, APPROACH SPANS	
(44A) KIND OF MATERIAL/DESIGN	0 - Other
(44B) TYPE OF DESIGN/CONSTRUCTION	00 - Other
(45) NUMBER OF SPANS IN MAIN UNIT	3
(46) NUMBER OF APPROACH SPANS	0
(107) DECK STRUCTURE TYPE	1 - Concrete Cast-in-Place
(108) WEARING SURFACE/PROTECTIVE SYSTEMS	
(108A) WEARING SURFACE	6 - Bituminous
(108B) DECK MEMBRANE	2 - Preformed Fabric
(108C) DECK PROTECTION	0 - None

Age of Service

(27) YEAR BUILT	1936
(106) YEAR RECONSTRUCTED	1996
(42) TYPE OF SERVICE	
(42A) TYPE OF SERVICE ON BRIDGE	5 - Highway-pedestrian
(42B) TYPE OF SERVICE UNDER BRIDGE	5 - Waterway
(28) LANES	
(28A) LANES ON THE STRUCTURE	04
(28B) LANES UNDER THE STRUCTURE	00
(29) AVERAGE DAILY TRAFFIC	14624
(30) YEAR OF AVERAGE DAILY TRAFFIC	2014
(109) AVERAGE DAILY TRUCK TRAFFIC	5
(19) BYPASS DETOUR LENGTH	1

Geometric Data

(48) LENGTH OF MAXIMUM SPAN (ft.)	235
(49) STRUCTURE LENGTH (ft.)	723.0
(50) CURB/SIDEWALK WIDTHS	
(50A) LEFT CURB SIDEWALK (ft.)	6.0
(50B) RIGHT CURB SIDEWALK (ft.)	6.0
(51) BRDG RDWY WIDTH CURB-TO-CURB (ft.)	40.6
(52) DECK WIDTH, OUT-TO-OUT (ft.)	41.6
(32) APPROACH ROADWAY WIDTH (ft.)	40
(33) BRIDGE MEDIAN	0 - No median
(34) SKEW (deg.)	0
(35) STRUCTURE FLARED	0 - No flare
(10) INV RTE, MIN VERT CLEARANCE (ft.)	15.58
(47) TOTAL HORIZONTAL CLEARANCE (ft.)	40
(53) VERTICAL CLEARANCE OVER BRIDGE ROADWAY (ft.)	15.58
(54) MIN VERTICAL UNDERCLEARANCE	
(54A) REFERENCE FEATURE	N - Feature not a highway or railroad
(54B) MIN VERTICAL UNDERCLEARENCE (ft.)	0
(55) MIN LATERAL UNDER CLEARANCE RIGHT	
(55A) REFERENCE FEATURE	N - Feature not a highway or railroad
(55B) MIN LATERAL UNDER CLEARANCE RIGHT (ft.)	327.76
(56) MIN LATERAL UNDER CLEARANCE (ft.)	99.9

Classification

(112) NBIS BRIDGE LENGTH	Yes
(104) HIGHWAY SYSTEM OF THE INVENTORY ROUTE	1 - Structure/Route is on NHS
(26) FUNCTIONAL CLASSIFICATION OF INVENTORY ROUTE	14 - Urban - Other Principal Arterial
(100) STRAHNET HIGHWAY DESIGNATION	Not a STRAHNET route
(101) PARALLEL STRUCTURE DESIGNATION	N - No parallel structure
(102) DIRECTION OF TRAFFIC	2-way traffic
(103) TEMP STRUCTURE	
(105) FEDERAL LANDS HIGHWAYS	Not Applicable
(110) DESIGNATED NATIONAL NETWORK	Inventory route not on network
(20) TOLL	3 - On Free Road
(21) MAINTENANCE RESPONSIBILITY	01 - State Highway Agency
(22) OWNER	01 - State Highway Agency
(37) HISTORICAL SIGNIFICANCE	2 - Eligible for National Register

Condition

(58) DECK	6 - Satisfactory Condition (minor deterioration)
(59) SUPERSTRUCTURE	6 - Satisfactory Condition (minor deterioration)
(60) SUBSTRUCTURE	6 - Satisfactory Condition (minor deterioration)
(61) CHANNEL & CHANNEL PROTECTION	7 - Bank protection needs minor repairs
(62) CULVERT	N - Not Applicable

Load Rating and Posting

(31) DESIGN LOAD	4 - H 20
(63) METHOD USED TO DETERMINE OPERATING RATING	8 - Load and Resistance Factor
(64) OPERATING RATING	0.72
(65) METHOD USED TO DETERMINE INVENTORY RATING	8 - Load and Resistance Factor
(66) INVENTORY RATING	0.55
(70) BRIDGE POSTING	5 - Equal to or above legal
(41) STRUCTURE OPEN/POSTED/CLOSED	A - Open

Appraisal

(67) STRUCTURAL EVALUATION	4
(68) DECK GEOMETRY	2
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL	N
(71) WATERWAY ADEQUACY	9 - Bridge Above Flood Water Elevations
(72) APPROACH ROADWAY ALIGNMENT	7 - Better than present minimum criteria
(36) TRAFFIC SAFETY FEATURE	
36A) BRIDGE RAILINGS:	1 - Meets acceptable standards
36B) TRANSITIONS:	0 - Does not meet acceptable standards/safety feature is required
36C) APPROACH GUARDRAIL	0 - Does not meet acceptable standards/safety feature is required
36D) APPROACH GUARDRAIL ENDS	0 - Does not meet acceptable standards/safety feature is required
(113) SCOUR CRITICAL BRIDGES	8 - Stable for scour conditions

Proposed Improvements

(75) TYPE OF WORK	
(75A) TYPE OF WORK PROPOSED	
(75B) WORK DONE BY	
(76) LENGTH OF STRUCTURE IMPROVEMENT (ft.)	
(94) BRIDGE IMPROVEMENT COST (SK)	
(95) ROADWAY IMPROVEMENT COST (SK)	
(96) TOTAL PROJECT COST	
(97) YEAR OF IMPROVEMENT COST ESTIMATE	
(114) FUTURE ADT	20474
(115) YEAR OF FUTURE ADT	2034

Navigation Data

(38) NAVIGATION CONTROL	0 - No navigation control on waterway (bridge
(111) PIER OR ABUTMENT PROTECTION	
(39) NAV VERT CLEARANCE	0
(116) MIN NAVIGATION VERT CLEARANCE, VERT LIFT BRIDGE	0
(40) NAV HORIZONTAL CLEARANCE	0

General Bridge Data

Structure Number: **3330** **Structure Name:** **BERNARD LOWN PEACE**

Owner:	1 State DOT	Town:	Auburn
Co-Owner:	N Not applicable	Town2:	Lewiston
Region:	01 Southern	Maintainer:	1 State DOT
Bridge Plans:	☐	Co-Maintainer:	N Not applicable

Structure Type

Main Span		**Approach Span**	
Type:	5 Truss	Type:	_
Sub Type:	2 Thru	Sub Type:	_
Construction:	2 Riveted	Construction:	_
Material:	1 Steel	Material:	_
Continuity:	1 Non Continuous	Continuity:	_
Composite:	1 Non Composite	Composite:	_
Moveable:	0 No	Moveable:	_

Deck Area:	30077.5657700 0000000	(SF)
Curb Reveal Lt:	6	(in)
Curb Reveal Rt:	6	(in)

Repairs Done:

Year	How	Scope
1995	Maintenance	Collision Damage
1996	Contract	Deck Replacement
1997	Contract	Substructure Rehab
2014	Contract	Superstructure Repair
2014	Contract	Substructure Rehab

Substructures

	Shaft	Notes
Abutment 1	**Stub Concrete**	
Pier	**Mass Concrete**	
Pier	**Mass Concrete**	
Pier		
Abutment 2	**Stub Concrete**	

	Foundation	Notes
Abutment 1	**Timber Piles**	
Pier	**Timber Piles**	
Pier	**Timber Piles**	
Pier		
Abutment 2	**Timber Piles**	

Roadway

Road/Route Name	**CEDAR STREET**
Abut-Abut Detour	**1.7**
Corridor Priority	**3**

Inspection Notes

Structure Number: 3330 | Town: Auburn

Structure Name: BERNARD LOWN PEACE | Inspection Date: 06/14/2016

Structure Notes

Three span, riveted steel, through truss. Concrete deck, abutments, piers and wing walls. 2015 - Post repair Special Inspection, raised the Superstructure rating from a 4 to a 6. Note - Northerly pier bearing broke away in 1997 causing the end span to drop approx. 1' The drop and subsequent jacking back into place of the truss caused ripling and bending of many of the sway frame and cross frame components. JWH

Wearing Surface

Wearing surface has scattered areas of patched potholes and moderate wear.

Deck

NBI Item 58: 6

Deck underside has isolated ares of spalling to rebar and delams, otherwise in good condition.

Superstructure

NBI Item 59: 6

Moderate deterioration and section loss at floorbeam and lateral bracing connections. Rivets at these locations have moderate to severe deterioration with section loss up to 100%. Two of the bottom chord parallel connection plates exhibit holes thru. Some of these plates have already been repaired. East abutment bearings rocked back. Top portion of truss inspected with bucket truck. Bucket truck notes:Paint in fair condition with scattered minor rust. Several bent cross braces at top of truss. See photos. Not new damage. Minor damage to portals and angles above traffic. See photos. No other issues noted.

Substructure

NBI Item 60: 6

Abutments and wings have scattered areas of heavy scaling, spalling and delams. West pier has been rehabbed and is in good condition. East pier has areas of deep nested cracking with soft concrete around bearing areas.

Culvert

NBI Item 62: N

Channel **NBI Item 61:** 7

Other

Special Inspection

Monitoring

Monitor cracking at east pier. (PAD) Monitor floorbeam connection rivets and section loss. (PAD) Monitor bottom chord parallel connection plate section loss. (PAD)

Pontis Notes

National Bridge Inventory

IDENTIFICATION

(1) STATE CODE 231 - Maine
(8) STRUCTURE NUMBER 3330
(5) INV. ROUTE (ON/UNDER) 1 3 0 0 0
(2) HIGHWAY AGENCY 01 (3) COUNTY CODE 001
(4) PLACE CODE 02060
(6) FEATURES INTERSECTED ANDROSCOGGIN RIVER
(7) FACILITY CARRIED CEDAR STREET
(9) LOCATION TOWNLINE
(11) MILEPOINT 2.990 (12) BASE HIGHWAY NETWORK 1
(13A) LRS INVENTORY ROUTE 0000110047 (13B) SUBROUTE NUMBER 00
(16) LATITUDE 44.0893916666667 (17) LONGITUDE 70.2213555555556
(98A) BORDER BRIDGE CODE
PERCENT RESPONSIBILITY 0 (99) BORDER BRIDGE STRUCT n/a

STRUCTURE TYPE AND MATERIAL

(43) STRUCTURE TYPE, MAIN
A) KIND OF MATERIAL/DESIGN: 3 - Steel
B) TYPE OF DESIGN/CONSTR: 10 - Truss - Thru
(44) STRUCTURE TYPE, APPROACH SPANS
A) KIND OF MATERIAL/DESIGN: 0 - Other
B) TYPE OF DESIGN/CONSTR: 00 - Other
(45) NUMBER OF SPANS IN MAIN 3 (46) NUMBER OF APPROACH 0
(107) DECK STRUCTURE TYPE 1 (108A) WEARING SURFACE 6
(108B) DECK MEMBRANE 2 (108C) DECK PROTECTION 0

AGE OF SERVICE

(27) YEAR BUILT 1936 (106) YEAR RECONSTRUCTED 1996
(42) TYPE OF SERVICE ON 5 UNDER 5
(28) LANES ON 04 UNDER 00
(29) AVERAGE DAILY TRAFFIC 14624 (19) BYPASS DETOUR LENGTH 1
(30) YEAR OF AVERAGE DAILY TRAFFIC 2014
(109) AVERAGE DAILY TRUCK TRAFFIC 5

GEOMETRIC DATA

(48) LENGTH OF MAX SPAN (ft.) 235 (49) STRUCTURE LENGTH (ft.) 723.0
(50) CURB/SIDEWALK WIDTHS (ft.) LEFT 6.0 RIGHT 6.0
(51) BRDG RDWY WIDTH CURB-TO-CURB (ft.) 40.6
(52) DECK WIDTH, OUT-TO-OUT (ft.) 41.6
(32) APPROACH ROADWAY WIDTH (ft.) 40
(33) BRIDGE MEDIAN 0 (34) SKEW (DEG.) 0
(35) STRUCTURE FLARED 0 (10) INV RTE, MIN VERT CLEAR (ft.) 15.58
(47) TOTAL HORIZONTAL CLEARANCE (ft.) 40
(53) VERTICAL CLEARANCE OVER BRIDGE ROADWAY (ft.) 15.58
(54) VERTICAL UNDER CLEARANCE (ft.) N 0
(55) LATERAL UNDER CLEARANCE RIGHT (ft.) N 327.76
(56) MIN LATERAL UNDER CLEARANCE (ft.) 99.9

PROPOSED IMPROVEMENTS

(75A) TYPE OF WORK PROPOSED (75B) WORK DONE BY
(76) LENGTH OF STRUCTURE IMPROVEMENT (ft.)
(94) BRIDGE IMPROVEMENT COST ($)
(95) ROADWAY IMPROVEMENT COST ($)
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 20474 (115) YEAR OF FUTURE ADT 2034

INSPECTIONS

(90) INSPECTION DATE 06/14/2016
(91) DESIGNATED INSPECTION FREQUENCY 24

(92) CRITICAL FEATURE INSPECTION			(93) CFI DATE
A. FRACTURE CRITICAL DETAIL	Y	24	4/22/2014
B. UNDERWATER INSPECTION	Y	60	10/1/2014
C. OTHER SPECIAL	N	24	6/4/2012

CONDITION

(58) DECK 6
(59) SUPERSTRUCTURE 6 (60) SUBSTRUCTURE 6
(61) CHANNEL & CHANNEL PROTECTION 7 (62) CULVERT N

LOAD RATING AND POSTING

(31) DESIGN LOAD 4
(63) METHOD USED TO DETERMINE OPERATING RATING 8
(64) OPERATING RATING 0.72
(65) METHOD USED TO DETERMINE INVENTORY RATING 8
(66) INVENTORY RATING 0.55
(70) BRIDGE POSTING 5
(41) STRUCTURE OPEN/POSTED/CLOSED A

APPRAISAL

(67) STRUCTURAL EVALUATION 4
(68) DECK GEOMETRY 2
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATERWAY ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 7
(36) TRAFFIC SAFETY FEATURE
36A) BRIDGE RAILINGS: 1
36B) TRANSITIONS: 0
36C) APPROACH GUARDRAIL: 0
36D) APPROACH GUARDRAIL ENDS: 0
(113) SCOUR CRITICAL BRIDGES 8
SUFFICIENCY RATING 2 STATUS 51.3

CLASSIFICATION

(112) NBIS BRIDGE LENGTH Y
(104) HIGHWAY SYSTEM OF THE INVENTORY ROUTE 1
(26) FUNCTIONAL CLASSIFICATION OF INVENTORY ROUTE 14
(100) STRAHNET HIGHWAY DESIGNATION 0
(101) PARALLEL STRUCTURE DESIGNATION N
(102) DIRECTION OF TRAFFIC 2
(103) TEMP STRUCTURE
(105) FEDERAL LANDS HIGHWAYS 0
(110) DESIGNATED NATIONAL NETWORK 0
(20) TOLL 3
(21) MAINTENANCE RESPONSIBILITY 01
(22) OWNER 01
(37) HISTORICAL 2

NAVIGATION DATA

(38) NAVIGATION CONTROL 0
(111) PIER OR ABUTMENT PROTECTION
(39) NAV VERT CLEARANCE (ft.) 0
(116) MIN NAVIGATION VERT CLEARANCE, VERT LIFT BRIDGE (ft.) 0
(40) NAV HORIZONTAL CLEARANCE (ft.) 0

Element Inspection

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
12 - Reinforced Concrete Deck	4 - Sev.	38319	sq. ft.	26269	12000	50	
113 - Steel Stringer	2 - Low	10122	ft.	8122	2000		
515 - Steel Protective Coating		10122	sq. ft.	8122	2000		
120 - Steel Truss	4 - Sev.	723	ft.	448	200	75	
515 - Steel Protective Coating		723	sq. ft.	448	200	75	
152 - Steel Floor Beam	4 - Sev.	1123	ft.	848	225	50	
515 - Steel Protective Coating		1123	sq. ft.	848	225	50	
162 - Steel Gusset Plate	3 - Mod.	84	each	48	36		
515 - Steel Protective Coating		84	sq. ft.	48	36		
210 - Reinforced Concrete Pier Wall	2 - Low	83	ft.	40	40	3	
215 - Reinforced Concrete Abutment	2 - Low	83	ft.	60	20	3	
300 - Strip Seal Expansion Joint	4 - Sev.	180	ft.	130	50		
302 - Compression Joint Seal	4 - Sev.	60	ft.	40	20		
311 - Movable Bearing	4 - Sev.	6	each	2	4		
515 - Steel Protective Coating		6	sq. ft.	0	6		
313 - Fixed Bearing	3 - Mod.	6	each	6			
515 - Steel Protective Coating		6	sq. ft.	0	6		
330 - Metal Bridge Railing	4 - Sev.	2892	ft.	1800	1000	92	
515 - Steel Protective Coating		2892	sq. ft.	2892			
820 - Reinforced Concrete Wall	2 - Low	120	ft.	40	70	10	
841 - Asphalt Wearing Surface with Membrane	4 - Sev.	29354	sq. ft.	23484	5000	870	

MaineDOT Load Rating and Posting

Structure Number: 3330

Town 1: Auburn

Bridge Name: BERNARD LOWN PEACE

Town 2: Lewiston

Owner: 1 State DOT

Design Load

Vehicle:	Operating Rating:	Inventory Rating:
HL-93	0.72	0.55
HL-93 Modified		

Legal Load

Configuration:	Axles:	Weight (Tons):	Rating:	Tons:
1	6	50	0.82	
2	6	47	0.79	
3	5	44	0.81	
4	5	44	0.83	
5	5	44	0.81	
6	4	38	0.69	
7	3	29.5	0.76	
8	2	18.7	1.18	

Routine Permit Loads

Configuration:	Axles:	Weight (Tons):	Rating:	Tons:	Status:
Tractor w/semi trailor	4	60			
Crane	5	65			No Go
Crane with dolly	5	68			No Go

Load Rating

TEDOC Reference:

Controlling Member:

Controlling Stress: positive moment

Posting Committee

Discussion:

TEDOC Reference:

Load Test

Type:

Load Test Date:

TEDOC Reference:

Load Test Results:

Posting Status

☐ Posted

Weight in tons:

☐ Posted for one truck at a time

☐ Posted for 4 axle

☐ Posted for spacing

Underwater Dive Inspection Report

Structure Number: 3330

Bridge Name: SOUTH BRIDGE

Town 1: 01010 - Auburn

Town 2: 01050 - Lewiston

Division: Dixfield

DiveID: 5527

Tidal:

Location: TOWNLINE

Tide Information:

Photos:

none

Dive Entry Location: Rollo Skating parking lot

Scour:

Comments/Hazards:

- rope tow from S/W

Streambed Description:

boulders, hard packed gravel

Channel Description:

Mostly flat, even across entire river

Substructure Description:

2010: Inspected 2 piers. No footings exposed. 2014: No major changes. No footings exposed. Rehab project on piers under way. Contractor on site.

Inspection Team:	**Role:**
Edwards	TL,SD
Merrithew	D
Gorneau	SD
Barden	SD

Dive Conditions:

Time: Entry:	3:35	AM/PM	PM
Time: Exit:	4:01	AM/PM	PM
Water Temp:	65		
Visibility (ft):	5		
Max Depth (ft):	6		
Current:	moderate		
Weather:	cloudy		

Underwater Inspection Date: 10012014

Channel Condition: 6

Substr/Culvert Condition: 6

Inspection Cycle: Y60

Ratings Comments:

Pictures

PHOTO 1

Description Roadway looking west

PHOTO 2

Description North face

Pictures

PHOTO 3

Description East abutment bearings rocked back and spalling with exposed rebar

PHOTO 4

Description 30% scattered spalling with exposed rebar at east abutment backall

Pictures

PHOTO 5

Description East abutment construction joint with spalling and delams

PHOTO 6

Description Typical condition at floorbeam and bottom chord connection

Pictures

PHOTO 7

Description General view span 1 pier 1

PHOTO 8

Description Scaling at SE wing end, bridge seat corner of east abutment

Pictures

PHOTO 9

Description Scattered rivets with 100% section loss at floorbeam connections

PHOTO 10

Description Example of before and after rivet deterioration

Pictures

PHOTO 11

Description Scattered areas of deterioration at deck form joints below sidewalk

PHOTO 12

Description Cracking east pier west bearing up to 4" deep

Pictures

PHOTO 13

Description Cracking and soft concrete at east pier west bearing

PHOTO 14

Description Isolated paint failures at stringers

Pictures

PHOTO 15

Description Heavy deterioration at sidewalk cantilevers

PHOTO 16

Description

Pictures

PHOTO 17

Description

PHOTO 18

Description Connection plate repair

Pictures

PHOTO 19

Description West abutment

PHOTO 20

Description South face

Pictures

PHOTO 21

Description Deep scaling at backwall of west abutment behind SW bearing

PHOTO 22

Description Isolated deck delams

Pictures

PHOTO 23

Description Delam after chipping

PHOTO 24

Description Section loss at lateral bracing connections

Pictures

PHOTO 25

Description Section loss at bottom chord connection plate - Mid span, west span, DS side

PHOTO 26

Description DS west pier bearings and concrete repair

Pictures

PHOTO 27

Description Wearing surface patches

PHOTO 28

Description Worst case connection plate section loss

Pictures

PHOTO 29

Description DS sidewalk deck forms deteriorating

PHOTO 30

Description Bottom chord connection plate with hole thru - Loceted before the second sidewalk cantilever going west from east pier DS side

Pictures

PHOTO 31

Description 4" deep crack with soft concrete on bridge seat adjacent to east pier DS bearing

PHOTO 32

Description Concrete deterioration and cracking at DS end of east pier

Pictures

PHOTO 33

Description Concrete deterioration and cracking at DS end of east pier at bearing area

PHOTO 34

Description Concrete deterioration and cracking at DS end of east pier at bearing area

Pictures

PHOTO 35

Description Spall with 2" deep rat hole to steel at the east abutment breastwall just below the DS bearing

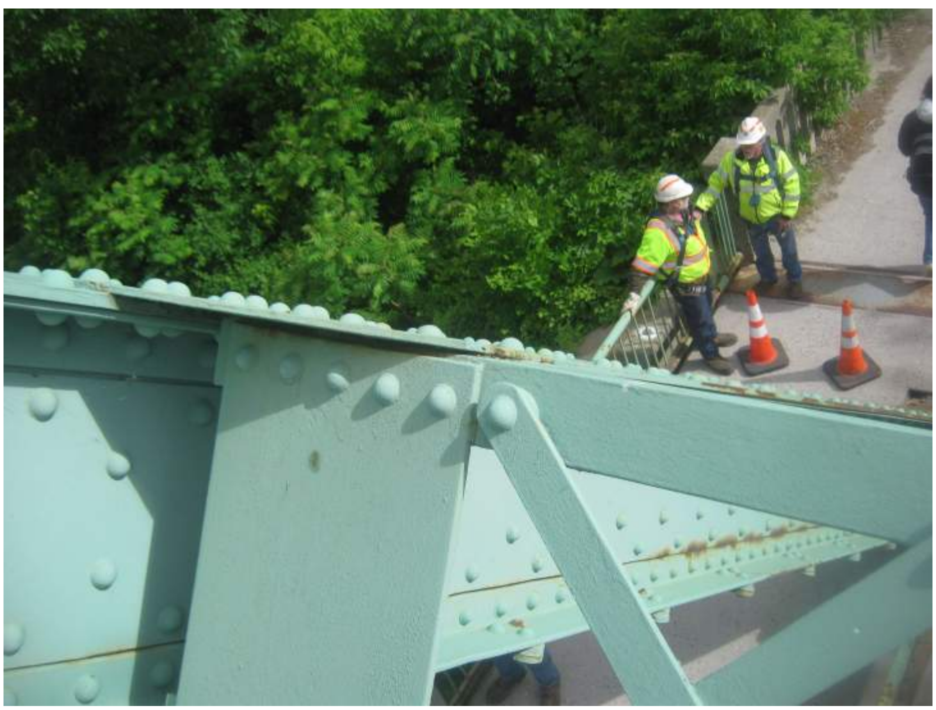


PHOTO 36

Description View of end portal gusset plate

Pictures

PHOTO 37

Description Typ view of gusset plate connection

PHOTO 38

Description Typ. view of top of gusset plate connection

Pictures

PHOTO 39

Description View of top of gusset plate connection

PHOTO 40

Description View showing bent cross bracing at top of truss

Pictures

PHOTO 41

Description View showing bent cross bracing at top of truss

PHOTO 42

Description Overall view from top

Pictures

PHOTO 43

Description View showing bent cross bracing at top of truss

PHOTO 44

Description View showing bent angle just above traffic

Pictures

PHOTO 45

Description View showing typ. minor rusting along riveted beams

PHOTO 46

Description View of typ. damage to angle just above traffic

Pictures

PHOTO 47

Description View showing damage to S portal

PHOTO 48

Description View showing welded repair to portal

Pictures

PHOTO 49

Description View showing bent cross bracing at top of truss

PHOTO 50

Description View showing bent cross bracing at top of truss

Maintenance Work Items

Structure Number: **3330** **Structure Name:** **BERNARD LOWN PEACE**

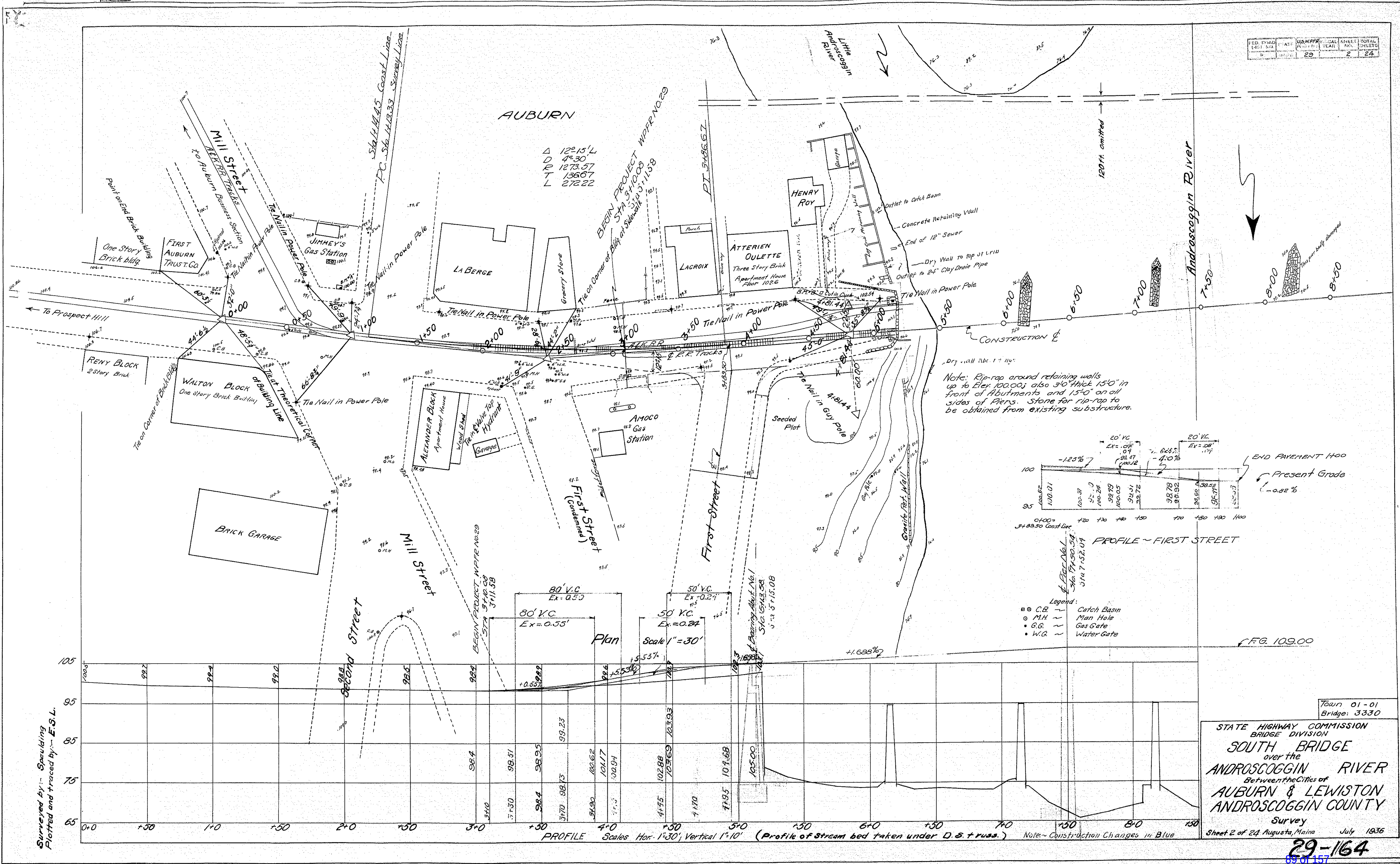
Town: **01010** **Owner:** **DeRocher, Pete**

Type	Work Item	Priority	Notes
Maintenance	Rehab Substructure		Rehab/repair all concrete deterioration of substructure. Concrete collar at east pier.
Maintenance	Reset Bearings		Reset bearings at east abutment.
Maintenance	Rehab Superstructure		Repair or replace heavily deteriorated steel elements as needed.
Maintenance	Rehab Superstructure		Repair or replace all heavily deteriorated rivets as needed.
Preservation	Paint		Clean and paint steel as needed.
Maintenance	Rehab Substructure		Repair heavy scaling below water line at piers.
Maintenance	Rehab Superstructure		Repair bottom chord connection plate with hole thru.

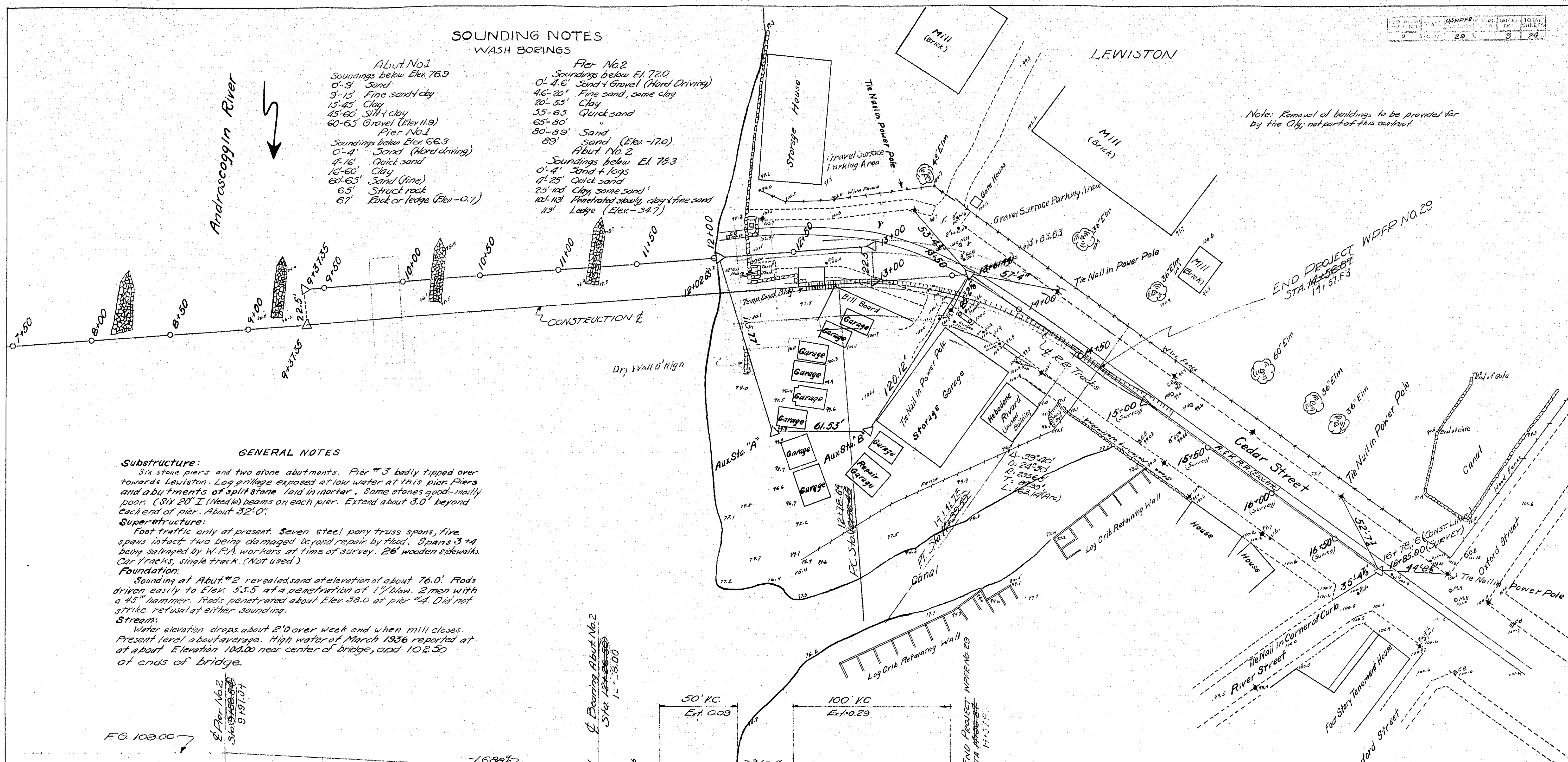
APPENDIX D: EXISTING BRIDGE PLANS

- **1936 ORIGINAL CONSTRUCTION PLANS**
- **1996 DECK REPLACEMENT PLANS**
- **2014 REHABILITATION PLANS**

Note: no plans have been found from the 1995 Pier 2 emergency repairs



AUBURN
Little Androscoggin River
Androscoggin River
Mill Street
Second Street
First Street
First Street (condemned)
To Prospect Hill
Δ 12°15' L
D 4°30'
R 1273.57
T 136.67
L 272.22
BEGIN PROJECT WPFR No 29 STA 3+10.08 Sta 3+11.58
PT 3+86.67
Sta 14+14.5 Const Line
PC Sta 14+13.33 Survey Line
Reny Block 2 Story Brick
Walton Block One Story Brick Building
First Auburn Trust Co.
One Story Brick bldg.
Jimmey's Gas Station
La Berge
Grocery Store
Lacroix
Atterien Oulette Three Story Brick Apartment House Floor 102.6
Henry Roy
Alexander Block Apartment House
Wood Shed
Garage
Brick Garage
Amoco Gas Station
Seeded Plot
Concrete Retaining Wall
End of 12" Sewer
Dry Wall to top of Crib
Outlet to 24" Clay Drain Pipe
Outlet to Catch Basin
Tie Nail in Power Pole
Tie Nail in Guy Pole
Construction ℄
120 ft. omitted
Note: Rip-rap around retaining walls up to Elev. 100.00; also 3'-0" thick 15'-0" in front of Abutments and 15'-0" on all sides of Piers. Stone for rip-rap to be obtained from existing substructure.
PROFILE ~ FIRST STREET
END PAVEMENT 1+00
Present Grade
Legend:
C.B. ~ Catch Basin
M.H. ~ Man Hole
G.G. ~ Gas Gate
W.G. ~ Water Gate
F.G. 109.00
80' V.C. Ex = 0.55'
50' V.C. Ex = 0.24
Plan Scale 1" = 30'
℄ Bearing Abut. No 1
℄ Pier No 1
PROFILE Scales Hor. 1" = 30'; Vertical 1" = 10' (Profile of Stream bed taken under D.S. truss.)
Note ~ Construction Changes in Blue
Surveyed by: ~ Spaulding
Plotted and traced by: ~ E.S.L.
Town 01-01
Bridge: 3330
STATE HIGHWAY COMMISSION
BRIDGE DIVISION
SOUTH BRIDGE
over the
ANDROSCOGGIN RIVER
Between the Cities of
AUBURN & LEWISTON
ANDROSCOGGIN COUNTY
Survey
Sheet 2 of 24 Augusta, Maine July 1936
29-1164



SOUNDING NOTES
WASH BORINGS

Abut. No. 1
Soundings below Elev. 76.9
0'-9' Sand
9'-15' Fine sand + clay
15'-45' Clay
45'-60' Silt + clay
60-65' Gravel (Elev 11.9)

Pier No. 1
Soundings below Elev. 66.3
0'-4' Sand (Hard driving)
4'-16' Quick sand
16'-60' Clay
60'-65' Sand (fine)
65' Struck rock
67' Rock or ledge (Elev. -0.7)

Pier No. 2
Soundings below El. 72.0
0'-4.6' Sand + Gravel (Hard Driving)
4.6'-20' Fine sand, some clay
20'-55' Clay
55'-65 Quick sand
65'-80' "
80'-89' Sand
89' Sand (Elev. -17.0)

Abut. No. 2
Soundings below El. 78.3
0'-4' Sand + logs
4'-25' Quick sand
25'-100' Clay, some sand
100'-113' Penetrated slowly, clay + fine sand
113' Ledge (Elev. -34.7)

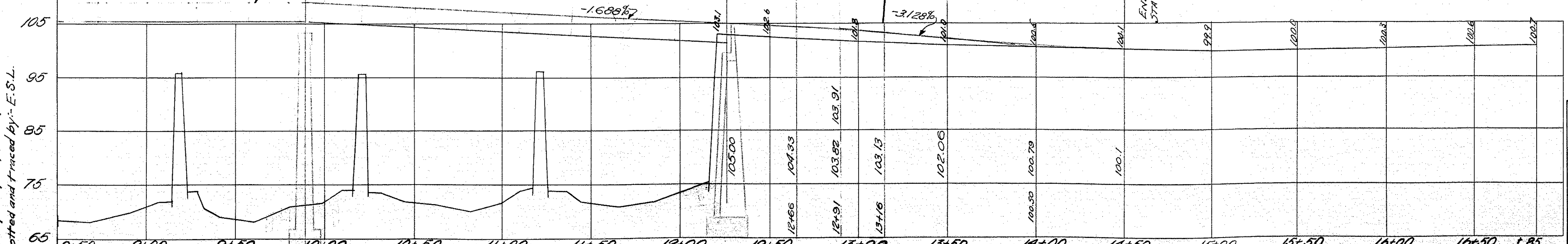
GENERAL NOTES

Substructure:
Six stone piers and two stone abutments. Pier #3 badly tipped over towards Lewiston. Log grillage exposed at low water at this pier. Piers and abutments of split stone laid in mortar. Some stones good - mostly poor. (Six 20" I (Needle) beams on each pier. Extend about 3.0' beyond each end of pier. About 32'-0".

Superstructure:
Foot traffic only at present. Seven steel pony truss spans, five spans intact, two being damaged beyond repair by flood. Spans 3+4 being salvaged by W.P.A. workers at time of survey. 26' wooden sidewalks. Car tracks, single track. (Not used)

Foundation:
Sounding at Abut. #2 revealed sand at elevation of about 76.0'. Rods driven easily to Elev. 53.5 at a penetration of 1"/blow. 2 men with a 45# hammer. Rods penetrated about Elev. 38.0 at pier #4. Did not strike refusal at either sounding.

Stream:
Water elevation drops about 2'.0 over week end when mill closes. Present level about average. High water of March 1936 reported at at about Elevation 104.00 near center of bridge, and 102.50 at ends of bridge.



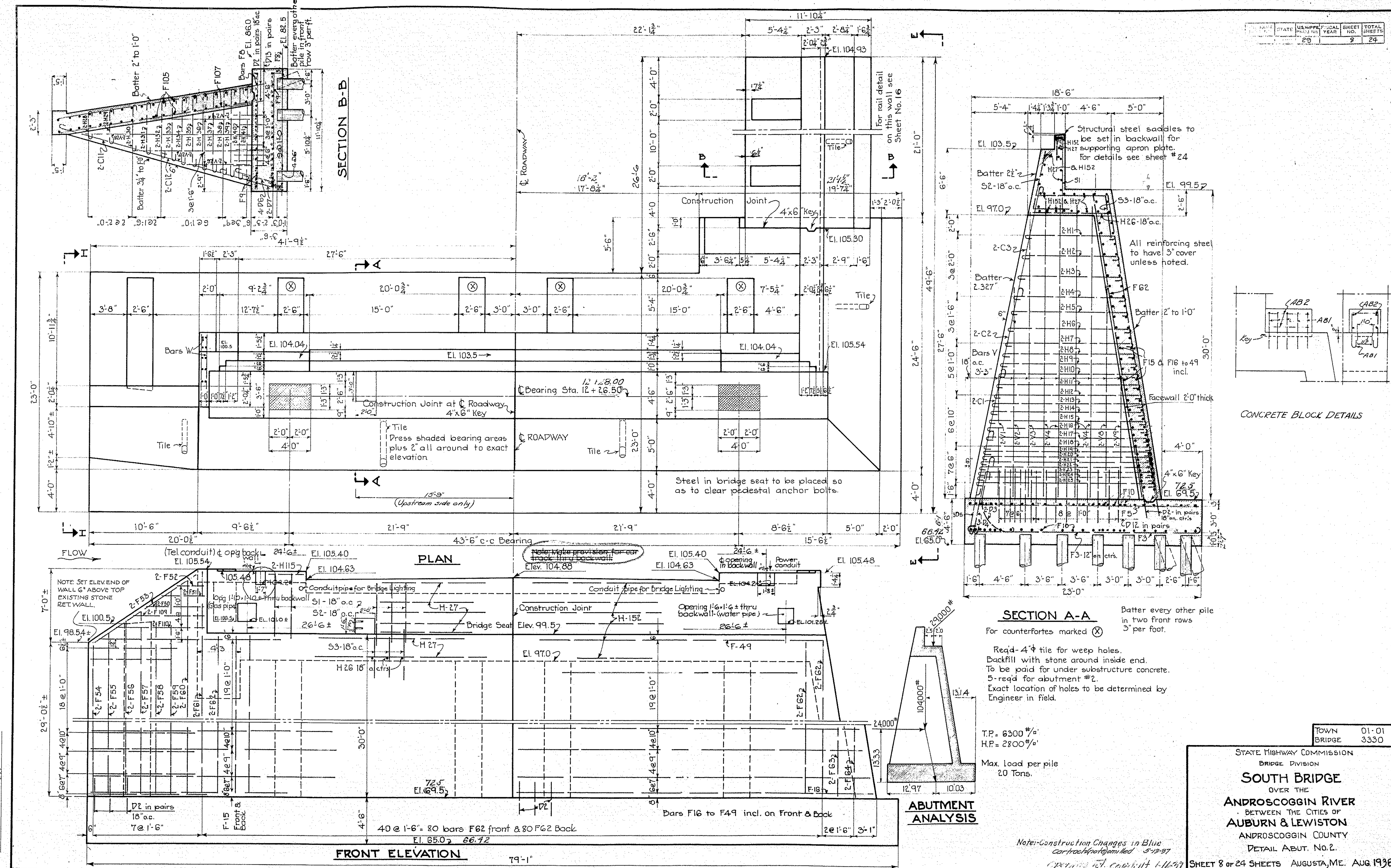
PROFILE Scales Hor. 1"=30'; Vertical 1"=10' (Profile of stream bed taken under down stream truss.) Note:- Construction Changes in ...

Surveyed by:- Spaulding
Plotted and traced by:- E.S.L.

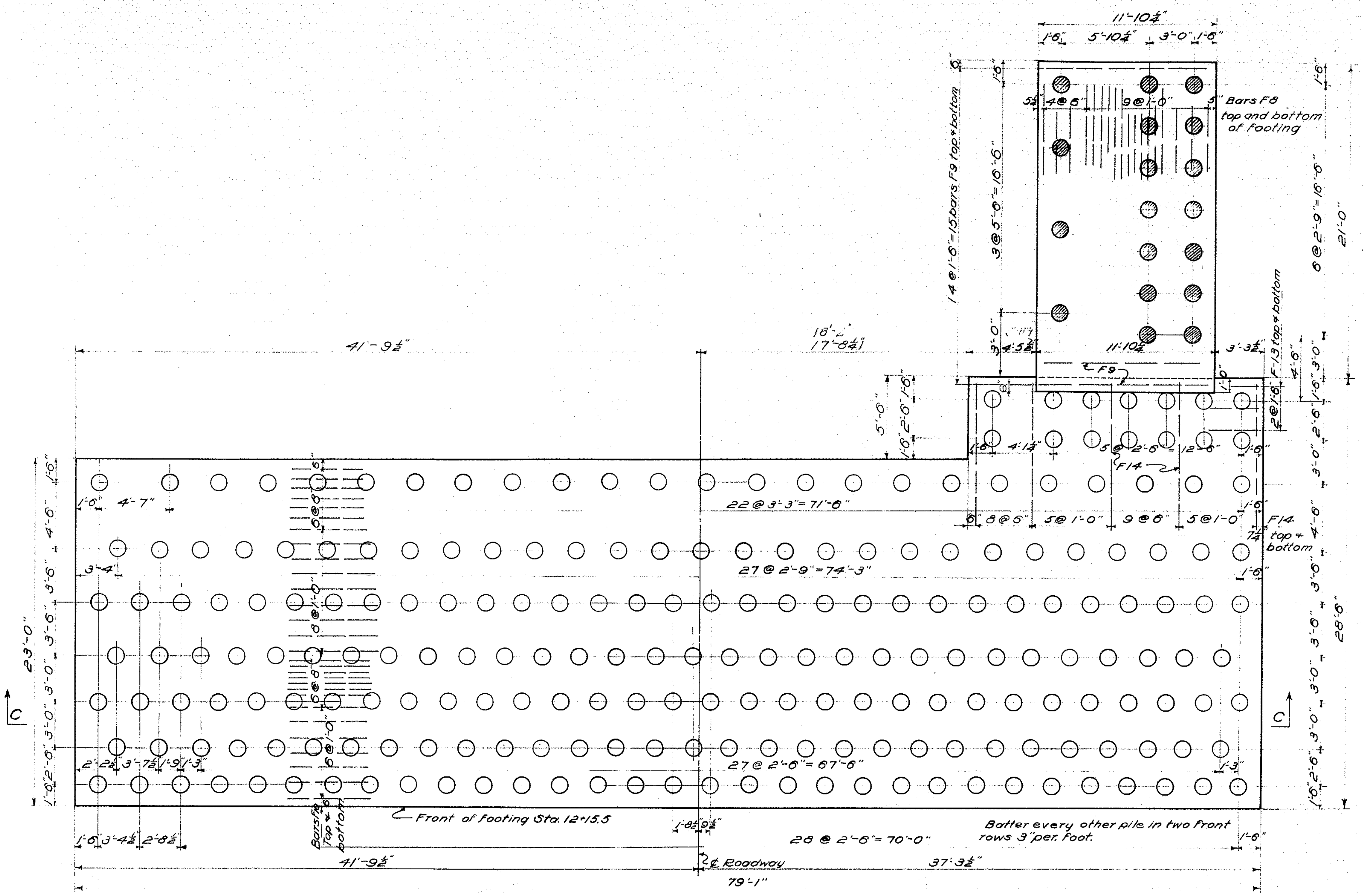
Town 01-01
Bridge: 3330

STATE HIGHWAY COMMISSION
BRIDGE DIVISION
SOUTH BRIDGE
over the
ANDROSCOGGIN RIVER
Between the Cities of
AUBURN & LEWISTON
ANDROSCOGGIN COUNTY
Survey
Sheet 3 of 24 Augusta, Maine July 1936

29-165


SECTION B-B
PLAN
FRONT ELEVATION
SECTION A-A
For counterfortes marked ⊗
ABUTMENT ANALYSIS
CONCRETE BLOCK DETAILS
Structural steel saddles to be set in backwall for supporting apron plate. For details see sheet #24
All reinforcing steel to have 3" cover unless noted.
Batter every other pile in two front rows 3" per foot.
Req'd - 4" φ tile for weep holes.
Backfill with stone around inside end.
To be paid for under substructure concrete.
5-req'd for abutment #2.
Exact location of holes to be determined by Engineer in field.
T.P. = 6300 #/□'
H.P. = 2800 #/□'
Max. load per pile 20 Tons.
Steel in bridge seat to be placed so as to clear pedestal anchor bolts.
Press shaded bearing areas plus 2" all around to exact elevation
Construction Joint at ℄ Roadway 4"x6" Key
℄ Bearing Sta. 12 + 26.50
℄ ROADWAY
For rail detail on this wall see Sheet No. 16
NOTE: SET ELEV. END OF WALL 6" ABOVE TOP EXISTING STONE RET. WALL.
Conduit pipe for Bridge Lighting
Bars F16 to F49 incl. on Front & Back
40 @ 1'-6" = 80 bars F62 front & 80 F62 Back
Note: Make provision for car track thru backwall
Note: Construction Changes in Blue
PLAN ~ VBF.
TRACED ~ Hamilton
CHECKED ~ C.L.P. FB
TOWN 01-01
BRIDGE 3330
STATE HIGHWAY COMMISSION
BRIDGE DIVISION
SOUTH BRIDGE
OVER THE
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
AUBURN & LEWISTON
ANDROSCOGGIN COUNTY
DETAIL ABUT. NO. 2.
SHEET 8 OF 24 SHEETS AUGUSTA, ME. AUG. 1936.
29-170

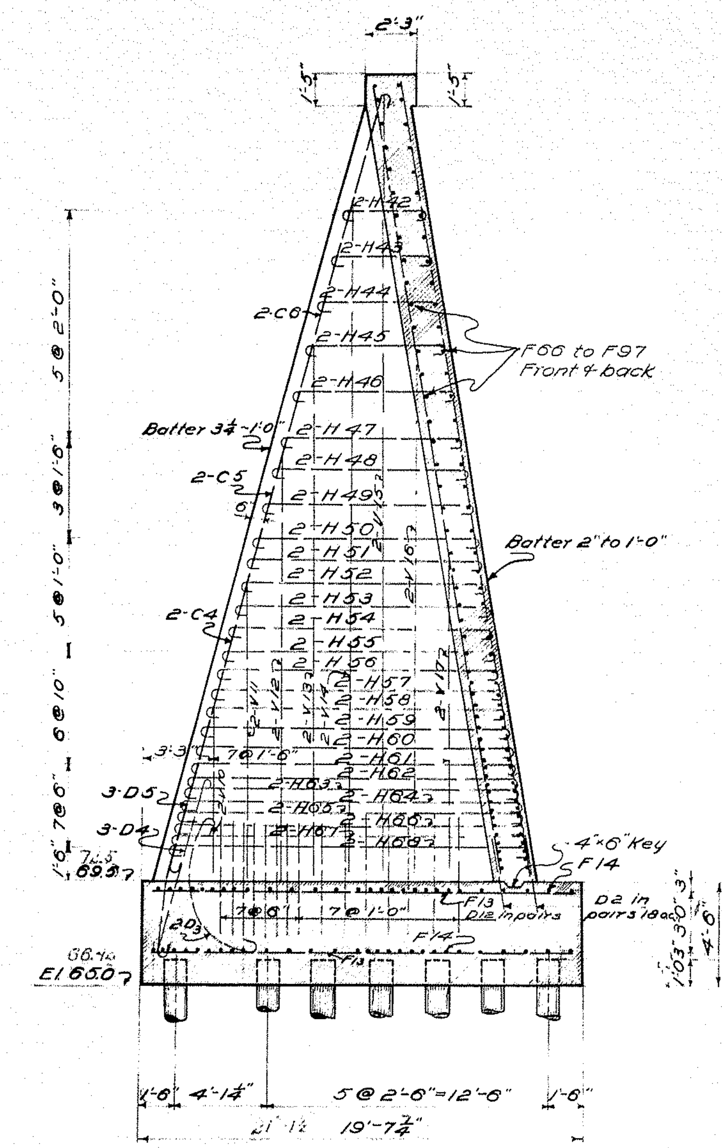
FED. ROAD DIV. NO.	STATE	U.S.W.P.F.R. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	MAINE	29		9	24



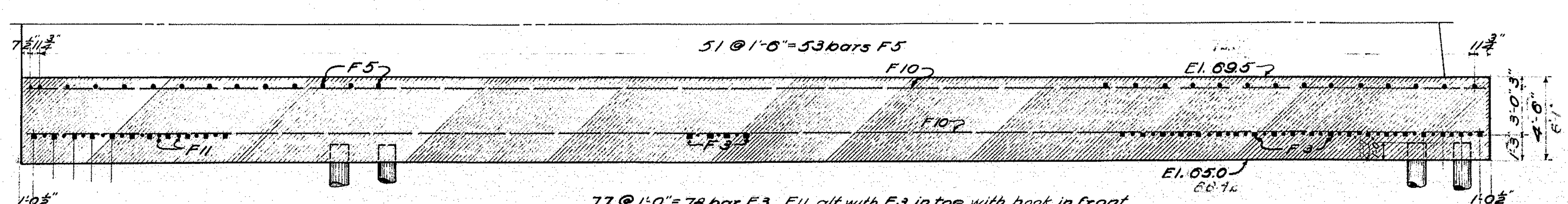
Piles shown cross hatched to be cut off at elev. 83.5. All other piles cut off at elev. ~~66.0~~ 69.0

Footing Layout and Pile Plan

Estimated length of piles 50'-0"
Req'd 237 piles



Section D.D. see sheet #10



Section C.C.

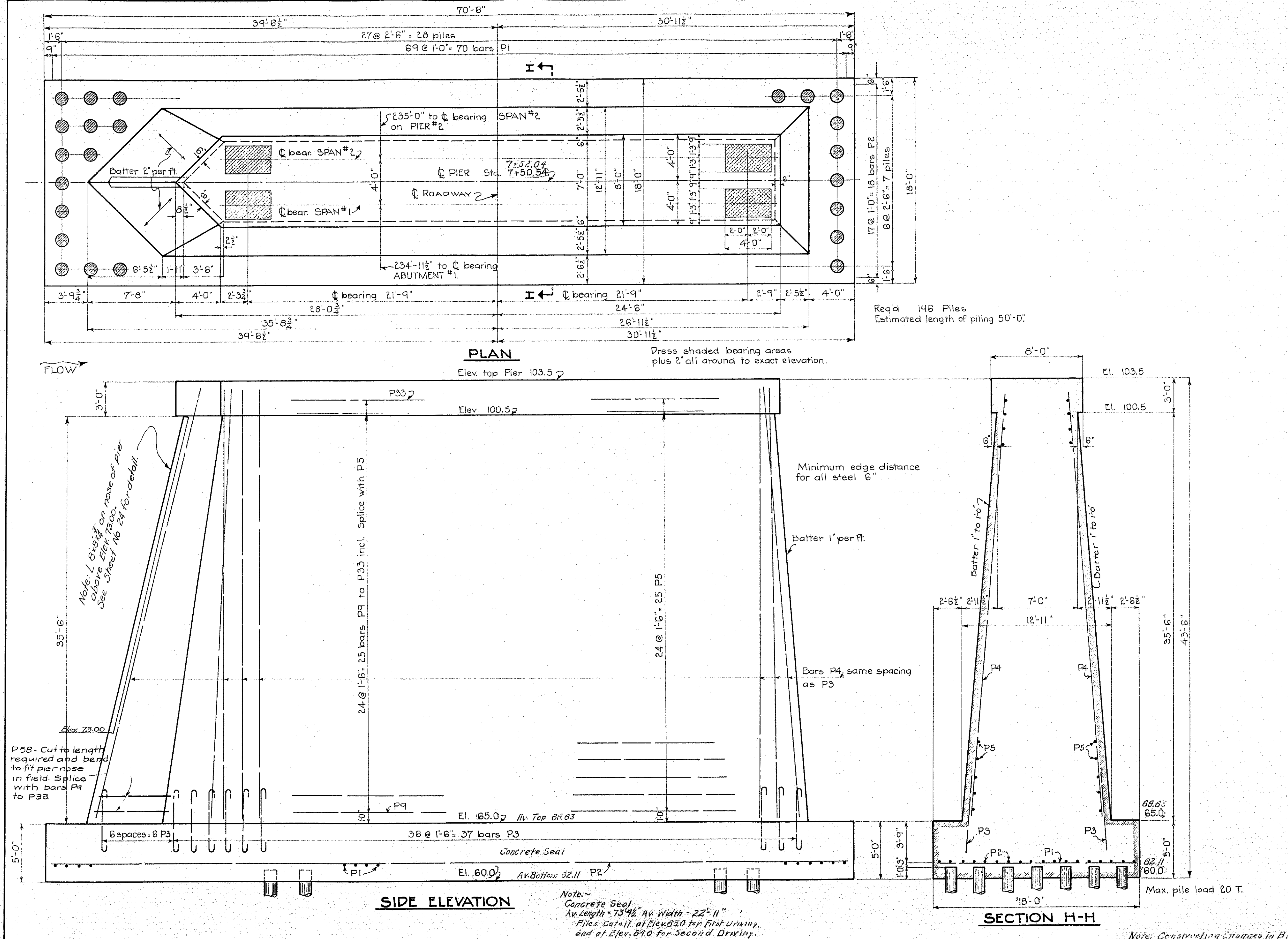
Plan – V.B.E.
Traced – Honan
Checked – E.B.

Note: Construction Changes in Blue

Town 01-01
Bridge 3330

State Highway Commission
Bridge Division
South Bridge
over the
Androscoggin River
between the cities of
Auburn & Lewiston
Androscoggin County
Abutment No. 2
Sheet 9 of 24 Sheets Augusta, Me. Aug. 1936

29-171



Note:~
Concrete Seal
Av. Length = 73'-9½" Av. Width = 22'-11"
Piles Cutoff at Elev. 83.0 for First Driving, and at Elev. 64.0 for Second Driving.

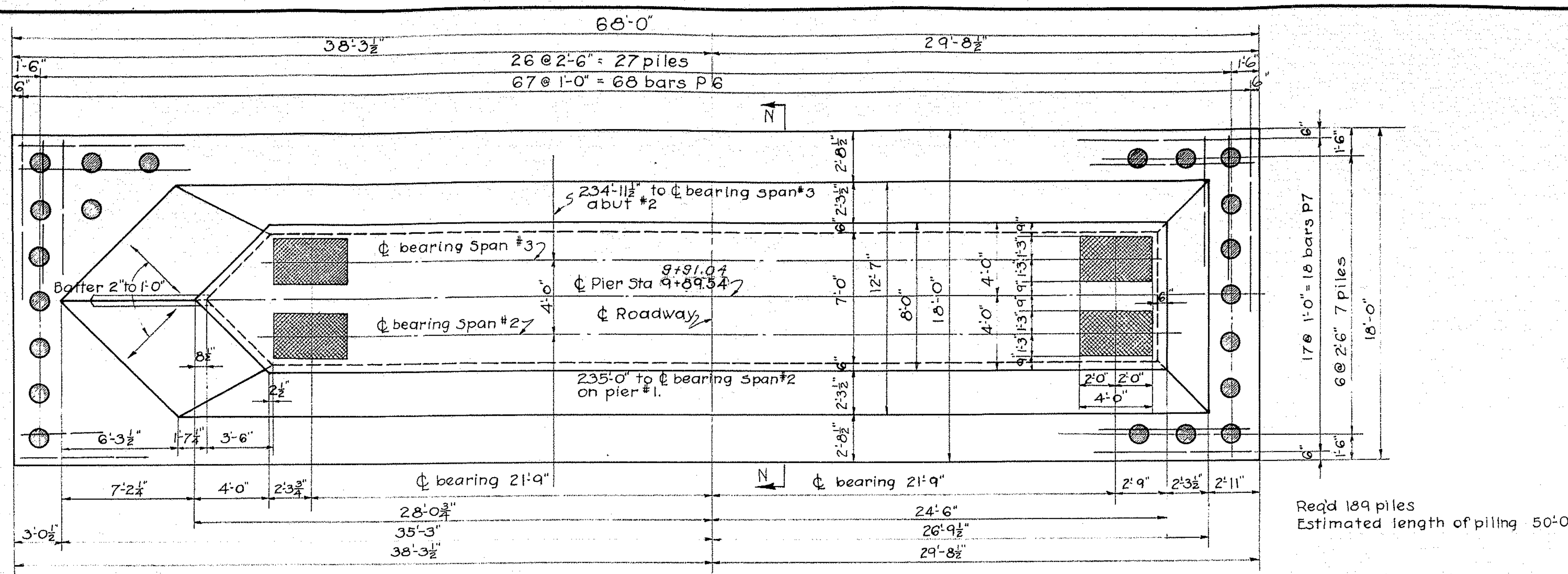
Note: Construction Changes in Blue.

TOWN	01-01
BRIDGE	3330

STATE HIGHWAY COMMISSION
BRIDGE DIVISION
SOUTH BRIDGE
OVER THE
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
AUBURN & LEWISTON
ANDROSCOGGIN COUNTY
DETAIL PIER No. 1.
SHEET 11 OF 24 SHEETS AUGUSTA, ME. AUG. 1936

PLAN ~ VBE
TRACED ~ Hamilton
CHECKED ~ E.B.

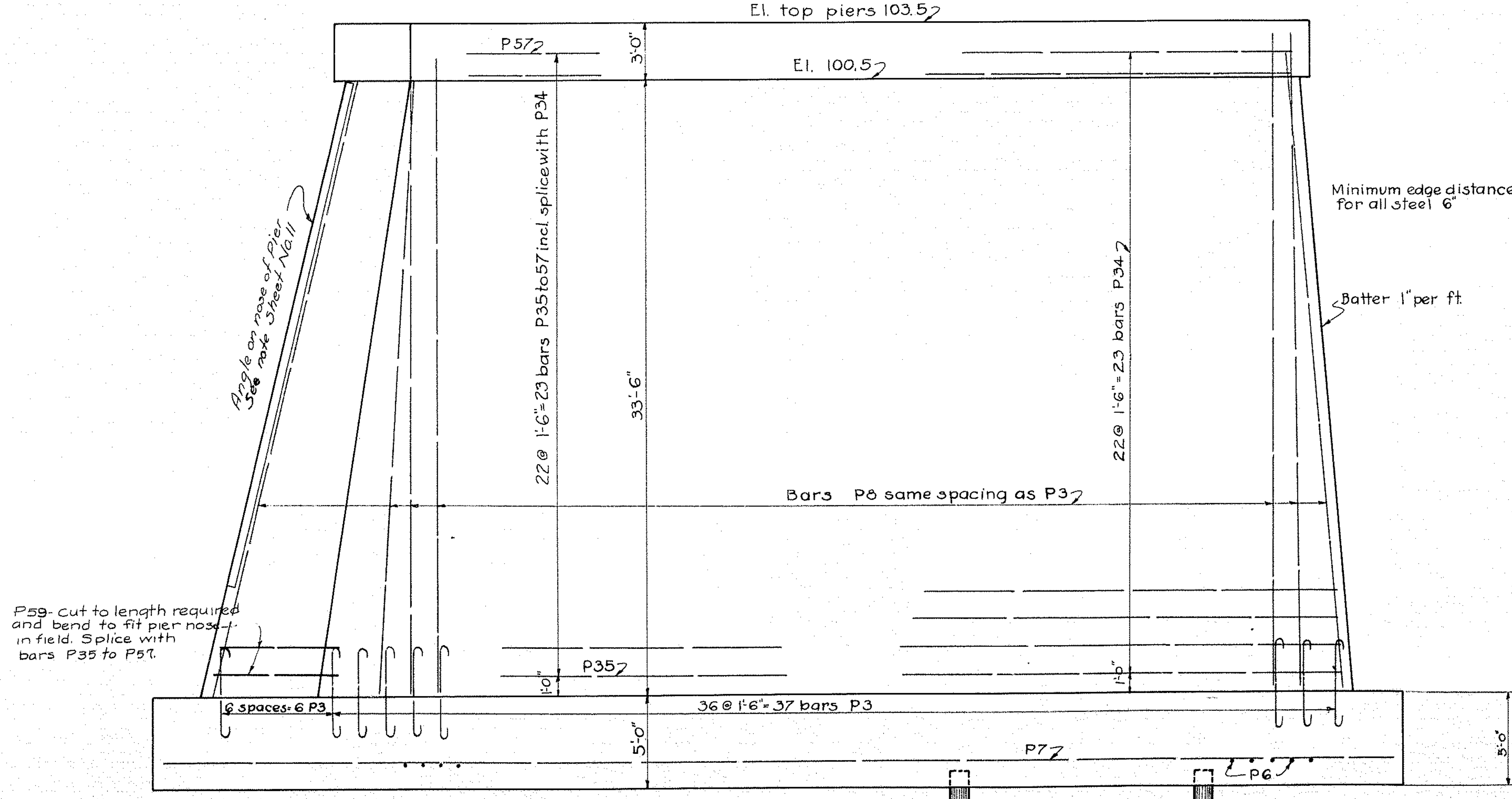
29-173



PLAN

Req'd 189 piles
Estimated length of piling 50'-0"

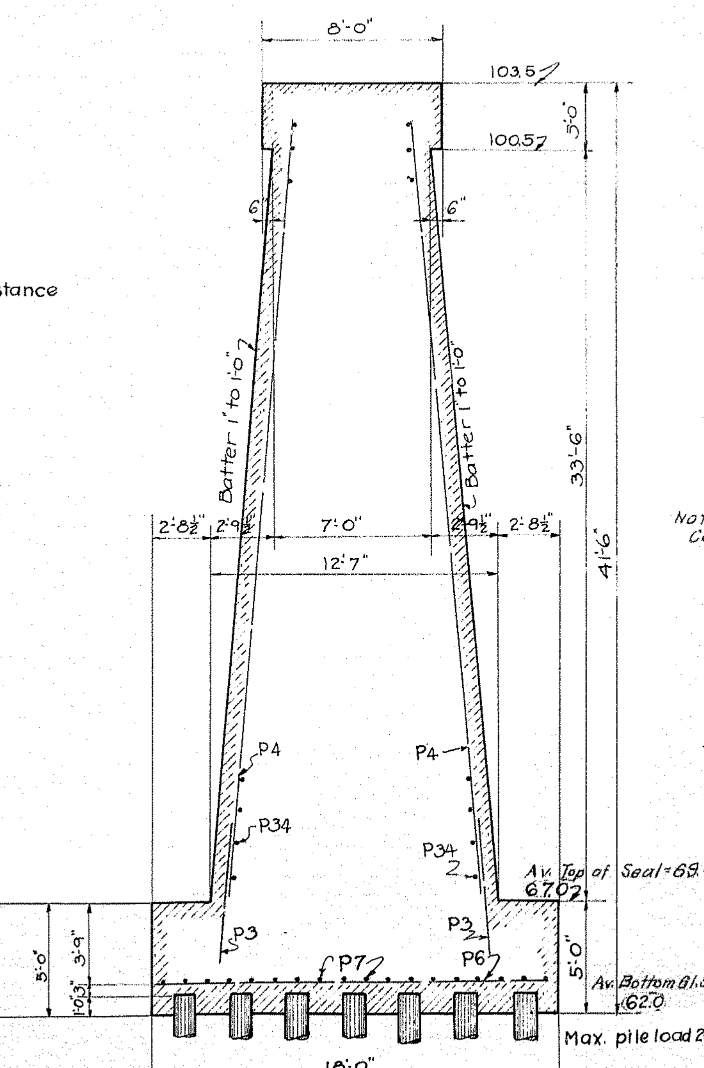
Dress shaded bearing areas plus 2" all around to exact elevation.



Minimum edge distance for all steel 6"

P59 - cut to length required and bend to fit pier nose in field. Splice with bars P35 to P57.

SIDE ELEVATION



SECTION N-N

Note:~ Concrete Seal at Pier No. 2
Av. Length - 74'-0" Av. Width = 23'-1"
Piles Cut off at Elev 63.5

Note:~ Construction Changes in Blue

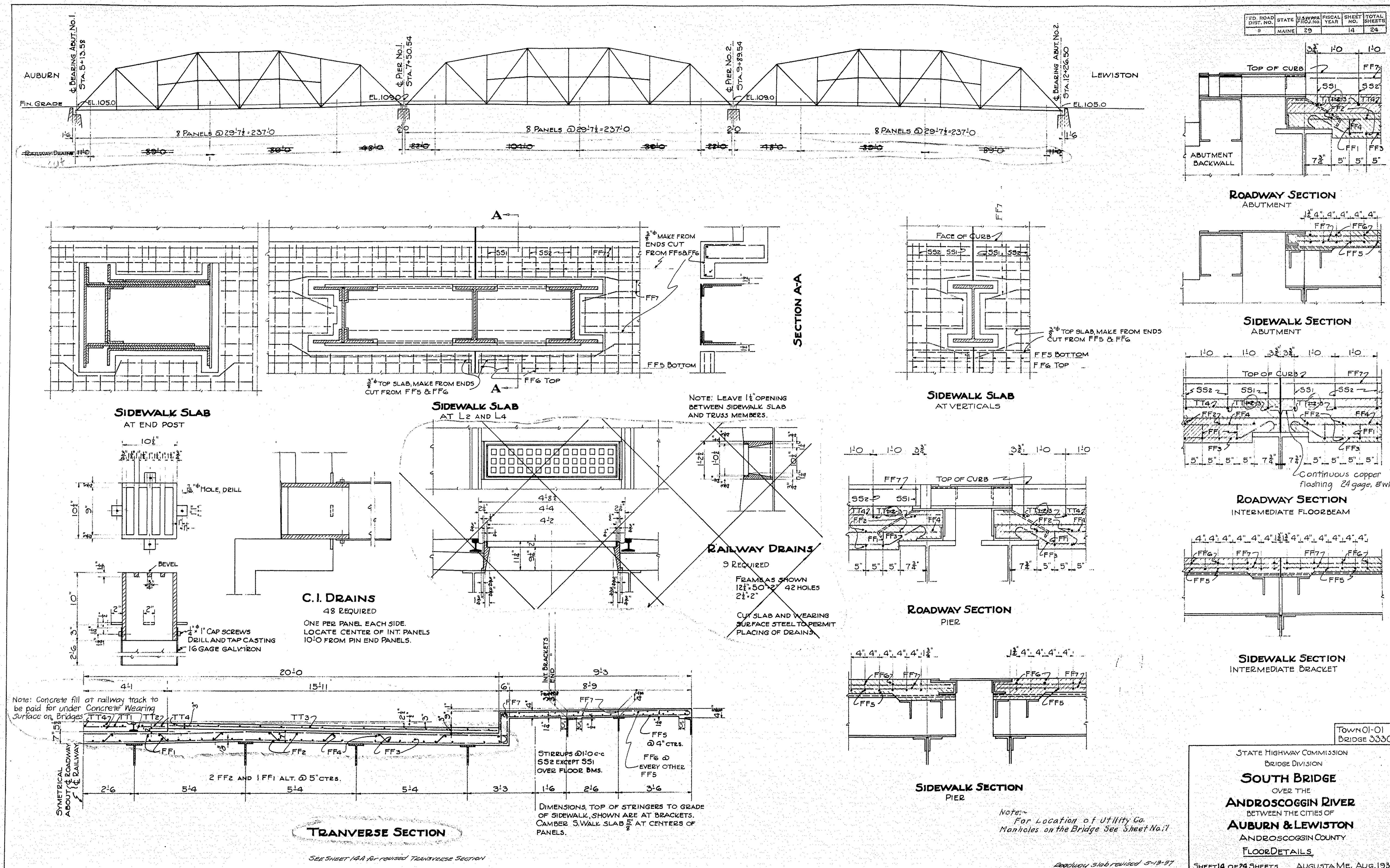
		U.S.W.P.A. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
			29	12	24

TOWN	01-01
BRIDGE	3330

STATE HIGHWAY COMMISSION
BRIDGE DIVISION
SOUTH BRIDGE
OVER THE
ANDROSCOGGIN RIVER
BETWEEN THE CITIES of
AUBURN & LEWISTON
ANDROSCOGGIN COUNTY
DETAIL PIER No. 2.
SHEET 12 OF 24 SHEETS AUGUSTA, ME. AUG 1936

PLAN ~ VBE
TRACED ~ Shout
CHECKED ~ E.B

29-174



TOWN 01-01
BRIDGE 3330

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

SOUTH BRIDGE
OVER THE
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
AUBURN & LEWISTON
ANDROSCOGGIN COUNTY

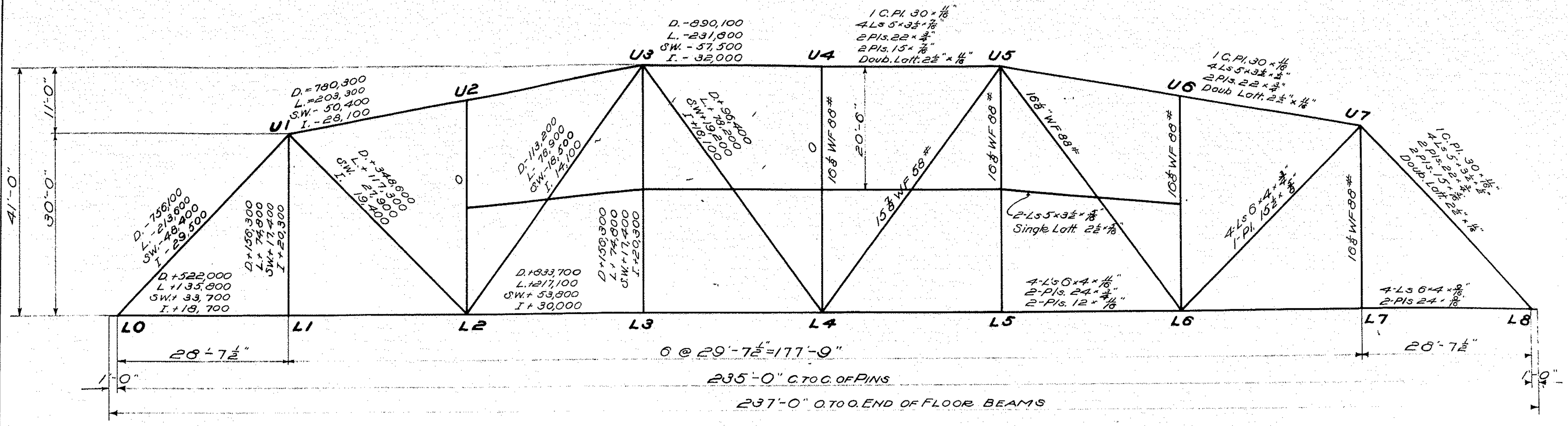
FLOOR DETAILS

SHEET 14 OF 24 SHEETS — AUGUSTA ME. AUG. 1936

29-176

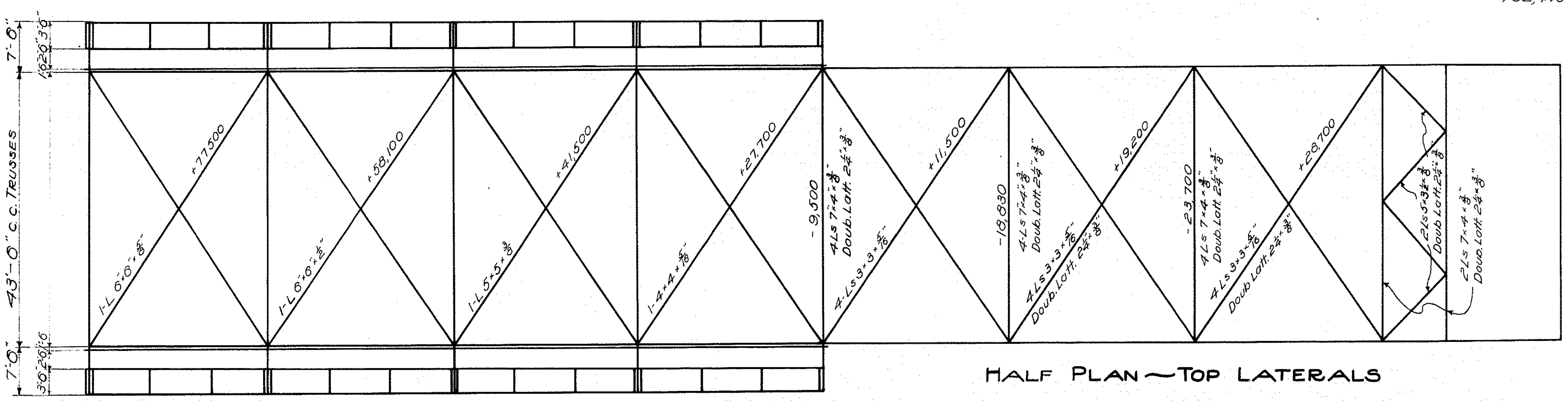
95 of 197

FED. ROAD DIST. NO.	STATE	U.S.W.P.E.R. PROJ.NO	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
8	MAINE	29		18	24



ELEVATION

Interior Sidewalk D.L.M. 234,995 in lbs.
L.L.M. 197,475 " "
432,470 in lbs Use 12" [35#



HALF PLAN ~ BOTTOM LATERALS

HALF PLAN ~ TOP LATERALS

STRINGERS

Exterior	D.L.M.	1,115,000 in lbs.	
	L.L.M.	1,456,800 " "	
	I.	472,000 " "	
		3,043,800	Use 23 7/8 W.F. 74#
Interior (Under El. R.R. Tracks R.R. Loading)	D.L.M.	1,113,700 in lbs.	
	R.R.M.	1,117,200 " "	
		362,000 " "	
		2,592,900 in lbs.	
(Truck Loading)	D.L.M.	1,113,700 in lbs.	
	L.L.M.	1,673,700 " "	
	I.	542,300 " "	
		3,329,700 " "	Use 24 W.F. 80#
Interior Roadway	D.L.M.	974,200 in lbs.	
	L.L.M.	1,725,500 " "	
	I.	559,100	
		3,258,800	Use 24 W.F. 80#
Exterior Sidewalk	D.L.M.	299,270 in lbs.	
	L.L.M.	197,475 "	
		496,745 " "	Use 12" [40#
Interior Sidewalk	D.L.M.	239,600 in lbs.	
	L.L.M.	394,950 " "	
		634,550 " "	Use 12 1/8 W.F. 32#

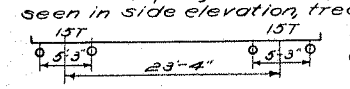
FLOOR BEAMS

Interior (R.R. + 2 Trucks)	D.L.M.	13,348,600 in lbs.	
	L.L.M.	9,829,700 " "	
	I.	2,675,700 " "	
		25,852,000 " "	Use 36 1/2 W.F. 280# (Silicon Steel)
(4 Lines H20 Trucks)	D.L.M.	13,348,600 in lbs.	
	L.L.M.	8,982,400 " "	
	I.	2,443,200 " "	
		24,774,200 " "	
End R.R. + 2 Trucks	D.L.M.	6,674,300 in lbs.	
	L.L.M.	9,829,700 " "	
	I.	2,673,700 " "	
		19,177,700 " "	Use 35 7/8 WF 230# (Silicon Steel)

LOADING

Floor System and Hangers ~ 4-20 Ton Trucks or 2-20 Ton Trucks and 30-Ton Electric Car, Using the Loading giving Greater Stress.
Trusses ~ uniform D.L. 5275#/ft., live moving load of 1109#/ft.
Concentration for moment 31,200#, concentration for shear 45067#
Sidewalk ~ $P = (40 + \frac{3000}{L})(\frac{55 - W}{50})$ P = load in lbs. per sq. ft., L = Loaded length in ft. W = width of sidewalk in ft.

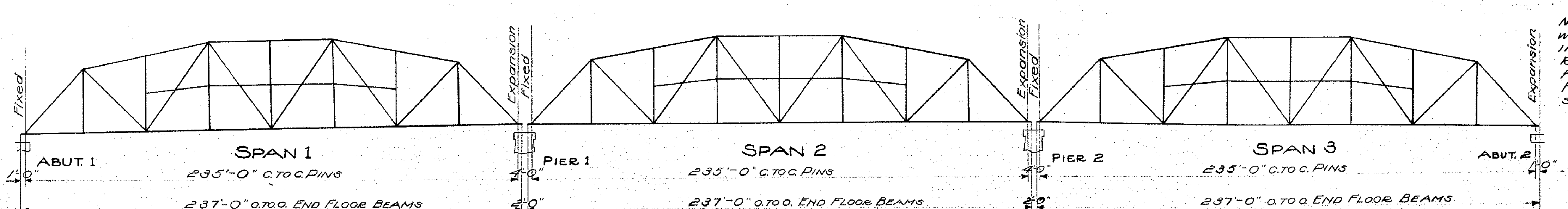
Impact ~ $I = \frac{50}{L + 125}$, where L = Loaded length in ft.
Lateral ~ Bottom system 30# per. sq. ft. on 1 1/2 x the area of the bridge as seen in side elevation + 300# per. lin ft.
~ Top system 50# per. sq. ft. on 1 1/2 x the area of the bridge as seen in side elevation, treated as a moving load.



30 TON CAR

Unit Stresses ~ Tension 18,000#/□" Carbon Steel Increase 40% Silicon Steel
Compression = $\frac{18,000}{1 + (\frac{1}{13,500})(\frac{L}{r})^2}$

NOTES: All details shall be made in accordance with MAINE STATE HIGHWAY COMMISSION SPECIFICATION FOR STEEL BRIDGES 1936
Rivets 7/8"φ for trusses, floor & bottom laterals, 3/4"φ for portals, sway frames & top laterals.
Field connections for main members to be sub-punched and reamed.



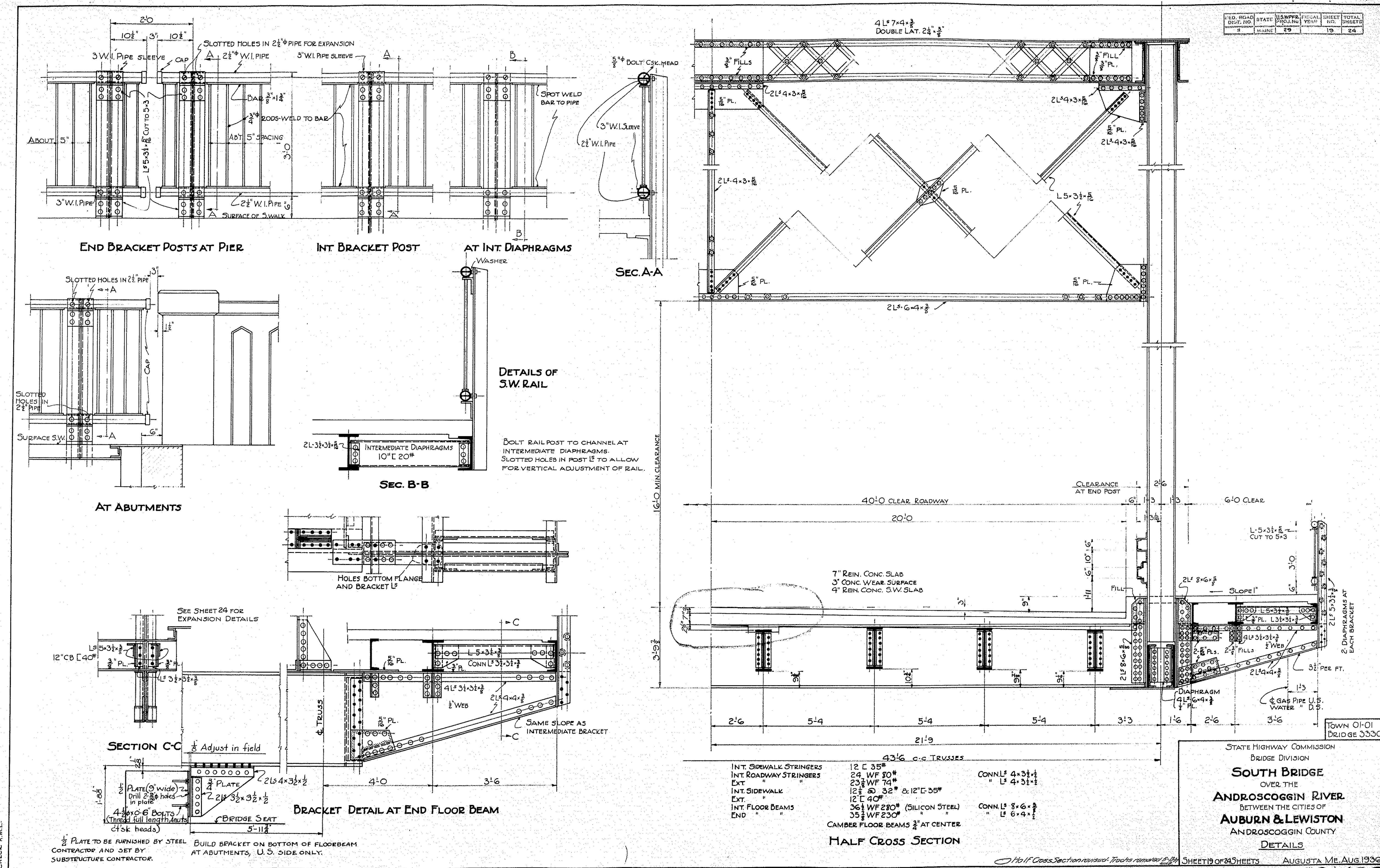
GENERAL ELEVATION

Design - C.L.P.
Plan - E.E.B.
Traced - T. Honan
Checked - R.M.L.

TOWN 01-01
BRIDGE 3330

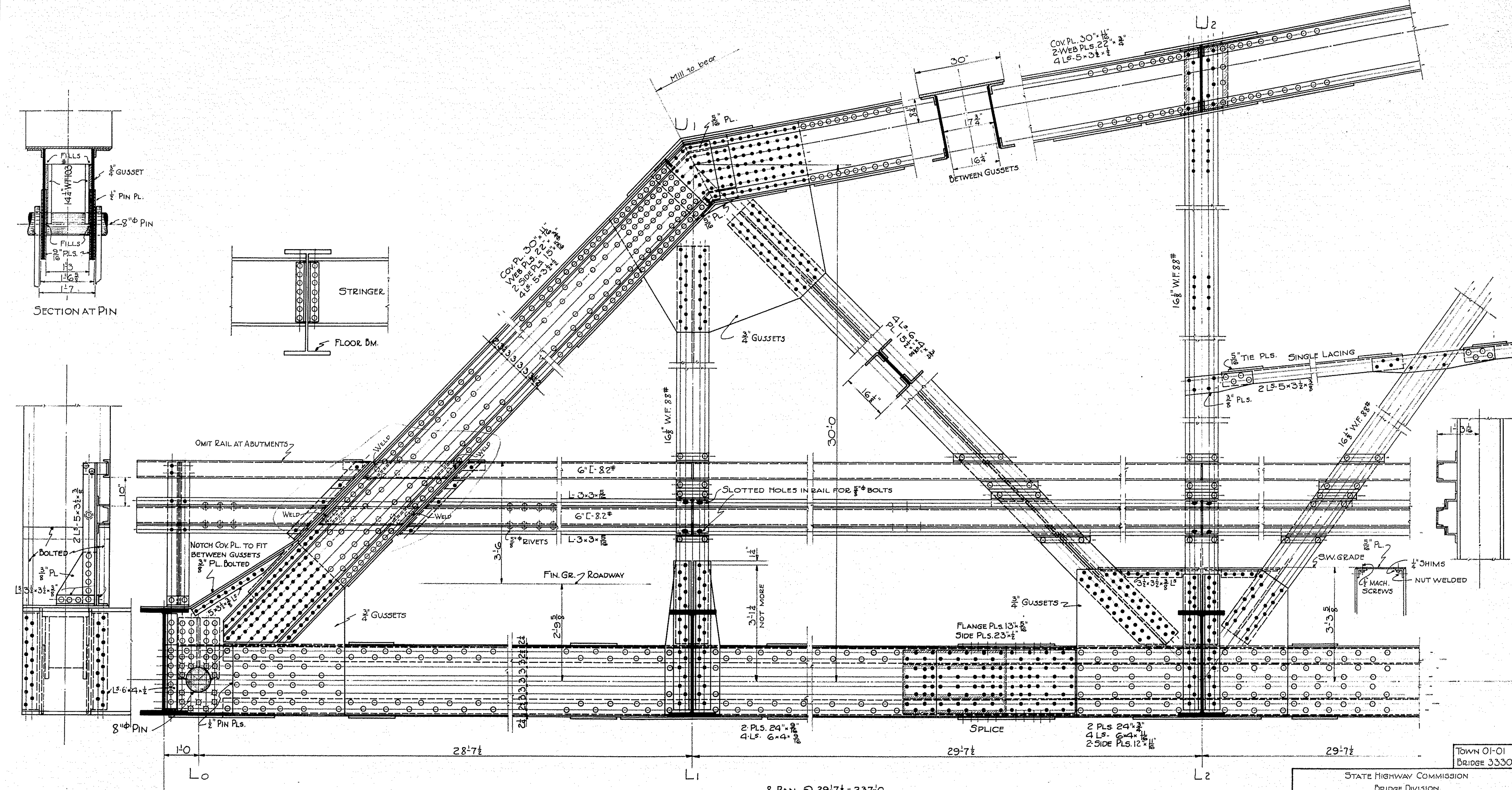
STATE HIGHWAY COMMISSION
BRIDGE DIVISION
SOUTH BRIDGE
OVER THE
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
AUBURN & LEWISTON
ANDROSCOGGIN COUNTY
STRESSES
SHEET 18 OF 24 SHEETS AUGUSTA ME. AUG. 1936.

29-181



FED. ROAD DIST. NO. | STATE | U.S.W.P.F.Z. PROJ. No. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS
MAINE | 29 | 19 | 24
END BRACKET POSTS AT PIER
INT BRACKET POST
AT INT. DIAPHRAGMS
SLOTTED HOLES IN 2½" PIPE FOR EXPANSION
3" W.I. PIPE SLEEVE
CAP
2½" W.I. PIPE
SPOT WELD BAR TO PIPE
BAR ⅜" × 1¼"
¾" RODS-WELD TO BAR
ABT. 5" SPACING
ABOUT 5"
SURFACE OF S.WALK
SEC. A-A
⅝" BOLT CSK. HEAD
3" W.I. SLEEVE
2½" W.I. PIPE
WASHER
DETAILS OF S.W. RAIL
INTERMEDIATE DIAPHRAGMS 10" [20#
SEC. B-B
BOLT RAIL POST TO CHANNEL AT INTERMEDIATE DIAPHRAGMS. SLOTTED HOLES IN POST Ls TO ALLOW FOR VERTICAL ADJUSTMENT OF RAIL.
AT ABUTMENTS
SLOTTED HOLES IN 2½" PIPE
SURFACE S.W.
HOLES BOTTOM FLANGE AND BRACKET Ls
SEE SHEET 24 FOR EXPANSION DETAILS
SECTION C-C
⅛" Adjust in field
BRACKET DETAIL AT END FLOOR BEAM
SAME SLOPE AS INTERMEDIATE BRACKET
¢ TRUSS
BRIDGE SEAT
½" PLATE TO BE FURNISHED BY STEEL CONTRACTOR AND SET BY SUBSTRUCTURE CONTRACTOR.
BUILD BRACKET ON BOTTOM OF FLOORBEAM AT ABUTMENTS, U.S. SIDE ONLY.
4 Ls 7×4×⅜ DOUBLE LAT. 2¼"×⅜"
16'-0 MIN. CLEARANCE
40'-0 CLEAR ROADWAY
20'-0
CLEARANCE AT END POST
6'-0 CLEAR
7" REIN. CONC. SLAB
3" CONC. WEAR. SURFACE
4" REIN. CONC. S.W. SLAB
2 DIAPHRAGMS AT EACH BRACKET
¢ GAS PIPE U.S.
WATER " D.S.
21'-9
43'-6 C-C TRUSSES
INT. SIDEWALK STRINGERS 12 [35#
INT. ROADWAY STRINGERS 24 WF 80#
EXT " " 23¾ WF 74#
INT. SIDEWALK 12½ @ 32# & 12" [35#
EXT. " 12 [40#
INT. FLOOR BEAMS 36½ WF 280# (SILICON STEEL)
END " " 35½ WF 230# " "
CONN. Ls 4×3½×½
CONN. Ls 8×6×⅝
CAMBER FLOOR BEAMS ⅜" AT CENTER
HALF CROSS SECTION
Half Cross Section revised - Tracks removed
TOWN 01-01
BRIDGE 3330
STATE HIGHWAY COMMISSION
BRIDGE DIVISION
SOUTH BRIDGE
OVER THE
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
AUBURN & LEWISTON
ANDROSCOGGIN COUNTY
DETAILS
SHEET 19 OF 24 SHEETS
AUGUSTA ME. AUG. 1936.
PLAN E.B.
TRACED I.B.
CHECK R.M.L.
29-182

F.D. ROAD DIST. NO.	STATE	U.S.W.P.R. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	MAINE	29		20	24



Town 01-01
Bridge 3330

State Highway Commission
Bridge Division

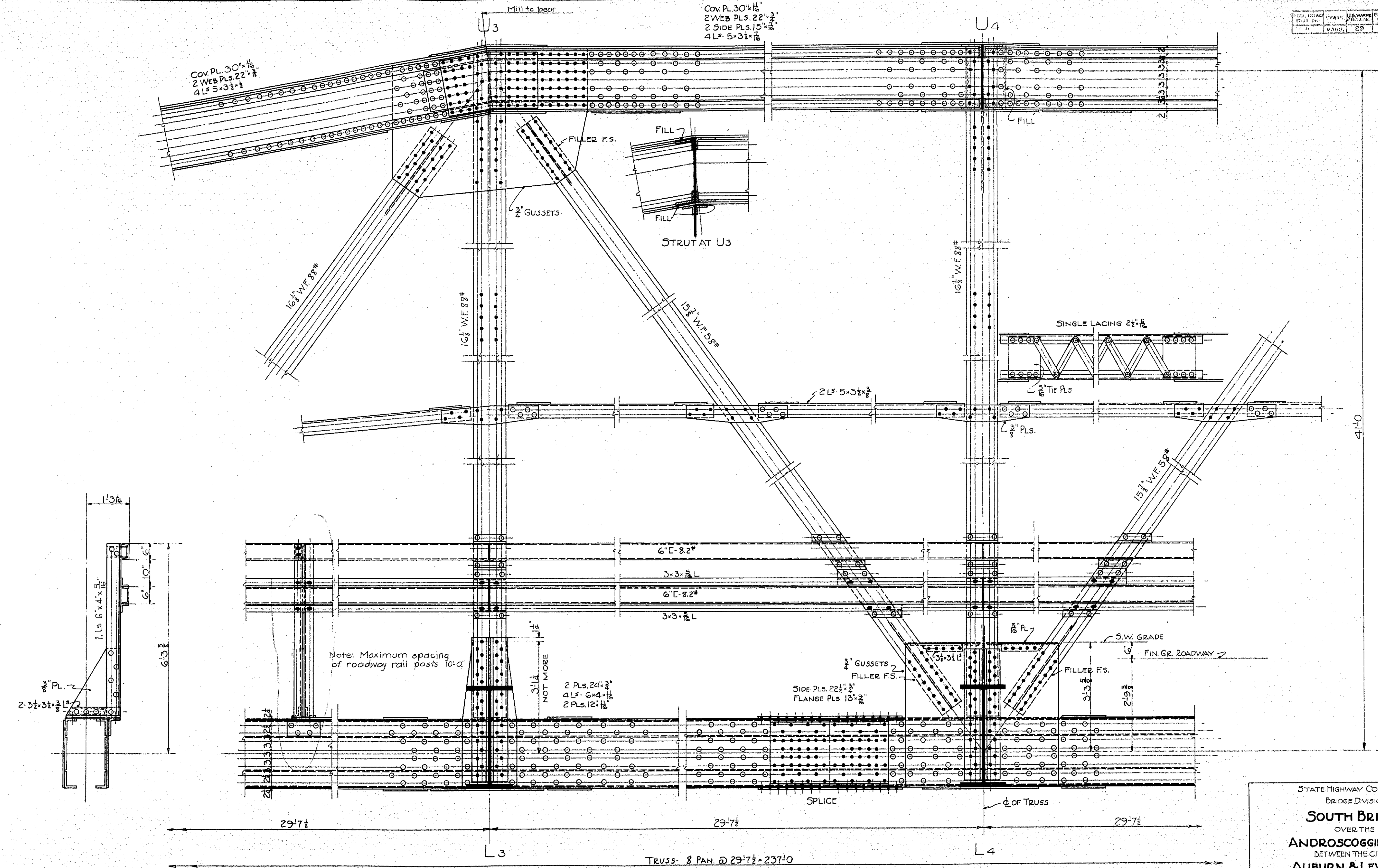
South Bridge
over the
Androscoggin River
between the cities of
Auburn & Lewiston
Androscoggin County
Truss

Sheet 20 of 24 Sheets
Augusta Me. Aug. 1936

Design C.L.P.
Plan I.R.
Traced I.R.
Check R.M.L.

29-183

FED. ROAD DIST. NO.	STATE	U.S.WPFB PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	MAINE	29		21	24



Town 01-01
Bridge 3330

State Highway Commission
Bridge Division

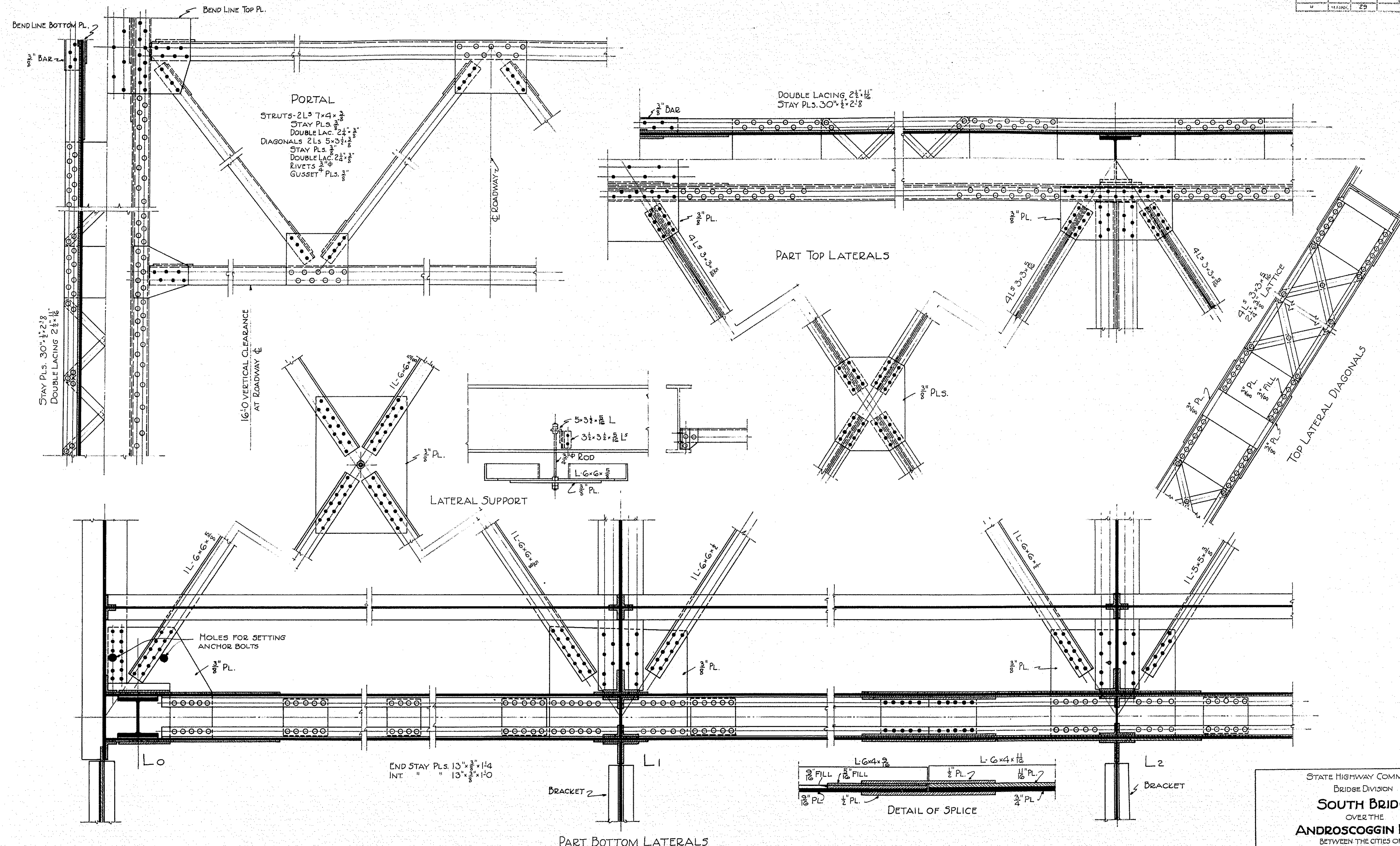
South Bridge
over the
Androscoggin River
between the cities of
Auburn & Lewiston
Androscoggin County

Truss

Sheet 21 of 24 Sheets   Augusta Me. Aug. 1936

Design C.L.P.
Plan I.R.
Traced I.R.
Check R.M.L.

29-184



Fed. Road Dist. No.	State	U.S. Proj. No.	Fiscal Year	Sheet No.	Total Sheets
4	Maine	29		22	24

Town 01-01
Bridge 3330

State Highway Commission
Bridge Division

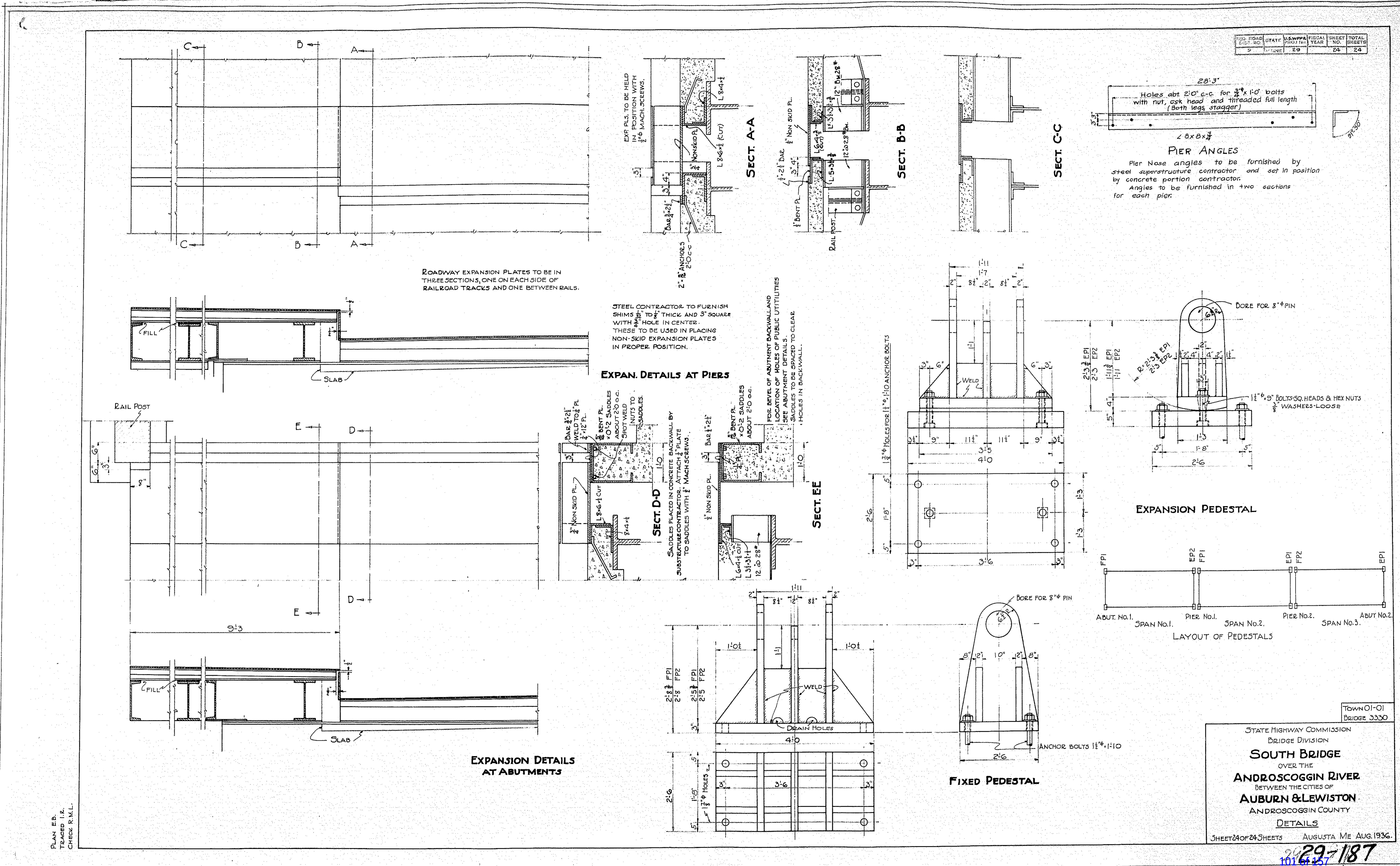
South Bridge
over the
Androscoggin River
between the cities of
Auburn & Lewiston
Androscoggin County

Laterals

Sheet 22 of 24 Sheets — Augusta Me Aug. 1936.

Design C.L.P.
Plan I.R.
Traced I.R.
Check R.M.L.

29-185



SECT. A-A
SECT. B-B
SECT. C-C
EXP. PLS. TO BE HELD IN POSITION WITH 1/2"φ MACH. SCREWS.
ROADWAY EXPANSION PLATES TO BE IN THREE SECTIONS, ONE ON EACH SIDE OF RAILROAD TRACKS AND ONE BETWEEN RAILS.
STEEL CONTRACTOR TO FURNISH SHIMS 1/32" TO 1/8" THICK AND 3" SQUARE WITH 3/4"φ HOLE IN CENTER. THESE TO BE USED IN PLACING NON-SKID EXPANSION PLATES IN PROPER POSITION.
EXPAN. DETAILS AT PIERS
FILL
SLAB
RAIL POST
SECT. D-D
SECT. E-E
SADDLES PLACED IN CONCRETE BACKWALL BY SUBSTRUCTURE CONTRACTOR. ATTACH 1/4" PLATE TO SADDLES WITH 1/2" MACH. SCREWS.
FOR LEVEL OF ABUTMENT BACKWALL AND LOCATION OF HOLES OF PUBLIC UTILITIES SEE ABUTMENT DETAILS. SADDLES TO BE SPACED TO CLEAR HOLES IN BACKWALL.
EXPANSION DETAILS AT ABUTMENTS
PIER ANGLES
Holes abt 2'0" c-c for 3/4"φ x 1'-0" bolts with nut, csk head and threaded full length (Both legs stagger)
Pier Nose angles to be furnished by steel superstructure contractor and set in position by concrete portion contractor. Angles to be furnished in two sections for each pier.
BORE FOR 8"φ PIN
1 1/2"φ x 9" BOLTS-SQ. HEADS & HEX NUTS WASHERS-LOOSE
EXPANSION PEDESTAL
1 1/2"φ HOLES FOR 1 1/2"φ x 1'-10 ANCHOR BOLTS
WELD
DRAIN HOLES
ANCHOR BOLTS 1 1/2"φ x 1'-10
FIXED PEDESTAL
ABUT. NO.1.
SPAN NO.1.
PIER NO.1.
SPAN NO.2.
PIER NO.2.
SPAN NO.3.
ABUT. NO.2.
LAYOUT OF PEDESTALS
TOWN 01-01
BRIDGE 3330
STATE HIGHWAY COMMISSION
BRIDGE DIVISION
SOUTH BRIDGE
OVER THE
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
AUBURN & LEWISTON
ANDROSCOGGIN COUNTY
DETAILS
SHEET 24 OF 24 SHEETS
AUGUSTA ME AUG. 1936.
PLAN E.B.
TRACED I.R.
CHECK R.M.L.
29-187

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(2)X	1	19

LEWISTON/AUBURN

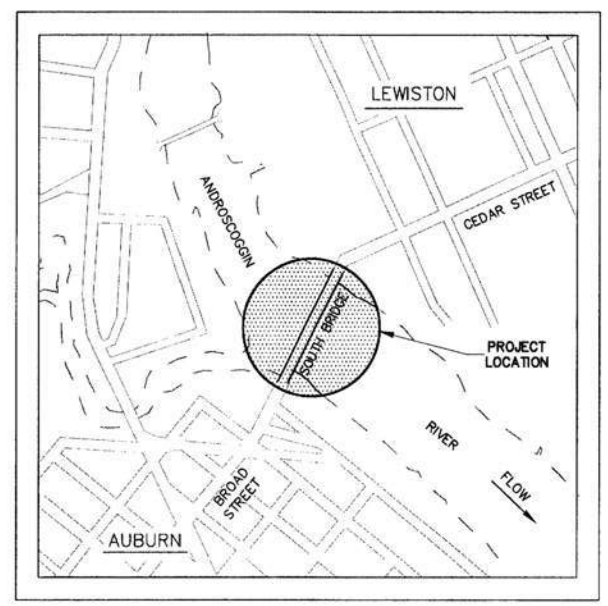
Div. 7

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

SOUTH BRIDGE
OVER THE
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON & AUBURN
ANDROSCOGGIN COUNTY
PROJECT NO. BH-0205(2)X
PROJECT LENGTH 0.147 MILE

QUANTITIES

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
202.10	REM EXIST SUPERSTRS PROP CONTR (1800 CY)	1	LS
202.17	REMOVING EXISTING STRUCTURAL CONCRETE (15 CY)	1	LS
202.203	PAVEMENT BUTT JOINTS	270	SY
202.127	REMOVING EXISTING BITUMINOUS PAVEMENT	1	LS
403.10	HOT BITUMINOUS PAVEMENT, GRADING D	530	T
409.15	BITUMINOUS TACK COAT APPLIED	70	G
502.26	STR CONC RD & SW SLAB ON ST BR	1	LS
502.4711	SILICA FUME ADDITIVE (1500 lb)	1	LS
502.621	SUBSTRUCTURE REPAIR	1	LS
503.12	REINFORCING STEEL, FABRICATION AND DELIVER	222,100	LB
503.13	REINFORCING STEEL, PLACING	222,100	LB
505.08	SHEAR CONNECTORS (13827 EA)	1	LS
506.17	SURFACE PREPARATION OF EXISTING STRUCTURAL STEEL	1	LS
506.172	FIELD PAINT EXISTING STRUCTURAL STEEL ZHP-1	1	LS
506.18	CONTAINMENT AND POLLUTION CONTROL	1	LS
508.13	MEMBRANE WATERPROOFING (3200 SY)	1	LS
514.06	CURING BOX FOR CONCRETE CYLINDERS	1	EA
515.21	PROTECTIVE COAT FOR CONC SURFACES	1	LS
520.21	EXPANSION DEVICE – GLAND SEAL	3	EA
520.22	EXPANSION DEVICE – COMPRESSION SEAL	1	EA
526.301	TEMPORARY CONCRETE BARRIER, TYPE 1	1	LS
608.08	Reinforced Concrete Sidewalk	50	SY
609.19	Vertical Curb Type II	48	LF
627.71	4 Inch WHITE PAVEMENT MARKING LINE	3400	LF
627.73	4 Inch YELLOW PAVEMENT MARKING LINE	1600	LF
627.77	REMOVING PAVEMENT MARKING	4000	SF
627.78	TEMPORARY 4" PAVEMENT MARKING LINE	6000	LF
639.22	TESTING FACILITIES BITUMINOUS MIXES	1	LS
639.23	TESTING FACILITIES CONCRETE	1	LS
652.31	TYPE I BARRICADE	10	EA
652.312	TYPE III BARRICADE	4	EA
652.33	DRUM	10	EA
652.34	CONE	20	EA
652.35	CONSTRUCTION SIGNS	400	SF
652.361	MAINTENANCE OF TRAFFIC CONTROL DEVICES	1	LS
652.38	FLAGGER	1000	MH
659.10	MOBILIZATION	1	LS
527.32	Portable Crash Barrel	8	Ea
627.79	Temporary 4" Plastic Line	600	LF
652.311	Type II Barricade	20	Ea
660.21	ON-THE-JOB TRAINING (BID)	1,000	MH



NO SCALE

INDEX OF SHEETS

SPECIFICATIONS

DESIGN: AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 1992, AND INTERIM SPECIFICATIONS THRU 1993.

CONTRACT: STATE OF MAINE, DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS, HIGHWAYS AND BRIDGES, REVISION OF 1990. HIGHWAYS AND BRIDGES, REVISION OF 1995.

MATERIALS

NEW
CONCRETE: CLASS "A" (f'c = 4000 PSI)
REINFORCING STEEL: ASTM A615, GRADE 60 (fy = 60,000 PSI)
STRUCTURAL STEEL fy = 36,000 PSI
POST TENSION STRAND – 1/2"ø fy = 270,000 PSI

EXISTING
STRUCTURAL STEEL: CARBON STEEL –TENSION = 18,000 PSI

DESIGN LOADING

EXISTING FLOOR BEAMS AND STRINGERS: HS 20

TRAFFIC DATA

1994 AADT	18,090
2014 AADT	25,330
D.H.V.	2,533
T%	4
D%	3
DIRECTIONAL DIST.	60
18K EQUIV. P2.0	257
18K EQUIV. P2.5	252

SCOPE OF WORK

REMOVE AND REPLACE EXISTING BITUMINOUS WEARING SURFACE WITH A NEW MEMBRANE AND BITUMINOUS WEARING SURFACE

REMOVE AND REPLACE CONCRETE DECK

REPLACE BRIDGE JOINTS

SELECTIVE PAINTING OF NEEDLE AND FLOOR BMS

PAVE APPROACHES TO MATCH BRIDGE PROFILE

REINFORCE CONCRETE PIER CAPS

NOTE
ALL WORK CONTEMPLATED UNDER THIS CONTRACT TO BE GOVERNED BY AND IN CONFORMITY WITH THE STANDARD SPECIFICATIONS (REVISION OF APRIL 1995) AND SUPPLEMENTALS THERETO AS MODIFIED ON THE PLANS AND IN THE SPECIAL PROVISIONS.

STATE OF MAINE REGISTERED PROFESSIONAL ENGINEER THEODORE H. KARASOPOULOS 1935

APPROVED:

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

COMMISSIONER — DATE 3-6-96

CHIEF ENGINEER — DATE 3-6-96

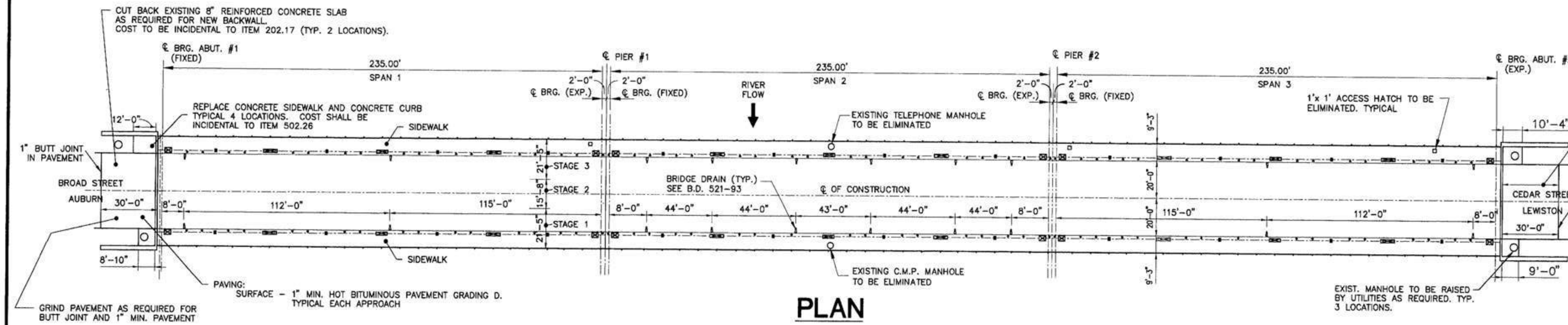
UNITED STATES
DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION 1
APPROVED:

DIVISION ADMINISTRATOR — DATE

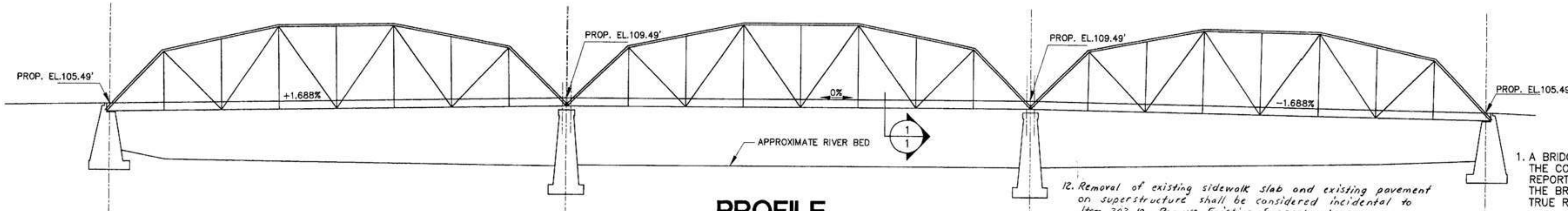
PLANS		BY	DATE
PROJECT DESIGN ENGINEER			
DESIGN-DETAILED		AR	2/26/96
CHECKED		TCH	3/1/96
REVISIONS			
FIELD CHANGES			

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(2)X	2	19

LEWISTON/AUBURN



PLAN



PROFILE

(ELEVATIONS AT CONSTRUCTION ℄)

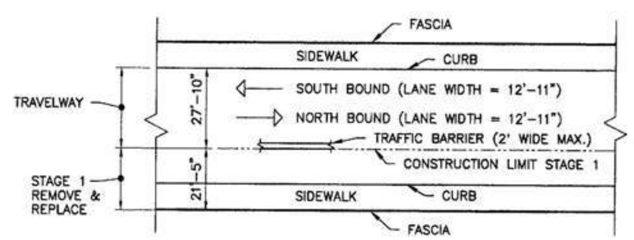
12. *Removal of existing sidewalk slab and existing pavement on superstructure shall be considered incidental to Item 202.10, Remove Existing Superstructure.*

13. *Removal and disposal of existing curb shall be considered incidental to Item 609.19, Vertical Curb, Type II.*

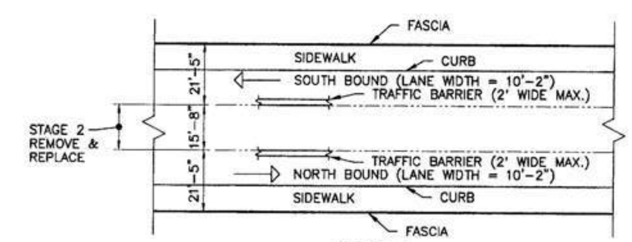
14. *Removal and disposal of existing sidewalk and placing Aggregate Subbase Course - Gravel shall be considered incidental to 608.08, Reinforced Concrete Sidewalk.*

GENERAL CONSTRUCTION NOTES

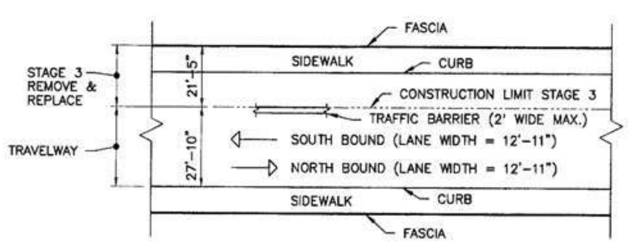
1. A BRIDGE DECK EVALUATION REPORT OF THE EXISTING BRIDGE IS AVAILABLE FOR THE CONTRACTOR'S REFERENCE AT THE BRIDGE DESIGN OFFICE IN AUGUSTA. THE REPORT CONTAINS VISUAL INSPECTION INFORMATION AND DECK CORE DATA OF THE BRIDGE. THERE IS NO ASSURANCE THAT THE INFORMATION OR DATA IS A TRUE REPRESENTATION OF THE CONDITIONS OF THE ENTIRE DECK.
2. PLANS OF THE EXISTING BRIDGE ARE AVAILABLE FOR THE CONTRACTOR'S REFERENCE AT THE BRIDGE DESIGN OFFICE IN AUGUSTA. THE PLANS ARE REPRODUCTIONS OF THE ORIGINAL DRAWINGS AS PREPARED FOR THE CONSTRUCTION OF THE BRIDGE AND IT IS VERY UNLIKELY THAT THE PLANS WILL SHOW ANY CONSTRUCTION FIELD CHANGES OR ANY ALTERATIONS WHICH MAY HAVE BEEN MADE TO THE BRIDGE DURING ITS LIFE SPAN.
3. ANY DAMAGE TO EXISTING STRUCTURAL STEEL, INCLUDING PAINT, SHALL BE REPAIRED OR REPLACED AS APPROPRIATE AT NO COST TO THE STATE.
4. EXISTING STRUCTURAL STEEL IN CONTACT WITH NEW CONCRETE SHALL HAVE PAINT, RUST, GREASE AND ALL OTHER FOREIGN MATTER REMOVED BEFORE PLACING CONCRETE. PAYMENT SHALL BE INCIDENTAL TO RELATED CONTRACT ITEMS.
5. FIRST COURSE OF HOT BITUMINOUS PAVEMENT SHALL BE PLACED WITH EACH STAGE OF CONSTRUCTION. FINAL COURSE SHALL BE PAVED IN ONE OPERATION.
6. PROTECT EXPOSED EDGE OF MEMBRANE DURING STAGE CONSTRUCTION TO PREVENT DAMAGE.
7. MAINTAIN PEDESTRIAN TRAFFIC AT ALL TIMES ON THE SIDEWALK NOT BEING WORKED ON.
8. MAINTAIN ONE 10-FOOT LANE OF TRAFFIC IN EACH DIRECTION AT ALL TIMES.
9. PAYMENT FOR ALL WORK AND MATERIALS FOR THE MAINTENANCE OF TRAFFIC AS ACCEPTED BY THE ENGINEER, WILL BE PAID FOR UNDER THE APPLICABLE PAY ITEMS UNLESS OTHERWISE NOTED.
10. OTHER METHODS OF MAINTENANCE OF TRAFFIC AND SEQUENCE OF CONSTRUCTION MAY BE USED SUBJECT TO ACCEPTANCE BY THE ENGINEER.
11. THE EXISTING STRUCTURAL STEEL IS PAINTED WITH A LEAD BASED PAINT. CONTRACTOR SHALL TAKE ALL PRECAUTIONS REQUIRED WHEN WORKING ON OR AROUND THE STRUCTURAL STEEL.



STAGE 1

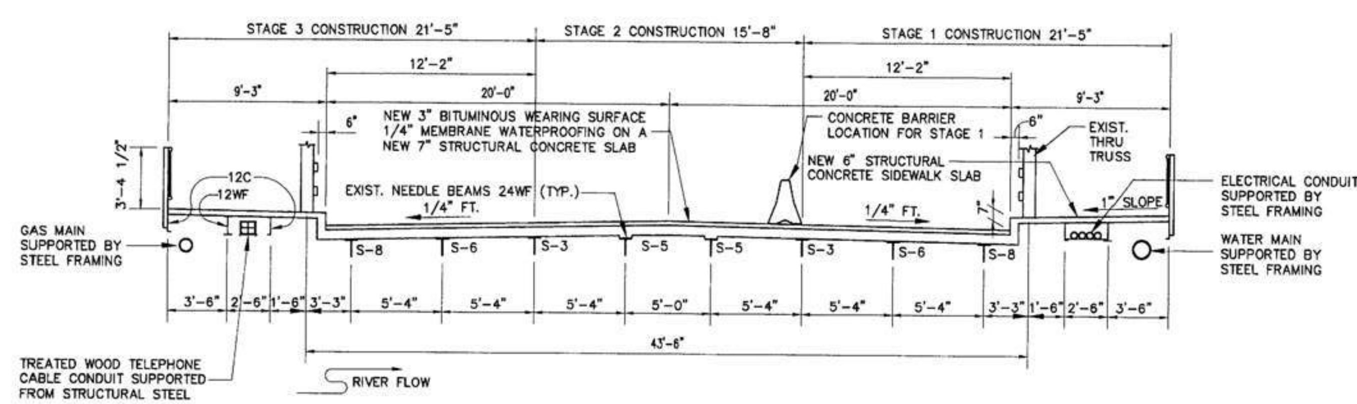


STAGE 2



STAGE 3

SCHEMATIC PLANS FOR STAGED CONSTRUCTION AND TRAFFIC MAINTENANCE.



SECTION

TYP. SPAN 1, 2, & 3

BRIDGE #3330

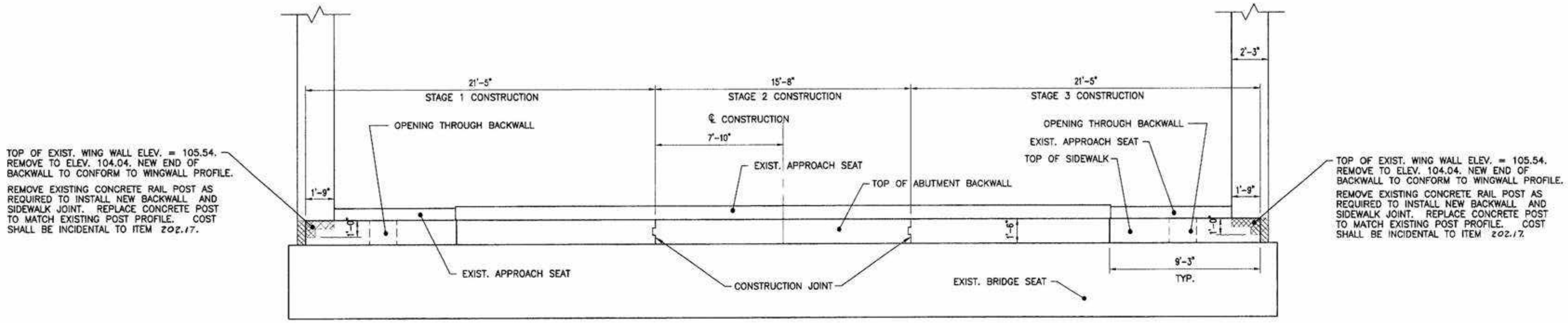
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

SOUTH BRIDGE
OVER
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON/AUBURN
ANDROSCOGGIN COUNTY
GENERAL PLAN & ELEVATION

SHEET 2 OF 19 AUGUSTA, MAINE

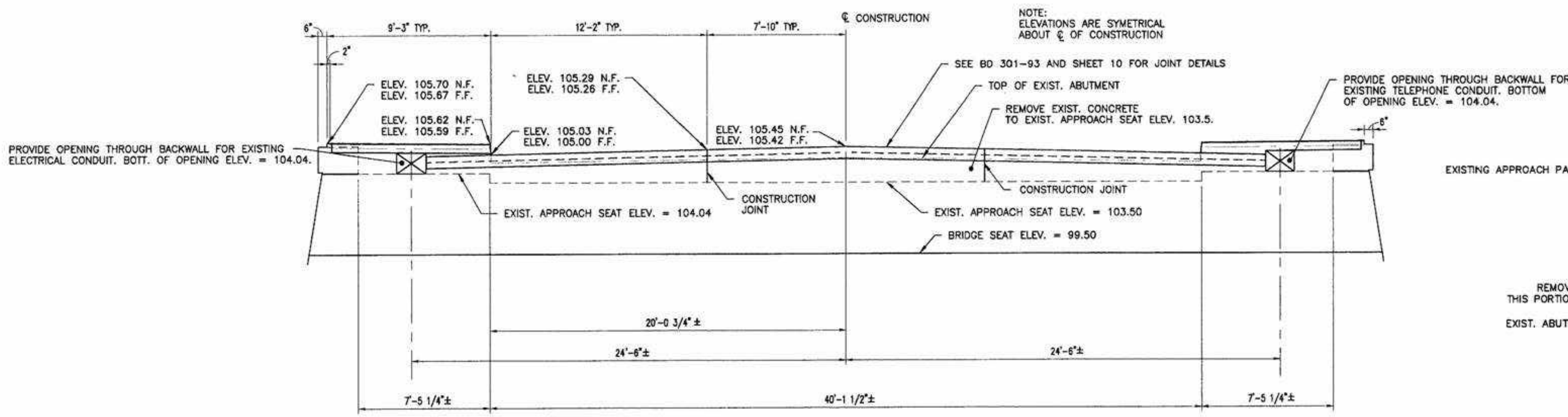
TAYLOR ENGINEERING ASSOCIATES
410 SUMMER STREET, AUBURN, MAINE 04210 (207) 784-5471

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED	AR	2/26/96
CHECKED	CA	2/26/96
REVISIONS	3C	
FIELD CHANGES		



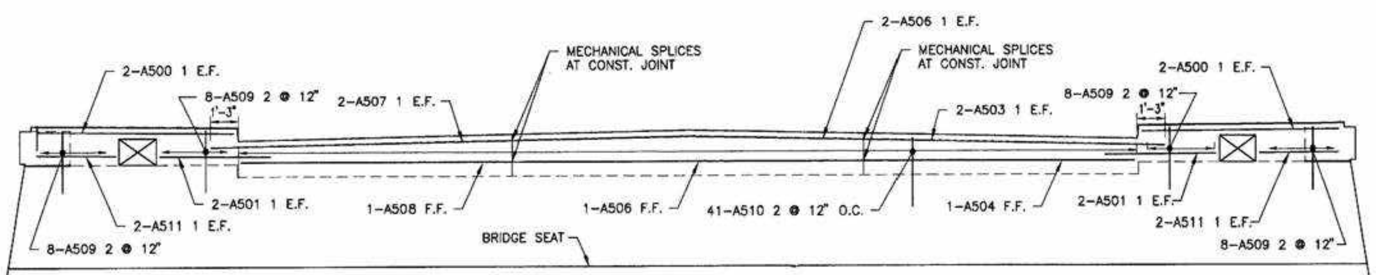
PART PLAN ABUTMENT 1

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



PART ELEVATION ABUTMENT 1

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

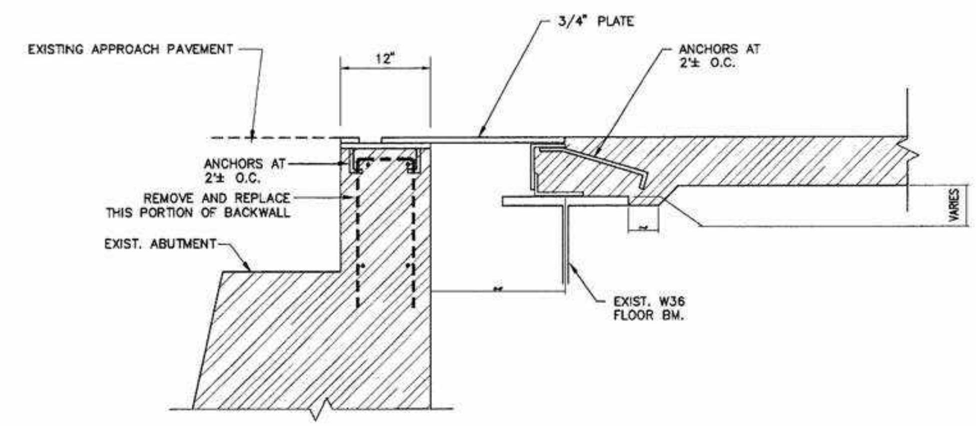


ABUTMENT 1 REINFORCING

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

ABUTMENT NOTES

1. CHAMFER ALL EXPOSED EDGES 3/4" UNLESS NOTED OTHERWISE.
2. ALL REINFORCING STEEL SPLICES AND EMBEDMENTS SHALL BE A MINIMUM OF 36 BAR DIAMETERS UNLESS NOTED OTHERWISE.
3. REINFORCING STEEL SHALL HAVE 2" COVER UNLESS NOTED OTHERWISE.
4. PLACE CONCRETE IN TOP OF ABUTMENT BACKWALLS AFTER THE SUPERSTRUCTURE SLAB HAS BEEN PLACED.
5. PROTECTIVE COATING FOR CONCRETE SURFACES SHALL BE APPLIED TO THE TOP OF THE BACKWALL, AND 12" DOWN THE BACK OF THE BACKWALL.
6. THE FOLLOWING IS A LIST OF ABBREVIATIONS BEING USED: E.F. = EACH FACE, N.F. = NEAR FACE, F.F. = FAR FACE.
7. SEE SHEETS 9 & 10 FOR SECTIONS AND DETAILS.
8. SEE SHEET 10 FOR TOP OF CONCRETE DETAILS AT BACKWALL.
9. SEE SHEET 10 FOR JOINT DETAILS.
10. COVER CONSTRUCTION JOINTS ON THE BACK WITH TWO LAYERS OF HEAVY ROOFING FELT. SEE BD 501-93 FOR DETAIL.
11. SAW CUT ALL EXPOSED SURFACES WHERE CONCRETE IS BEING REMOVED AND WHERE DIRECTED BY THE ENGINEER.



ABUTMENT 1 JOINT DETAIL (EXIST.)

SCALE: 1" = 1'-0" BROAD ST., AUBURN

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED	CG KG	2/26/96
CHECKED	RGH	4/24/96
REVISIONS		
FIELD CHANGES		

BRIDGE #3330

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

SOUTH BRIDGE
OVER
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON / AUBURN
ANDROSCOGGIN COUNTY
ABUTMENT 1 DETAILS

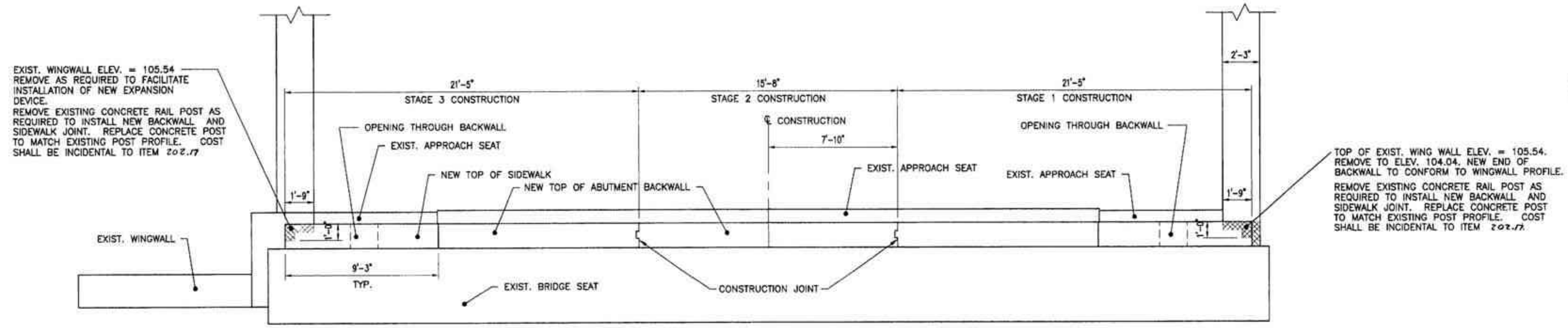
SHEET 3 OF 19 AUGUSTA, MAINE

TAYLOR ENGINEERING ASSOCIATES
410 SUMMER STREET, AUBURN, MAINE 04210 (207) 784-5471

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(3)X	4	19

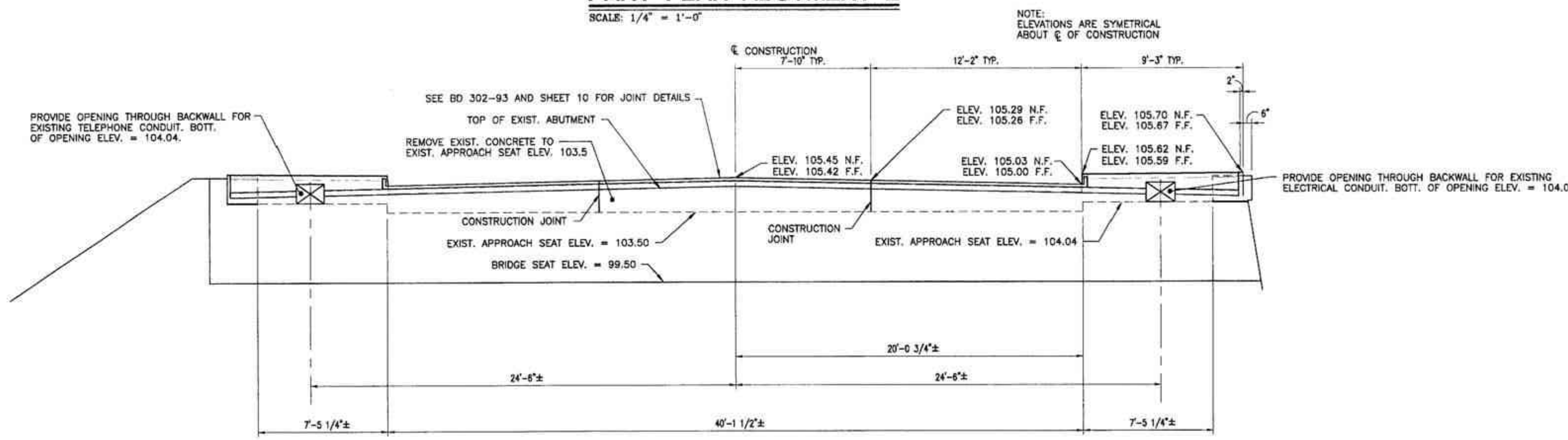
LEWISTON / AUBURN

NOTE:
SEE SHEET 3 FOR ABUTMENT NOTES.



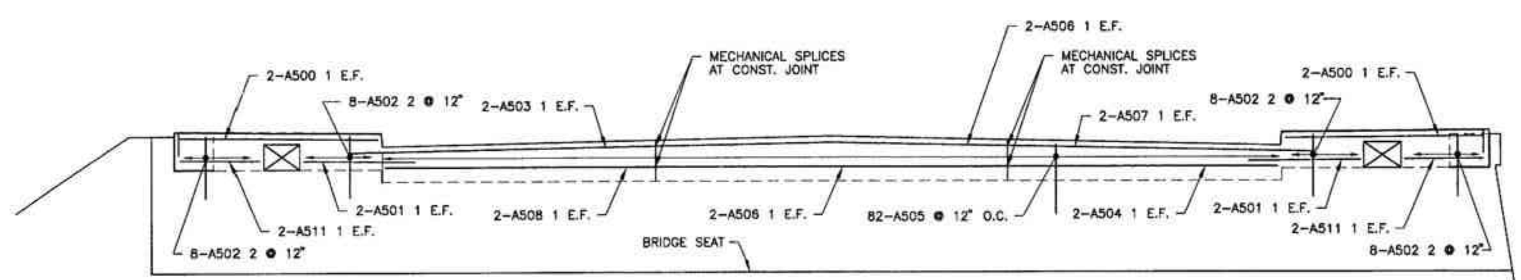
PART PLAN ABUTMENT 2

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



PART ELEVATION ABUTMENT 2

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



ABUTMENT 2 REINFORCING

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

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED	CG	2/26/96
CHECKED	JCL	3/26/96
REVISIONS		
FIELD CHANGES		

P:\9505\9505648T Mon Feb 26 11:56:06 1996 COPYRIGHT 1996, TAYLOR ENGINEERING ASSOCIATES

TAYLOR ENGINEERING ASSOCIATES
410 SUMMER STREET, AUBURN, MAINE 04210 (207) 784-5471

BRIDGE #3330

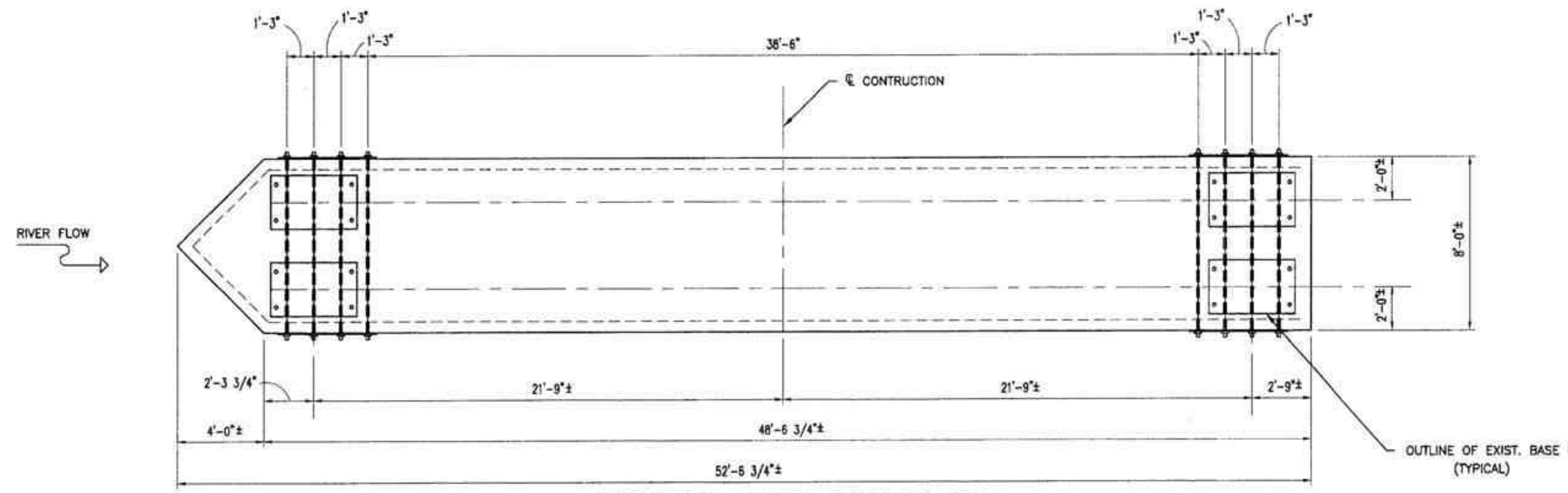
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

SOUTH BRIDGE
OVER
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON / AUBURN
ANDROSCOGGIN COUNTY
ABUTMENT 2 DETAILS

SHEET 4 OF 19 AUGUSTA, MAINE

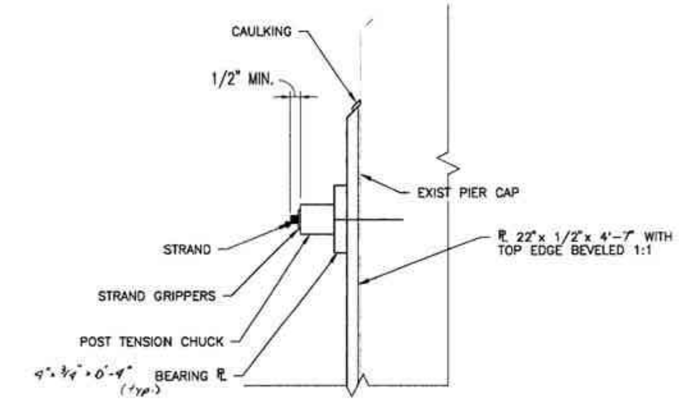
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(2)X	5	19

LEWISTON / AUBURN



TYPICAL PIER CAP PLAN

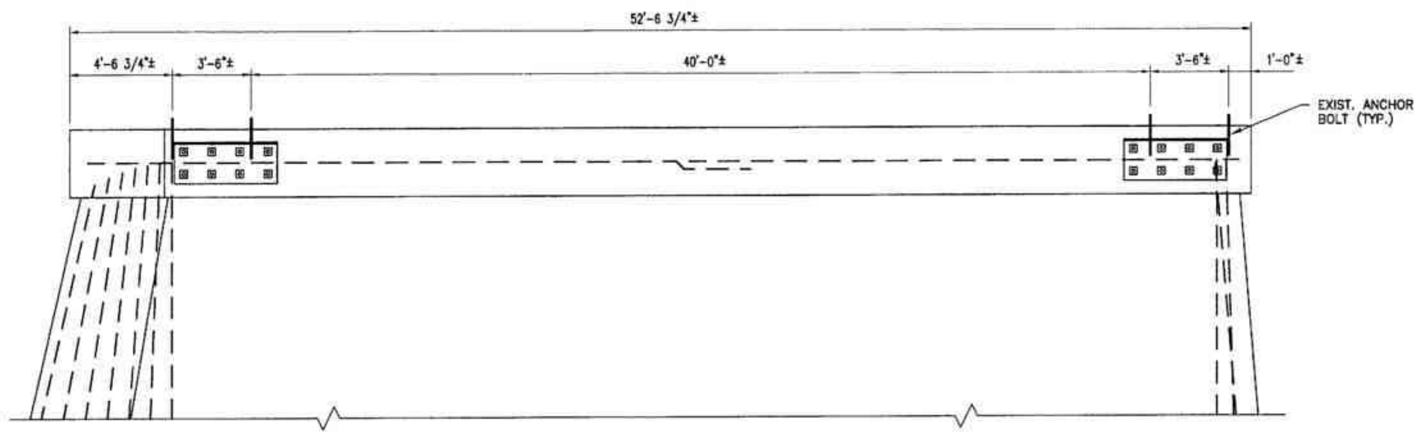
SCALE: 1/4" = 1'-0"



POST TENSION CHUCK DETAIL

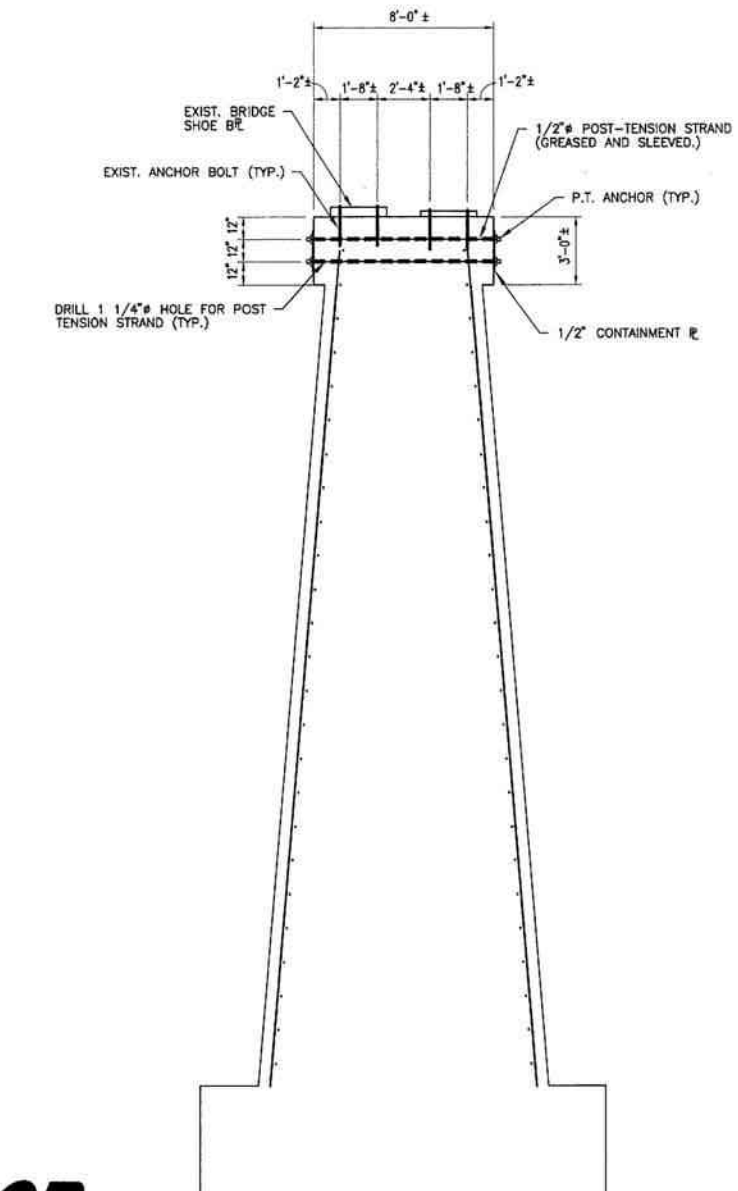
SCALE: 3" = 1'-0"

TYPICAL FOR BOTH STRESSING AND DEAD END



TYPICAL PIER ELEVATION

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



PIER SECTION

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

PIER NOTES:

1. POST TENSION STRAND: 7 WIRE – 270 KSI STRESS RELIEVED STRAND.
2. MAXIMUM STRESS BEFORE SEATING = 206.5 KSI.
3. MAXIMUM STRESS AFTER SEATING = 189 KSI.
4. MAXIMUM STRAND ELONGATION PRIOR TO SEATING = 11/16".
5. BEARING AND CONFINEMENT PLATES TO BE GALVANIZED AFTER FABRICATION.
6. STRANDS TO BE SUPPLIED WITH FACTORY SET DEAD END ANCHORS.
7. BEARING PLATES TO HAVE 11/16"ø HOLES FOR POST TENSION STRANDS.
8. ALL POST TENSION STRANDS SHALL BE GREASED AND SHEATHED.
9. CONTAINMENT PLATES SHALL BE DRILLED FOR STRAND PATTERN AFTER HOLES IN CONCRETE ARE DRILLED. MAXIMUM HOLE DIAMETER = 1"ø.
10. CAULKING SHALL BE INCIDENTAL TO ITEM 502.621
11. EXPOSED STRANDS, GRIPPERS, AND CHUCKS SHALL BE CLEANED AND PAINTED AFTER STRANDS ARE CUT.
12. ALL WORK AND MATERIALS NECESSARY TO REPAIR PIER CAPS SHALL BE INCIDENTAL TO ITEM 502.621

TAYLOR ENGINEERING ASSOCIATES

410 SUMMER STREET, AUBURN, MAINE 04210 (207) 784-5471

PLANS		BY	DATE
	PROJECT DESIGN ENGINEER		
	DESIGN-DETAILED		
	CHECKED		
	REVISIONS		
	FIELD CHANGES		

BRIDGE #3330

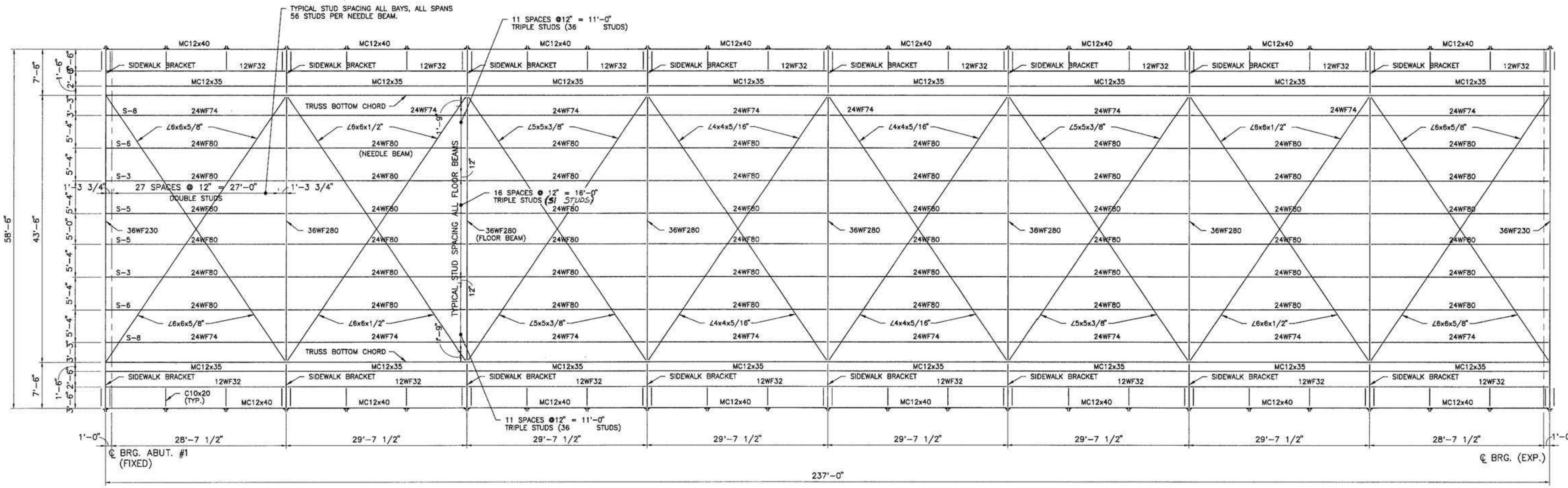
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

SOUTH BRIDGE
OVER
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON / AUBURN
ANDROSCOGGIN COUNTY
PIER MODIFICATIONS

SHEET 5 OF 19 AUGUSTA, MAINE

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(2)X	6	19

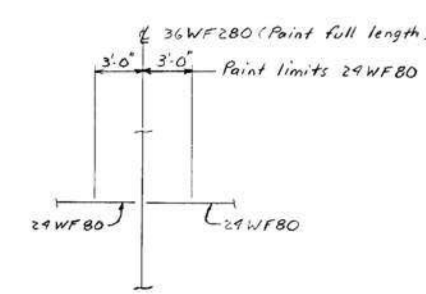
LEWISTON/AUBURN



STUD LAYOUT PLAN

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

TYPICAL SPANS 1, 2, AND 3



Floorbeam Paint Scheme
(typ. at each connection)
include bearings
PLAN

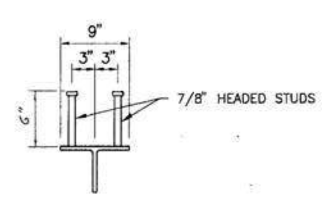
STRUCTURAL STEEL NOTES:

1. ALL FRAMING IS EXISTING.
2. STUD SPACING MAY BE VARIED ON S-8's AS REQUIRED TO CLEAR BRIDGE DRAINS. NUMBER OF SHEAR CONNECTORS INDICATED SHALL REMAIN UNCHANGED. SEE SHEET 2 FOR BRIDGE DRAIN LOCATIONS.
3. SEE STUD SCHEDULE FOR VARIOUS STUD LENGTHS. ALL STUDS TO BE 7/8" DIAMETER.
4. ALL BEAMS WITHIN THE ROADWAY SHALL BE FITTED WITH SHEAR CONNECTORS.
5. CLEAN AND PAINT ALL AREAS WHERE EXISTING PAINT IS DISTURBED DUE TO ATTACHMENT OF STUDS. *Payment to be incidental to related items.*

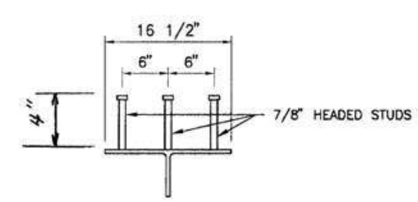
[redacted]

7. SEE BD 521-93 SUPPERSTRUCTURE DETAILS FOR STUD DETAILS. (OMIT NOTE 2)

8. *Clean steel and paint all areas as shown on the plans or as directed by the Engineer.*



NEEDLE BEAM STUD SCHEDULE



FLOOR BEAM STUD SCHEDULE

PROJECT DESIGN ENGINEER	BY	DATE
DESIGN-DETAILED	BL	2/86/...
CHECKED	CS	3/6/...
REVISIONS		
FIELD CHANGES		

PLANS

TAYLOR ENGINEERING ASSOCIATES
410 SUMMER STREET, AUBURN, MAINE 04210 (207) 784-5471

BRIDGE #3330

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

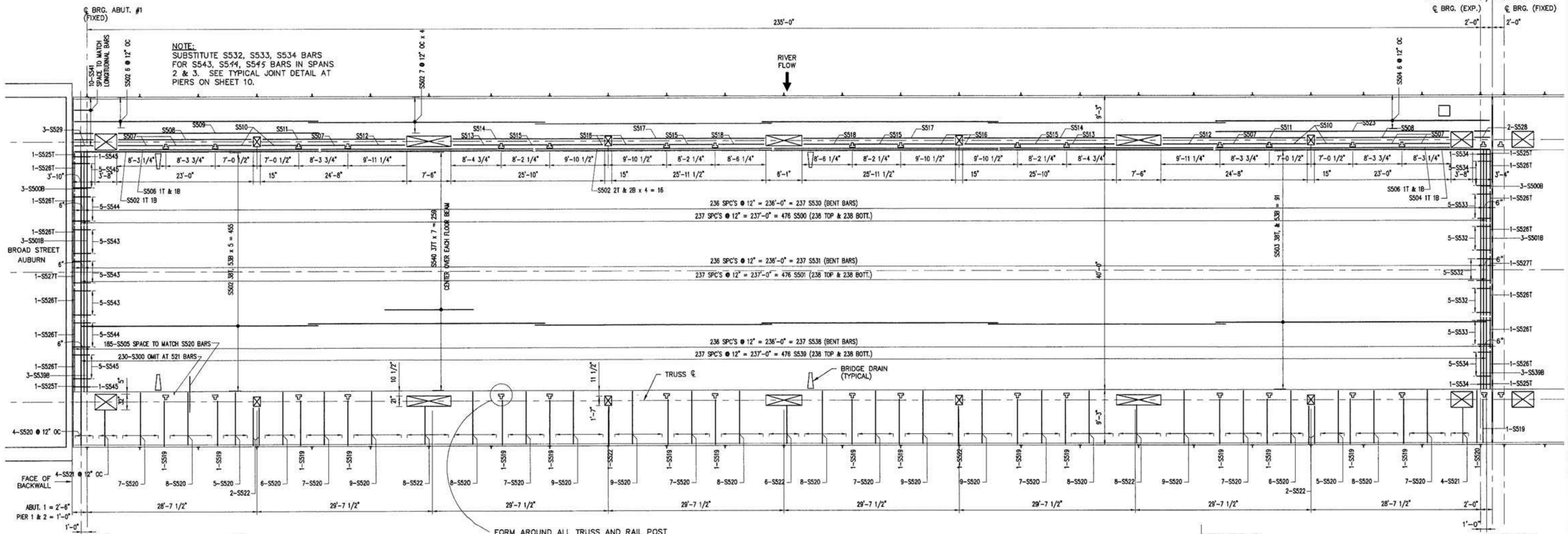
SOUTH BRIDGE
OVER
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON/AUBURN
ANDROSCOGGIN COUNTY
STUD LAYOUT PLAN

SHEET 6 OF 19 AUGUSTA, MAINE

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(2)X	7	19

LEWISTON/AUBURN

NOTE:
SUBSTITUTE S532, S533, S534 BARS FOR S543, S544, S545 BARS IN SPANS 2 & 3. SEE TYPICAL JOINT DETAIL AT PIERS ON SHEET 10.



SUPERSTRUCTURE PLAN

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

SPAN 1 SHOWN
TYPICAL SPANS 1, 2, & 3 UNLESS NOTED OTHERWISE

SUPERSTRUCTURE NOTES

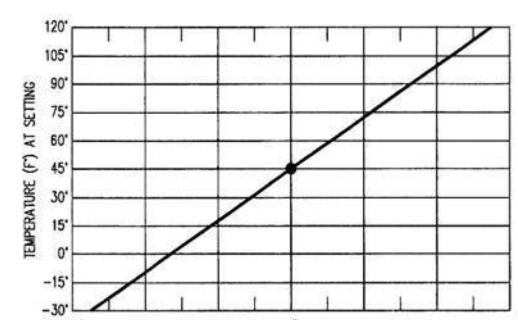
1. CHAMFER ALL EXPOSED EDGES OF CONCRETE A CONSISTENT DIMENSION BETWEEN 1/2" AND 3/4" INCLUSIVE, UNLESS OTHERWISE INDICATED.
2. REINFORCING STEEL SHALL HAVE A MINIMUM COVER OF 2", UNLESS OTHERWISE INDICATED.
3. THE SUPERSTRUCTURE SLAB CONCRETE SHALL BE PLACED CONTINUOUSLY FOR EACH STAGE ON ANY SPAN AND SHALL BE KEPT PLASTIC UNTIL THE ENTIRE SLAB CONCRETE HAS BEEN PLACED. APPROVED SET RETARDING ADMIXTURES SHALL BE USED WHEN AUTHORIZED BY THE ENGINEER, IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. THE CONTRACTOR'S METHOD OF PLACEMENT SHALL BE APPROVED BY THE ENGINEER.
4. PROTECTIVE COATING FOR CONCRETE SURFACES SHALL BE APPLIED TO THE CONCRETE CURBS, SIDEWALK, DOWN SIDEWALK FASCIA TO CHANNEL, AND ANY EXPOSED CONCRETE AT JOINTS.
5. SIDEWALK SHALL BE LIGHT BROOM FINISHED PERPENDICULAR TO THE DIRECTION OF TRAFFIC.
6. REINFORCING STEEL TO HAVE A MINIMUM OF 36 BAR DIAMETERS SPLICE AND EMBEDMENT UNLESS OTHERWISE INDICATED.
7. PROVIDE MECHANICAL SPLICES FOR TRANSVERSE REINFORCING AT STAGE CONSTRUCTION JOINTS. SPLICES SHALL BE APPROVED BY THE ENGINEER.
8. NUMBER OF BARS INDICATED ON PLAN ARE FOR EACH SPAN UNLESS NOTED OTHERWISE.
9. BARS IN SIDEWALK ARE SYMMETRICAL FOR OPPOSITE SIDEWALK. NUMBER OF BARS INDICATED ARE FOR ONE SIDEWALK.
10. *Mechanical splices shall be incidental to related contract items.*

DECK JOINT

1. THE SEAL TO BE FURNISHED SHALL HAVE A MINIMUM MOVEMENT RATING OF 3" AT PIER #1, #2, AND ABUTMENT #2, AND 1/2" AT ABUTMENT #1.
2. THE JOINT OPENING WILL VARY DEPENDING ON THE DIMENSION OF THE SEAL SELECTED BY THE CONTRACTOR. THE JOINT OPENING SHALL BE SET ACCORDING TO THE OPENING SHOWN ON THE APPROVED SHOP DETAIL DRAWINGS.
3. THE SEALS SHALL BE APPROVED BY THE ENGINEER PRIOR TO FABRICATION OF THE JOINT ARMOR.
4. THE ADJUSTMENT CHART SHOWS THE ADJUSTMENT OF THE JOINT OPENING TO COMPENSATE FOR TEMPERATURE ONLY.

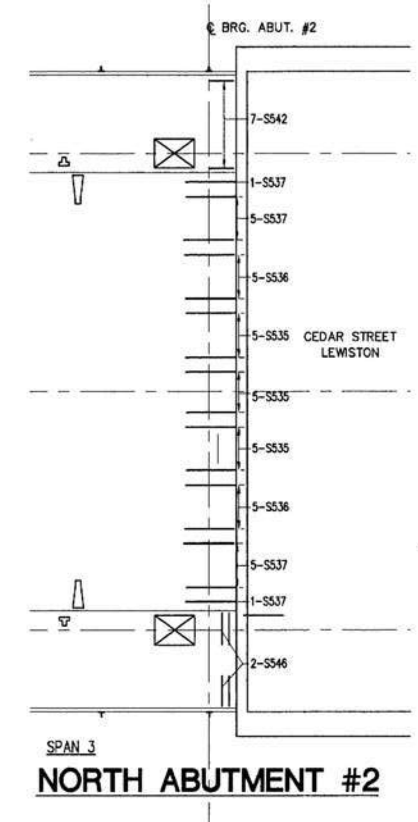
BRIDGE DRAIN NOTES

1. SEE STANDARD DETAIL SHEET (BD 521-93).
2. EXACT POSITION TO BE DETERMINED IN THE FIELD FOR APPROXIMATE LOCATION SEE SHEET 2.
3. ADJUST REINFORCING STEEL TO FIT AROUND THE DRAINS IN A MANNER APPROVED BY THE ENGINEER. DO NOT CUT TRANSVERSE BARS.



EXPANSION JOINT ADJUSTING CHART

(PIER 1 & 2 AND ABUT. 2)



SPAN 3

NORTH ABUTMENT #2

BRIDGE #3330

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

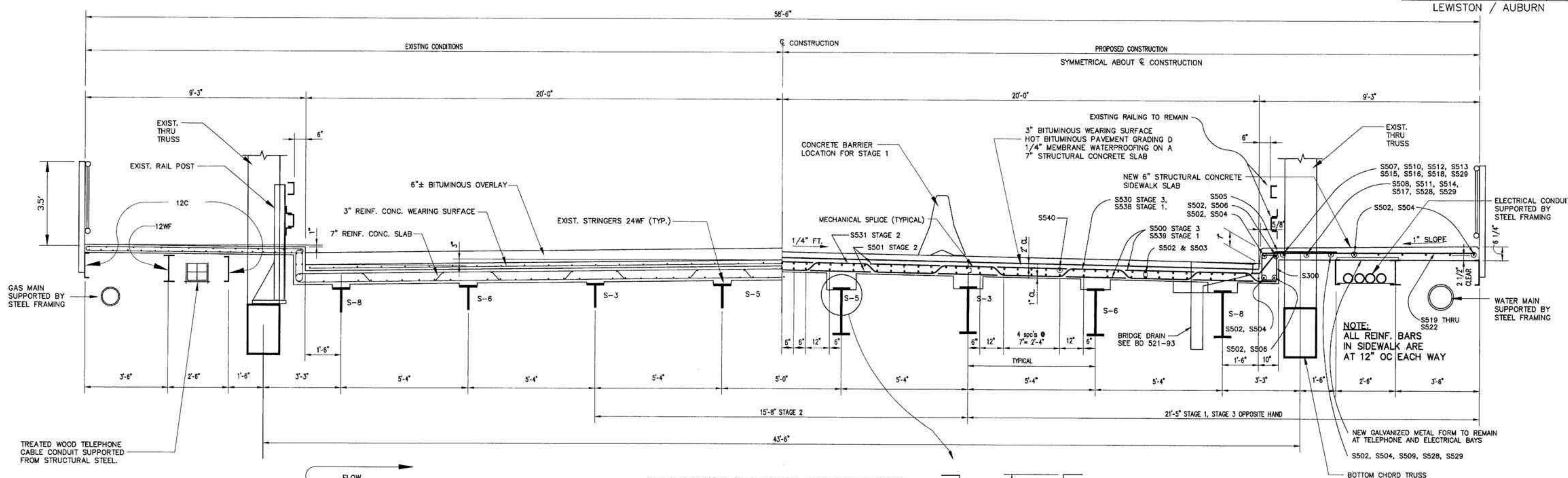
SOUTH BRIDGE
OVER
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON/AUBURN
ANDROSCOGGIN COUNTY
SUPERSTRUCTURE PLAN

SHEET 7 OF 19 AUGUSTA, MAINE

PLANS		BY	DATE
PROJECT DESIGN ENGINEER			
	DESIGN-DETAILED		
	CHECKED		
	REVISIONS		
	FIELD CHANGES		

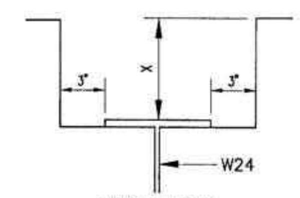
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(2)X	8	19

LEWISTON / AUBURN



TRANSVERSE SECTION

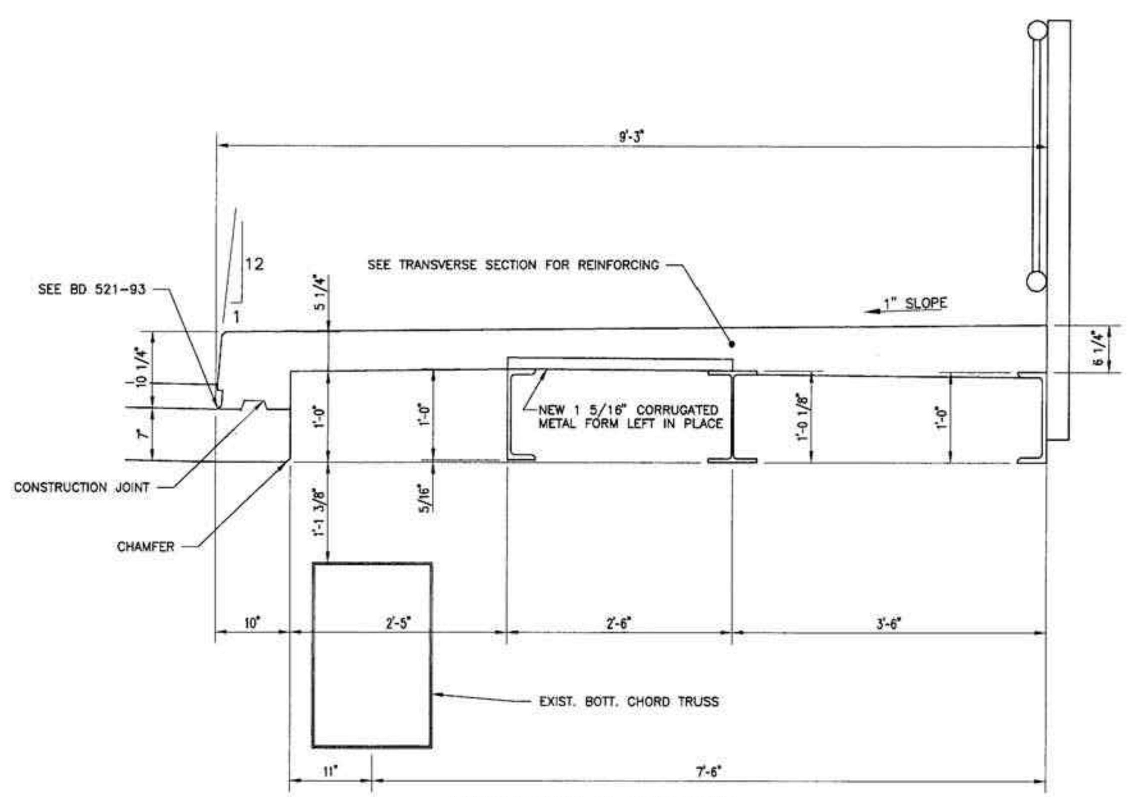
TYPICAL SPANS 1, 2, &3



NEEDLE BEAM

STRINGER	X
S-5	7"
S-3	4 7/8"
S-6	4 3/8"
S-8	3 5/8"

SEE SHEET 9 FOR FLOOR BEAM HAUNCH



SIDEWALK DETAIL

SCALE: 1" = 1'

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED	BL	2/26/96
CHECKED	RLL	2/26/96
REVISIONS		
FIELD CHANGES		

\P\95058\95058SEC Mon Feb 26 13:00:30 1996 COPYRIGHT 1996, TAYLOR ENGINEERING ASSOCIATES

BRIDGE #3330

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

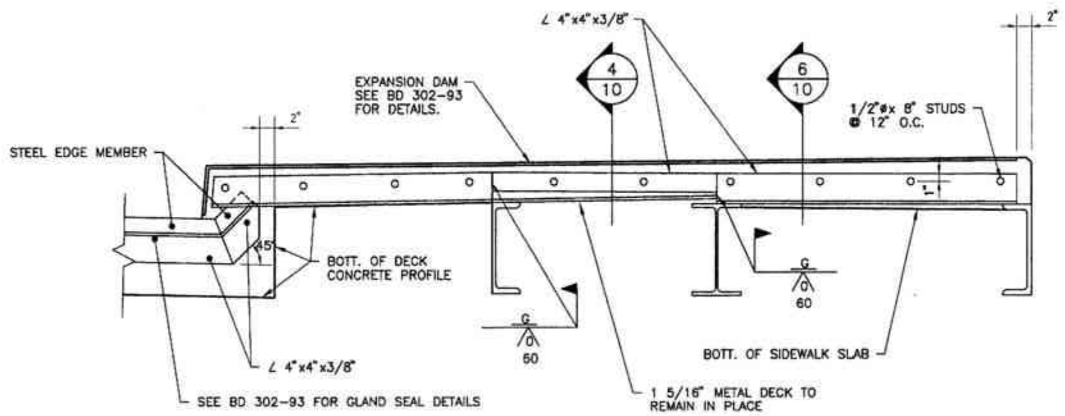
SOUTH BRIDGE
OVER
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON / AUBURN
ANDROSCOGGIN COUNTY
TRANSVERSE SECTION

SHEET 8 OF 19 AUGUSTA, MAINE

TAYLOR ENGINEERING ASSOCIATES
410 SUMMER STREET, AUBURN, MAINE 04210 (207) 784-5471

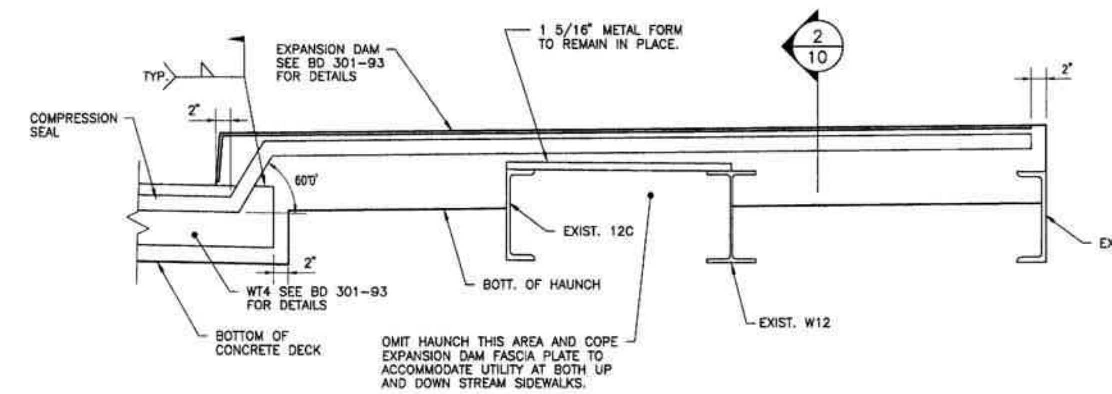
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(2)X	9	19

LEWISTON / AUBURN



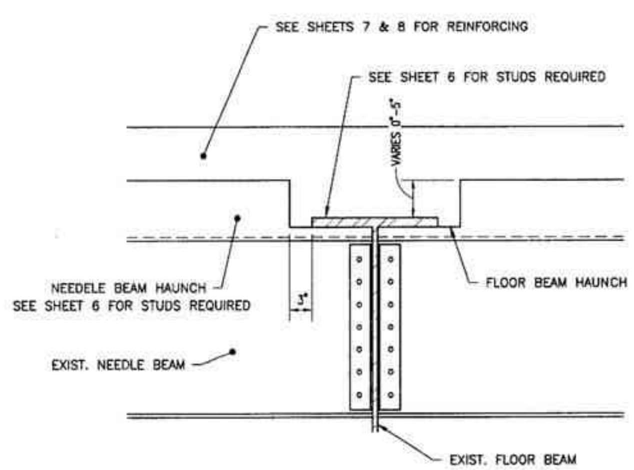
SIDEWALK EXPANSION DAM DETAIL (AT PIERS)

SCALE: 1" = 1'-0"



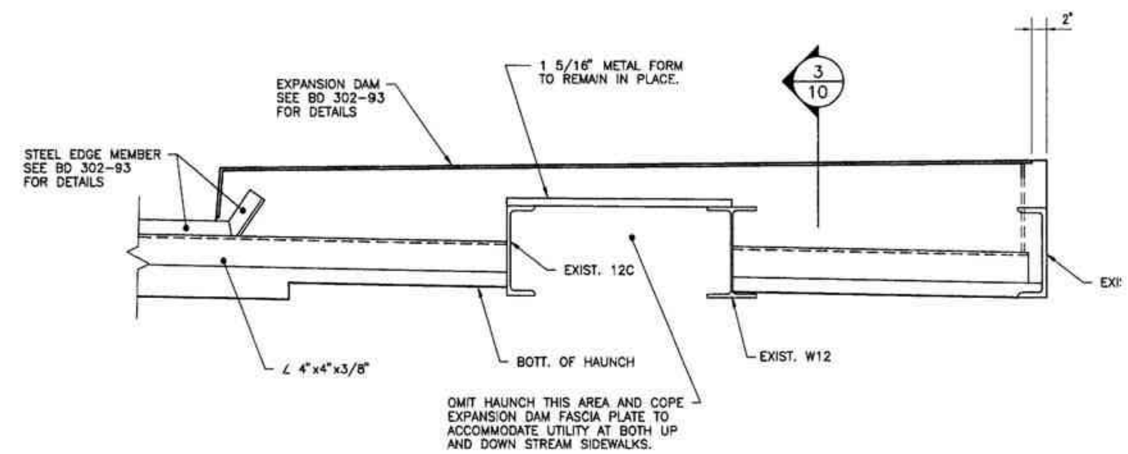
SIDEWALK EXPANSION DAM DETAIL (AT ABUT. 1)

SCALE: 1" = 1'-0" DOWNSTREAM SHOWN, UPSTREAM OPPOSITE HAND



FLOOR BEAM HAUNCH DETAIL

SCALE: 1" = 1'-0"



SIDEWALK EXPANSION DAM DETAIL (AT ABUT. 2)

SCALE: 1" = 1'-0" UPSTREAM SHOWN, DOWNSTREAM OPPOSITE HAND

PLANS		BY	DATE
	PROJECT DESIGN ENGINEER		
	DESIGN-DETAILED	CG	2/26/96
	CHECKED	BCH	2/27/96
	REVISIONS		
	FIELD CHANGES		

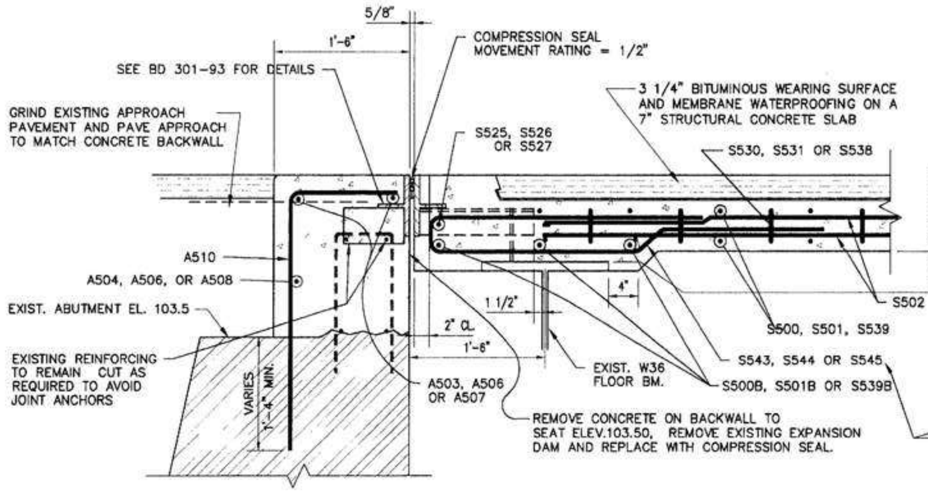
BRIDGE #3330

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

SOUTH BRIDGE
OVER
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON / AUBURN
ANDROSCOGGIN COUNTY
JOINT DETAILS

SHEET 9 OF 19 AUGUSTA, MAINE

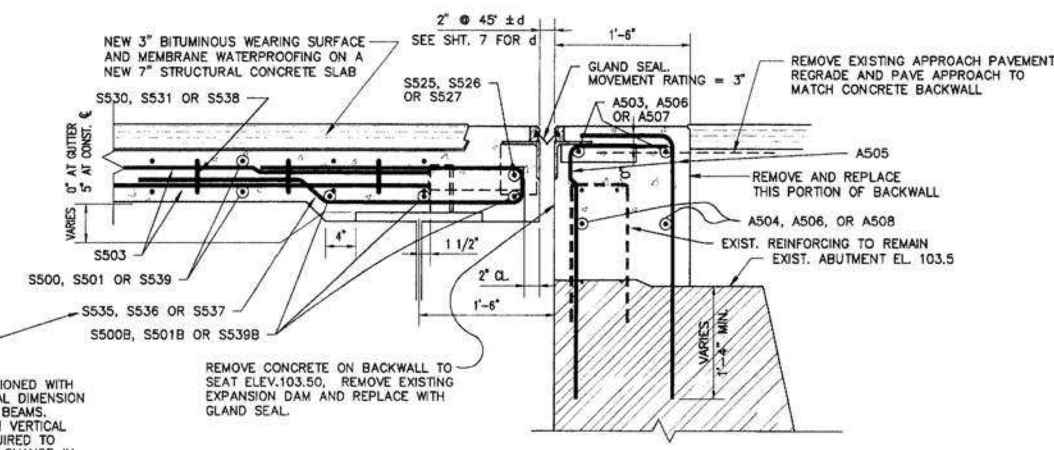
TAYLOR ENGINEERING ASSOCIATES
410 SUMMER STREET, AUBURN, MAINE 04210 (207) 784-5471



BARS ARE DIMENSIONED WITH THE SAME VERTICAL DIMENSION BETWEEN NEEDLE BEAMS. ROTATE BAR FROM VERTICAL POSITION AS REQUIRED TO COMPENSATE FOR CHANGE IN HAUNCH THICKNESS.

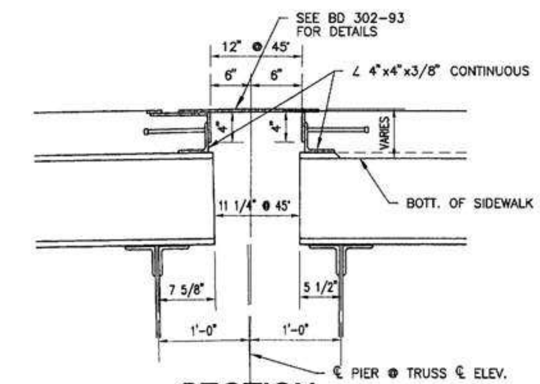
ABUTMENT 1 JOINT DETAIL (NEW)

SCALE: 1" = 1'-0" BROAD ST., AUBURN



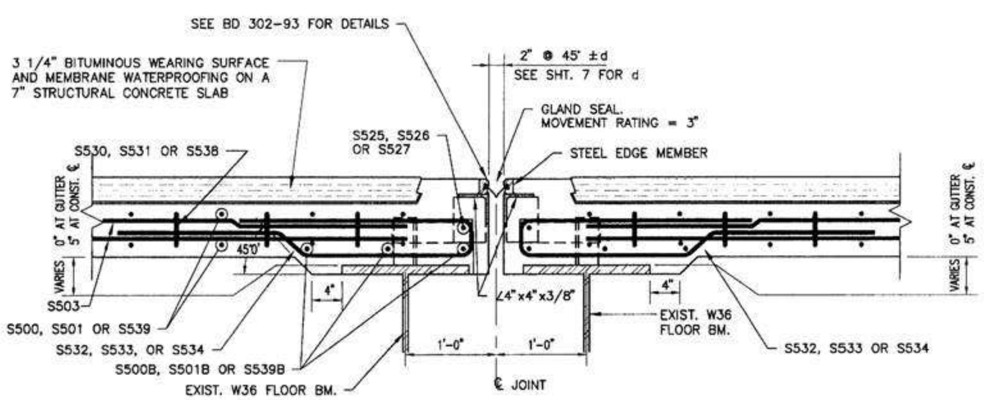
ABUTMENT 2 JOINT DETAIL (NEW)

SCALE: 1" = 1'-0" CEDAR ST., LEWISTON



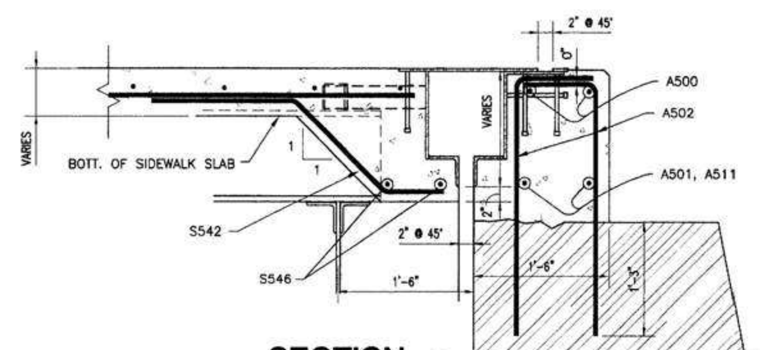
SECTION 6/9

SCALE: 1" = 1'-0"



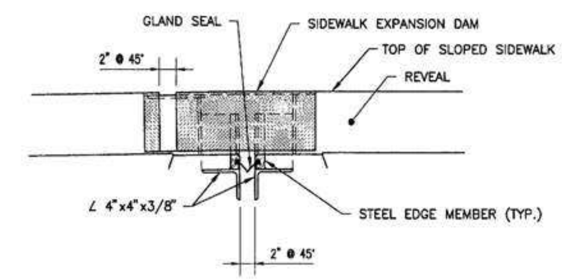
TYPICAL JOINT DETAIL AT PIERS (NEW)

SCALE: 1" = 1'-0"



SECTION 3/9

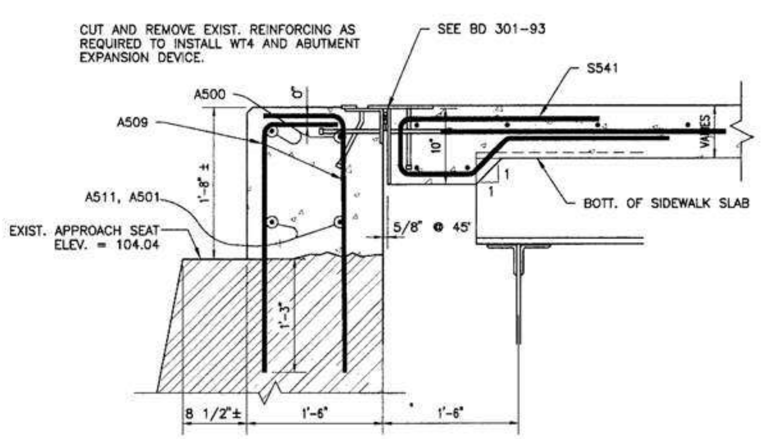
SCALE: 1" = 1'-0"



ELEVATION SIDEWALK EXPANSION DAM AT PIERS

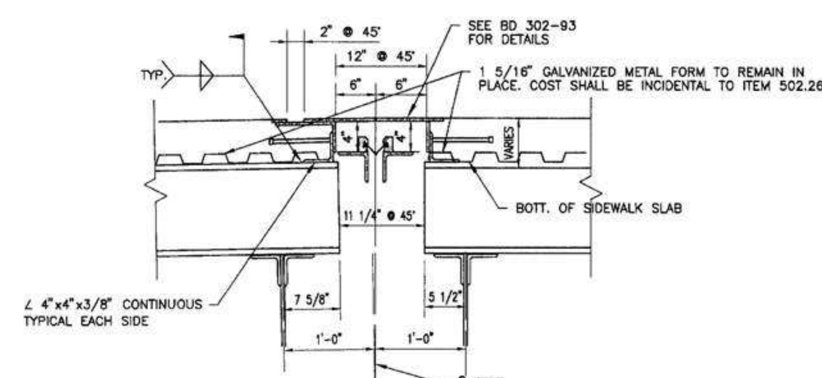
SCALE: 1" = 1'-0"

NOTE:
SEE SHEET 3 FOR SECTION THROUGH EXISTING JOINT AT ABUTMENTS 1 & 2.
SEE SHEET 9 FOR SECTION THROUGH EXISTING JOINTS AT PIERS.



SECTION 2/9

SCALE: 1" = 1'-0"



SECTION 4/9

SCALE: 1" = 1'-0"

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED	BH	7/26/95
CHECKED	CG	
REVISIONS	BCH	2/2/96
FIELD CHANGES		

TAYLOR ENGINEERING ASSOCIATES
410 SUMMER STREET, AUBURN, MAINE 04210 (207) 784-5471

BRIDGE #3330

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

SOUTH BRIDGE
OVER
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON / AUBURN
ANDROSCOGGIN COUNTY
JOINT DETAILS

SHEET 10 OF 19 AUGUSTA, MAINE

REINFORCING STEEL SCHEDULE

STRAIGHT BARS

MARK	NO.	LENGTH	LOCATION	MARK	NO.	LENGTH	LOCATION	MARK	NO.	LENGTH	LOCATION
A500	8	8'-11"	ABUTMENT •1 & •2								
A501	8	4'-9"	ABUTMENT •1 & •2								
A503	4	13'-5"	ABUTMENT •1 & •2								
A504	3	12'-0"	ABUTMENT •1 & •2								
A506	7	15'-8"	ABUTMENT •1 & •2								
A507	4	13'-5"	ABUTMENT •1 & •2								
A508	3	12'-0"	ABUTMENT •1 & •2								
A511	8	4'-0"	ABUTMENT •1 & •2								
S501	1428	15'-8"	SUPERSTRUCTURE								
S501B	18	15'-8"	SUPERSTRUCTURE								
S502	1677	40'-0"	SUPERSTRUCTURE								
S503	285	44'-6"	SUPERSTRUCTURE								
S504	48	44'-6"	SUPERSTRUCTURE								
S506	24	17'-0"	SUPERSTRUCTURE								
S507	36	7'-8"	SUPERSTRUCTURE								
S508	24	22'-8"	SUPERSTRUCTURE								
S509	6	34'-0"	SUPERSTRUCTURE								
S510	24	5'-8"	SUPERSTRUCTURE								
S511	12	24'-2"	SUPERSTRUCTURE								
S512	12	9'-5"	SUPERSTRUCTURE								
S513	12	7'-10"	SUPERSTRUCTURE								
S514	12	25'-6"	SUPERSTRUCTURE								
S515	24	7'-5"	SUPERSTRUCTURE								
S516	24	8'-8"	SUPERSTRUCTURE								
S517	12	25'-4"	SUPERSTRUCTURE								
S518	12	8'-0"	SUPERSTRUCTURE								
S519	96	7'-5"	SUPERSTRUCTURE								
S520	1110	8'-11"	SUPERSTRUCTURE								
S521	48	5'-10"	SUPERSTRUCTURE								
S522	168	6'-2"	SUPERSTRUCTURE								
S523	6	40'-0"	SUPERSTRUCTURE								
S525	12	2'-0"	SUPERSTRUCTURE								
S526	36	5'-0"	SUPERSTRUCTURE								
S527	6	4'-8"	SUPERSTRUCTURE								
S528	12	3'-0"	SUPERSTRUCTURE								
S529	18	3'-0"	SUPERSTRUCTURE								
S540	777	15'-0"	SUPERSTRUCTURE								
S546	8	3'-8"	SUPERSTRUCTURE								

BENT BARS

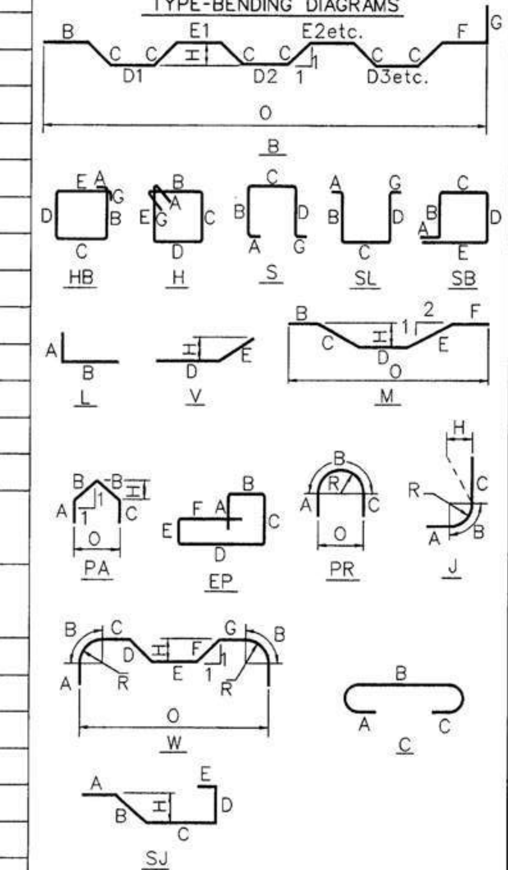
MARK	NO.	LENGTH	TYPE	A	B	C	D	E	F	G	H	O	R	LOCATION
A502	32	3'-7"	L	10"	2'-9"									ABUTMENT •2
A505	82	4'-4"	L	1'-2"	3'-2"									ABUTMENT •2
A509	32	3'-8"	L	11"	2'-9"									ABUTMENT •1
A510	41	4'-4"	L	1'-1"	3'-2"									ABUTMENT •1
S300	1152	4'-1"	HB	5"	1'-1"	6½"	1'-1"	6½"		5"				SUPERSTRUCTURE
S500	1428	13'-6"	L	8"	12'-10"									SUPERSTRUCTURE
S500B	18	13'-6"	L	8"	12'-10"									SUPERSTRUCTURE
S505	1110	5'-0"	SJ	2'-0"	1'-0"	2'-0"	0"	0"			9⅝"			SUPERSTRUCTURE
S530	711	13'-6"	B		1'-1¼"	4¾"	D1-2'-4" D2-2'-4"	E1-2'-2½" E2-2'-2½"	8"	8"	3⅜"	12'-10"		SUPERSTRUCTURE
S531	711	16'-9"	B		1'-1"	4¾"	D1-2'-4" D2-2'-0" D3-2'-4"	E1-2'-2½" E2-2'-2½" E3-2'-2½"		0"	3⅜"	15'-8"		SUPERSTRUCTURE
S532	60	6'-11"	SJ	2'-0"	7"	1'-8"	8"	2'-0"			5"			SUPERSTRUCTURE
S533	40	6'-9"	SJ	2'-0"	7"	1'-8"	6"	2'-0"			3"			SUPERSTRUCTURE
S534	48	6'-8"	SJ	2'-0¼"	7"	1'-8"	4¾"	2'-0"			1¾"			SUPERSTRUCTURE
S535	15	7'-4"	SJ	2'-0"	7"	2'-1"	8"	2'-0"			5"			SUPERSTRUCTURE
S536	10	7'-2"	SJ	2'-0"	7"	2'-1"	6"	2'-0"			3"			SUPERSTRUCTURE
S537	12	7'-1"	SJ	2'-0¼"	7"	2'-1"	4¾"	2'-0"			1¾"			SUPERSTRUCTURE
S538	711	13'-6"	B		1'-1¼"	4¾"	D1-2'-4" D2-2'-4"	E1-2'-2½" E2-2'-2½"	8"	8"	3⅜"	12'-10"		SUPERSTRUCTURE
S539	1428	13'-6"	L	8"	12'-10"									SUPERSTRUCTURE
S539B	18	13'-6"	L	8"	12'-10"									SUPERSTRUCTURE
S541	14	5'-7"	SJ	2'-0"	5½"	9½"	4"	2'-0"			4"			SUPERSTRUCTURE
S542	14	4'-0"	SJ	2'-0"	1'-5½"	6½"	0"	0"			12½"			SUPERSTRUCTURE
S543	15	7'-5"	SJ	2'-0"	7"	2'-2"	8"	2'-0"			5"			SUPERSTRUCTURE
S544	10	7'-3"	SJ	2'-0"	7"	2'-2"	6"	2'-0"			3"			SUPERSTRUCTURE
S545	12	7'-2"	SJ	2'-0¼"	7"	2'-2"	4¾"	2'-0"			1¾"			SUPERSTRUCTURE

MARK NO. LENGTH TYPE A B C D E F G H O R LOCATION

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(2)X	11	19

LEWISTON/AUBURN

TYPE-BENDING DIAGRAMS



All dimensions are out to out of reinforcing bar

Bending details and hooks shall conform to the recommendations of the current revision of ACI Standard 318

Reinforcing Bar: ASTM A615 Grade 60

GENERAL NOTES

1.-First digit(s) following the letter of the mark indicates size of the bar:
Mark (A502) bar size-•5
Mark (P1001) bar size-•10
Mark (S603) bar size-•6

2.-Each truss bar, Type B, may be replaced by two (2) straight bars (one top and one bottom) of the same bar size as the truss bar. Payment in either case shall be based on truss bars as scheduled on plans.

NO.	REVISIONS	DATE

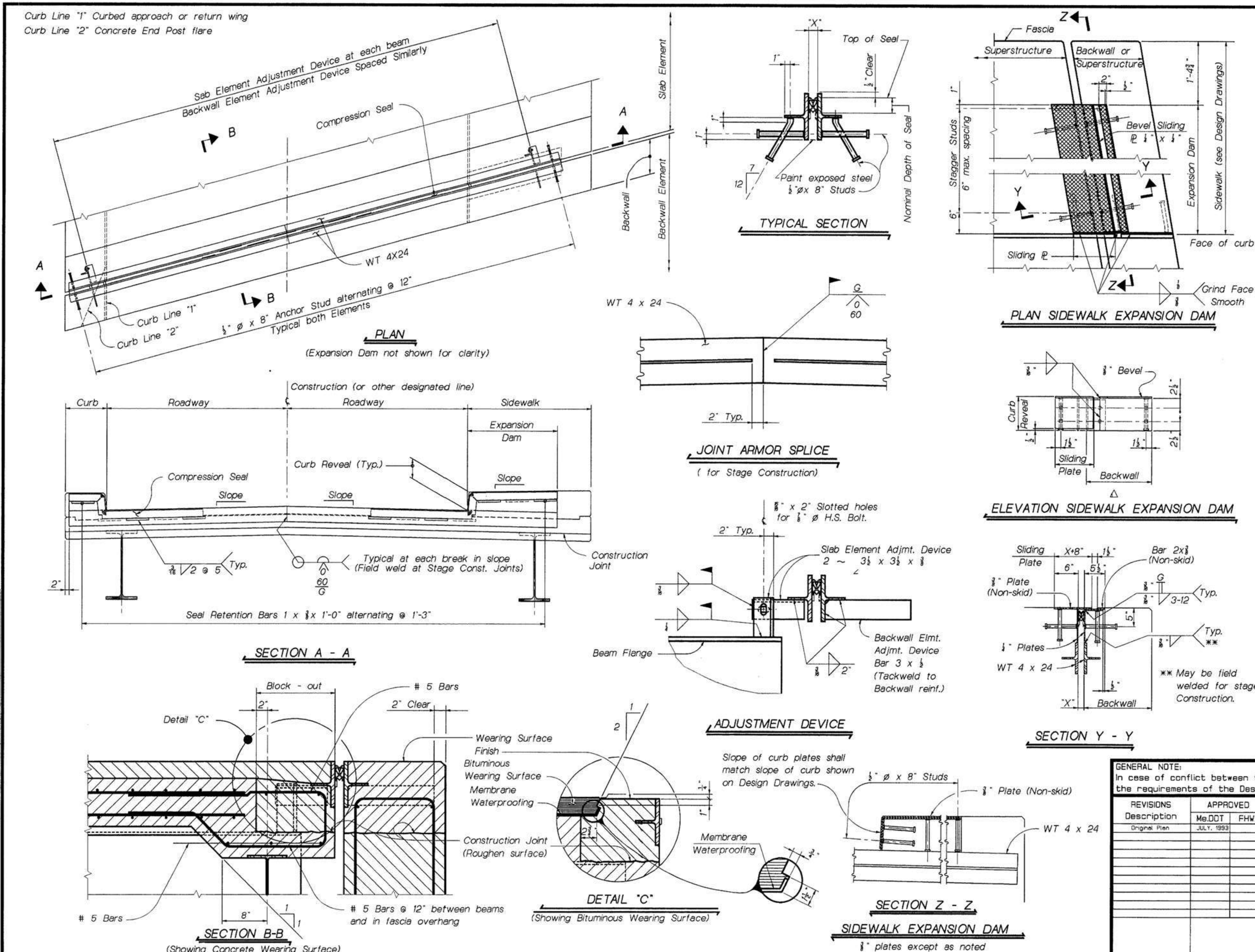
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

SOUTH BRIDGE
OVER
ANDROSCOGGIN RIVER
BETWEEN THE CITIES OF
LEWISTON/AUBURN
ANDROSCOGGIN COUNTY

REINFORCING SCHEDULE

SHEET 11 OF 19 AUGUSTA MAINE FEBRUARY 1996

PLANS		BY	DATE
	PROJECT DESIGN ENGINEER	BCT	02-13-96
	DESIGN-DETAILED	BEW/JKM	02-23-96
	CHECKED		
	REVISIONS		
	FIELD CHANGES		



F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(2)X	12	19

NOTES

1. ______Each "Expansion Device" consists of one pair of matching Slab and Backwall Elements and Expansion Dams as required. At expansion joints over piers, two Slab Elements shall be used.

2. ______Refer to Design Drawings for all dimensions, slopes, skew, and other information necessary to fabricate and install each individual "Expansion Device".

3. ______"Expansion Devices" shall be installed normal to grade.

4. ______Dimension "X" at 45°F shall be determined as follows:

(0.85 x nom. seal width)-1/2MR *

Deminsion "X" and the make and type of seal to be provided shall be shown on the Shop Detail Drawings.

5. ______Final adjustment for temperature shall be made in the field according to the "Compression Seal Adjustment Chart" shown on the Design Drawings. Adjustment shall be measured parallel to the centerline of construction.

6. ______Welding to reinforcing steel will be allowed in the top of the abutment backwall above the construction joint.

7. ______The slab and backwall concrete shall be in place before the "Expansion Device" is fixed in position. No allowance for movement due to dead load deflection is necessary.

8. ______The concrete in the slab block-out may be placed with the curb / sidewalk concrete. An approved epoxy bonding agent shall be applied to all vertical surfaces of the block-out before making the final concrete placement.

* MR (Movement Rating) of seal shall be as determined by MDOT for the make and type of seal provided.

GENERAL NOTE:
In case of conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.

REVISIONS Description	APPROVED Me.DOT	FHWA
Original Plan	JULY, 1993	

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS
BD 301 - 93

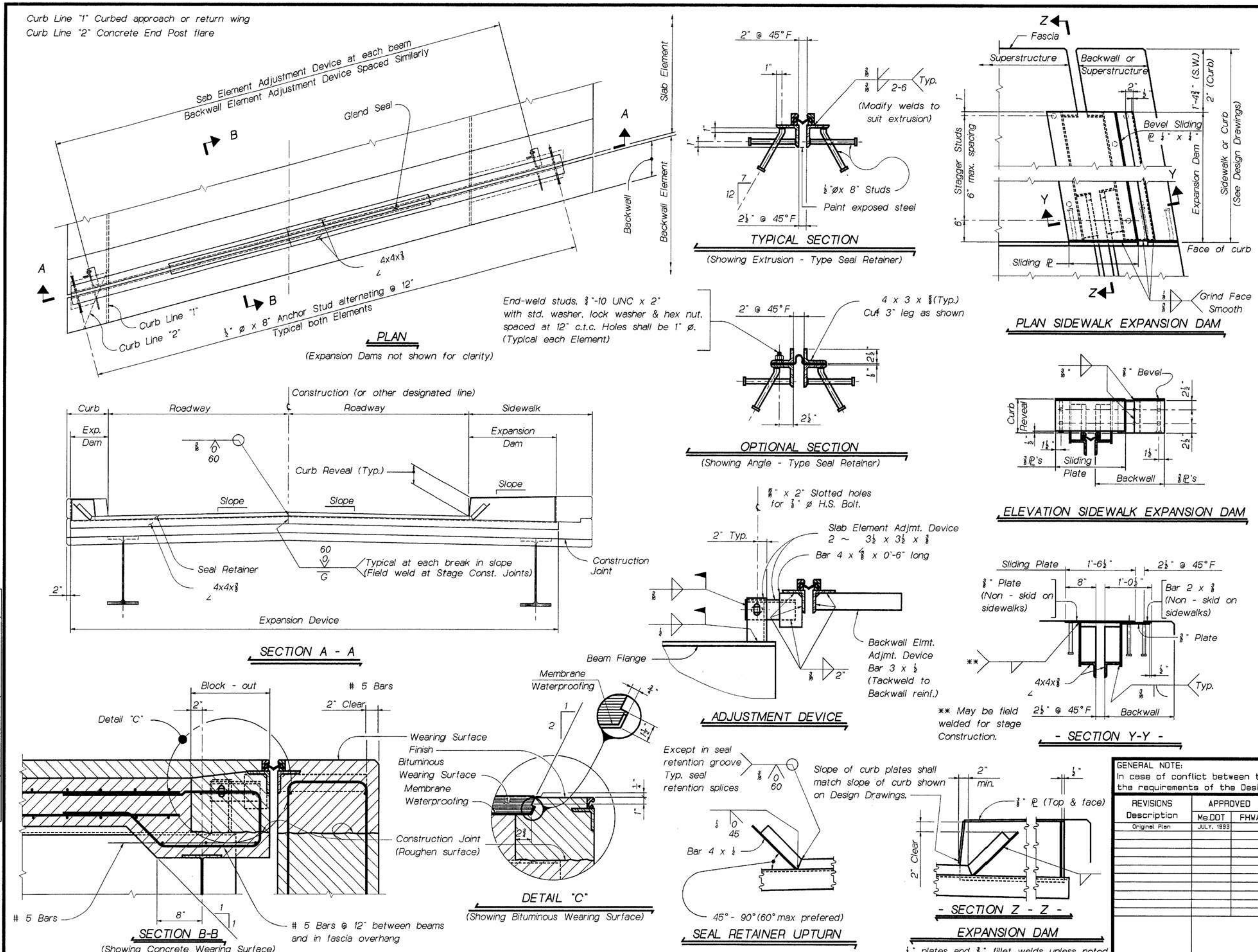
EXPANSION DEVICE
COMPRESSION SEAL

SHEET 12 OF 19 AUGUSTA, MAINE July 1993

	BY	DATE
PROJECT DESIGN ENGINEER		
DESIGN-DETAILED	KJ	7/93
CHECKED	BDS	
REVISIONS		
FIELD CHANGES		

PLANS

05NOV95-010030
BD301



F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	BH-0205(2)X	13	19

NOTES

1. ______Each "Expansion Device" consists of one pair of matching Slab and Backwall Elements and Expansion Dams as required. At expansion joints over piers, two Slab Elements shall be used.

2. ______Refer to Design Drawings for all dimensions, slopes, skew, and other information necessary to fabricate and install each individual "Expansion Device".

3. ______"Expansion Devices" shall be installed normal to grade.

4. ______"Expansion Device" shall be set to an opening of two inches in the fabrication shop. The opening shall be adjusted in the field to reflect the temperature of the structure at the time of installation.

Correction per 10°F = $\frac{0.0125 \text{ in} \times L\,(\text{exp.})}{15}$

where L(exp.) at abutments is the distance in feet to the nearest fixed bearing and where L(exp.) at piers is the distance in feet between the fixed bearings at either side of the expansion joint.

5. ______Welding to reinforcing steel will be allowed in the top of the abutment backwall above the construction joint.

6. ______The slab and backwall concrete shall be in place before the "Expansion Device" is fixed in position. No allowance for movement due to dead load deflection is necessary.

7. ______The concrete in the slab block-out may be placed with the curb / sidewalk concrete. An approved epoxy bonding agent shall be applied to all vertical surfaces of the block-out before making the final concrete placement.

GENERAL NOTE:
In case of conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.

REVISIONS Description	APPROVED Me.DOT	FHWA
Original Plan	JULY, 1993	

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

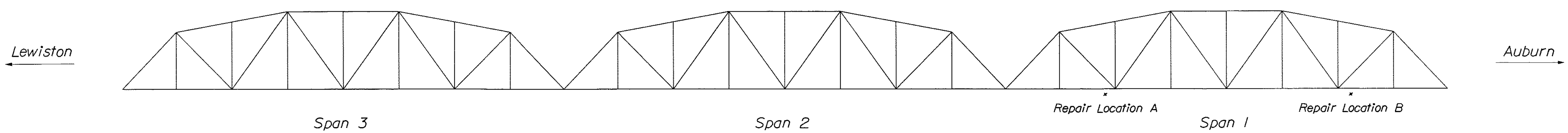
STANDARD DETAILS
BD 302 - 93

EXPANSION DEVICE
GLAND SEAL

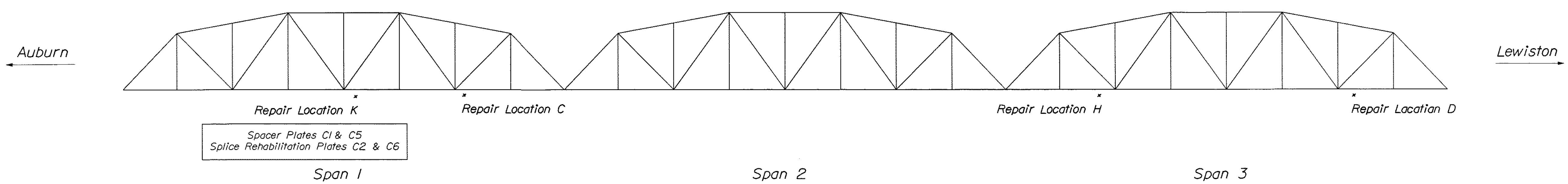
SHEET 13 OF 19 AUGUSTA, MAINE July 1993

PLANS		BY	DATE
PROJECT DESIGN ENGINEER	DESIGN-DETAILED	KJ	7/93
	CHECKED	BDS	
	REVISIONS		
	FIELD CHANGES		

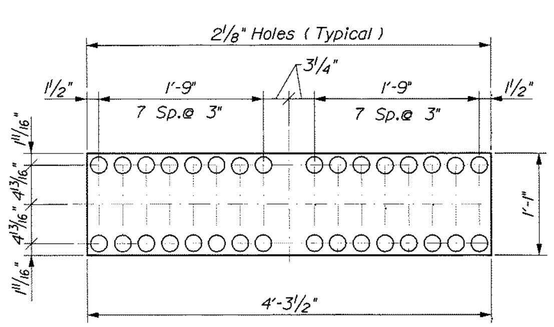
05NOV95-010030
BD302



Upstream Elevation



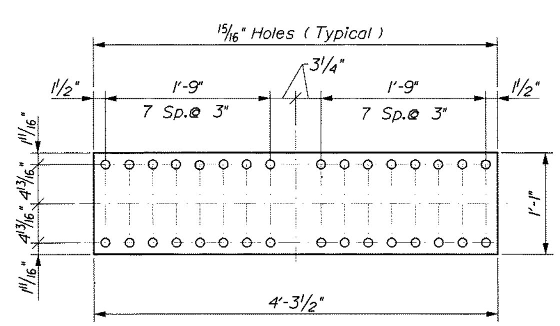
Downstream Elevation



C1 Bottom Chord Spacer Plate

1 1/4" Thick (1 Required) 196 lbs

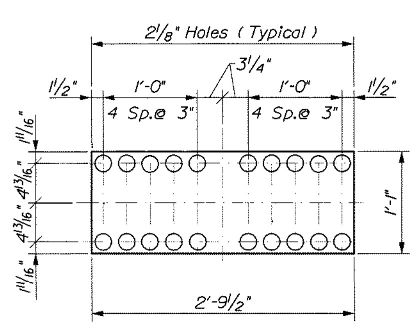
@ Repair Location K



C2 Bottom Chord Splice Rehabilitation Plate

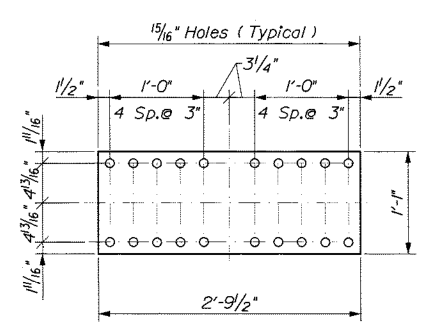
3/4" Thick (1 Required) 137 lbs

@ Repair Location K



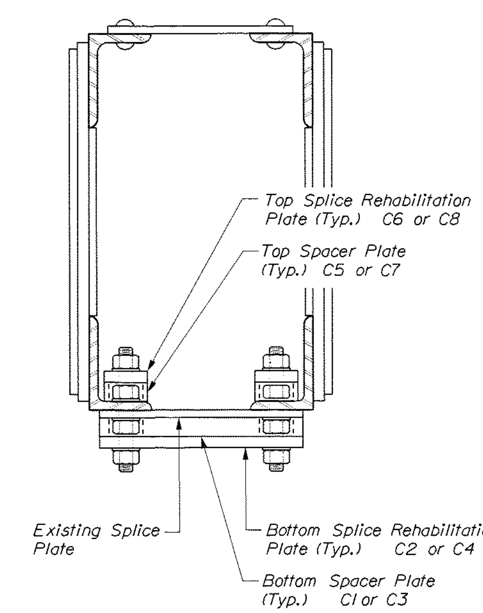
C3 Bottom Chord Spacer Plate

1 1/4" Thick (5 Required) 128 lbs



C4 Bottom Chord Splice Rehabilitation Plate

3/4" Thick (5 Required) 89 lbs



Cheese Plate Assembly

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

WIN 21124.00

Bridge #3330

Bridge Plans

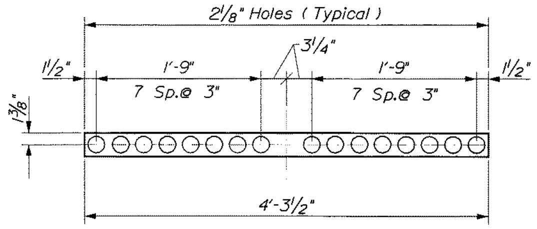
	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	B. Snowden	
CHECKED-REVIEWED	K. McLaggan	7/9/14
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE
P.E. NUMBER
DATE

Lewiston - Auburn
Bernard Lown Peace Bridge
Bottom Splice Plate Rehabilitation

Sheet Number

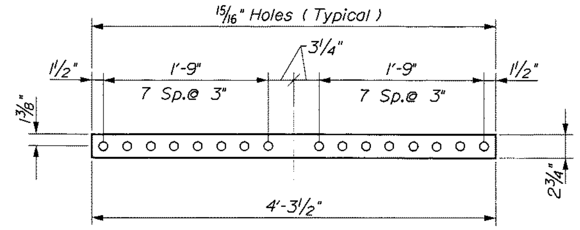
2



C5 Bottom Chord Spacer Plate

1¼" Thick (2 Required) 30 lbs

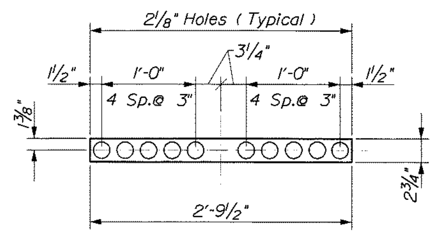
@ Repair Location K



C6 Bottom Chord Splice Rehabilitation Plate

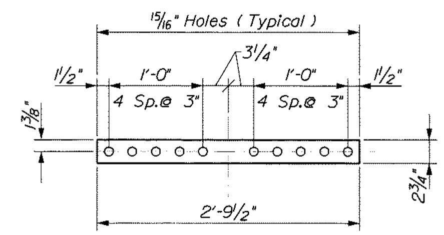
¾" Thick (2 Required) 28 lbs

@ Repair Location K



C7 Bottom Chord Spacer Plate

1¼" Thick (10 Required) 20 lbs



C8 Bottom Chord Splice Rehabilitation Plate

¾" Thick (10 Required) 18 lbs

MATERIAL	QUANTITY REQUIRED	QUANTITY SUPPLIED BY MAINEDOT	QUANTITY PROVIDED BY CONTRACTOR	NOTES
⅞" Diameter Threaded Rod, 12" Length	132	54	78	ASTM A449 Galvanized in accordance with ASTM A153
⅞" Diameter Heavy Hex Nuts	528	60	468	Galvanized
⅞" Diameter, Flat Washers	264	60	204	Galvanized
⅞" Diameter, Lock Washers	264	60	204	Galvanized

General Notes:

1. Prior to starting any work removing deteriorated concrete on the pier, steel blocking will be placed between the top of the pier and the steel superstructure in such a manner as to support the steel superstructure in case of any movement at the bearings when deteriorated concrete is being removed. The steel blocking will be placed in a manner such that it will not interfere with the pier rehabilitation project. The steel blocking will be removed once the pier has been rehabilitated and post tensioned. All labor, equipment, scaffolding and materials required to place and remove the steel blocking will be incidental to the lump sum item "910.301 Special Work - Pier Repair and Post Tensioning".

2. A minimum of two lanes of two way traffic and one sidewalk must be maintained across the bridge at all times.

Erection of Steel Splice Rehabilitation Plates:

1. Replace rivets on existing bottom splice plate with ⅞" diameter threaded rod and two flat washers and two nuts. Only 1 rivet at a time can be replaced, replace all bottom rivets at a splice before proceeding.

2. Place top 1¼" spacer plates over new nuts and washers on angles on top side of bottom splice, and then place both ¾" splice rehabilitation plates and fasten with nuts and lock washers.

3. Place bottom 1¼" spacer plate over nuts and washers on existing splice plate and secure in place.

4. Place bottom ¾" splice rehabilitation plate under bottom 1¼" spacer plate and fasten with nuts and lock washers.

5. All required steel plates will be supplied by MaineDOT. Some of the ⅞" diameter threaded rod, washers and nuts will be supplied, what is not supplied will be furnished by the Contractor as outlined in the table provided. The ⅞" threaded rod will be ASTM A449 galvanized in accordance with ASTM A153. Each piece of threaded rod shall have four heavy hex nuts and four ASTM F436 washers, all galvanized. Both ends of ⅞" threaded rod will be re-tapped for nut threads.

6. Primed side of steel plates will be placed on existing steel leaving the painted side exposed. The bridge has a lead paint coating system, any lead paint removed or disturbed during the Contractor's operation, on steel that will be exposed, shall be touched-up by the Contractor. MaineDOT will supply any lead paint needed for the touch up work upon Contractor's request to the Resident Engineer. Any required surface preparation, field painting, containment and pollution control and disposal of special waste or hazardous waste materials will be done according to industry standards as well as state and federal requirements for working with lead paint and as approved by the Resident Engineer. All materials, labor, tools, equipment, scaffolding, QC inspections, permits, tests, transportation, tipping fees and any other incidentals necessary for the satisfactory performance of the touch-up painting will be incidental to the lump sum item "504.5101 Misc. Bridge Repairs – Erection of Steel Splice Rehabilitation Plates".

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

WIN 21124.00

Bridge Plans

Bridge #3330

PROJ. MANAGER; DESIGN-DETAILED: B. Snowden; CHECKED-REVIEWED: K. McLaggan 7/9/14; DESIGN2-DETAILED2; DESIGN3-DETAILED3; REVISIONS 1; REVISIONS 2; REVISIONS 3; REVISIONS 4; FIELD CHANGES

BY | SIGNATURE | P.E. NUMBER | DATE

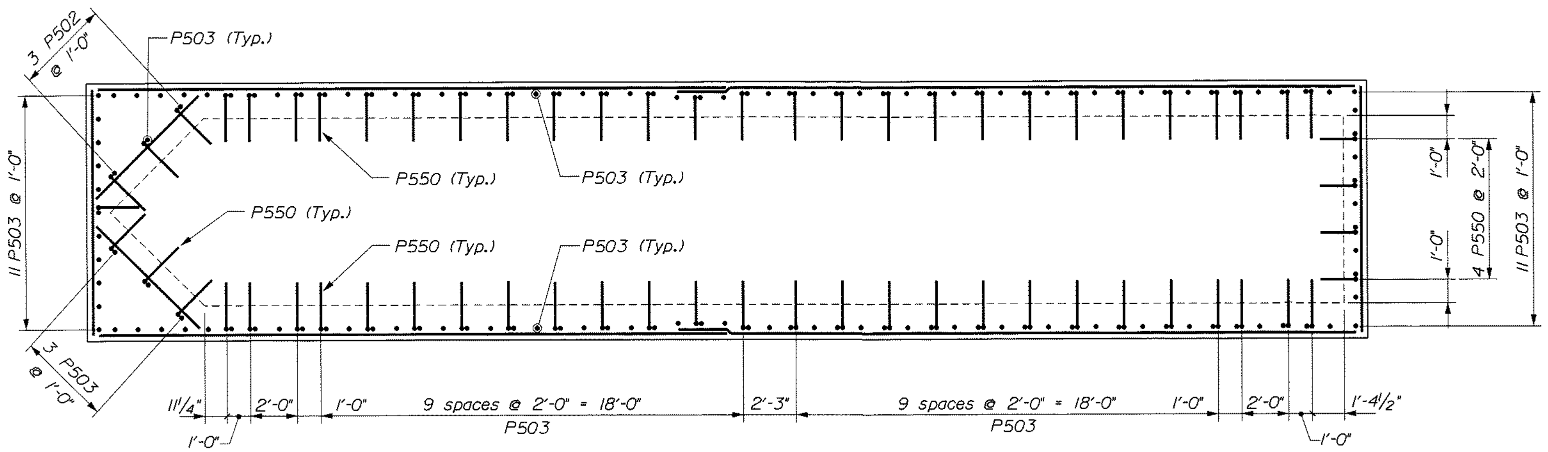
Lewiston - Auburn
Bernard Lown Peace Bridge

Bottom Splice Plate
Rehabilitation

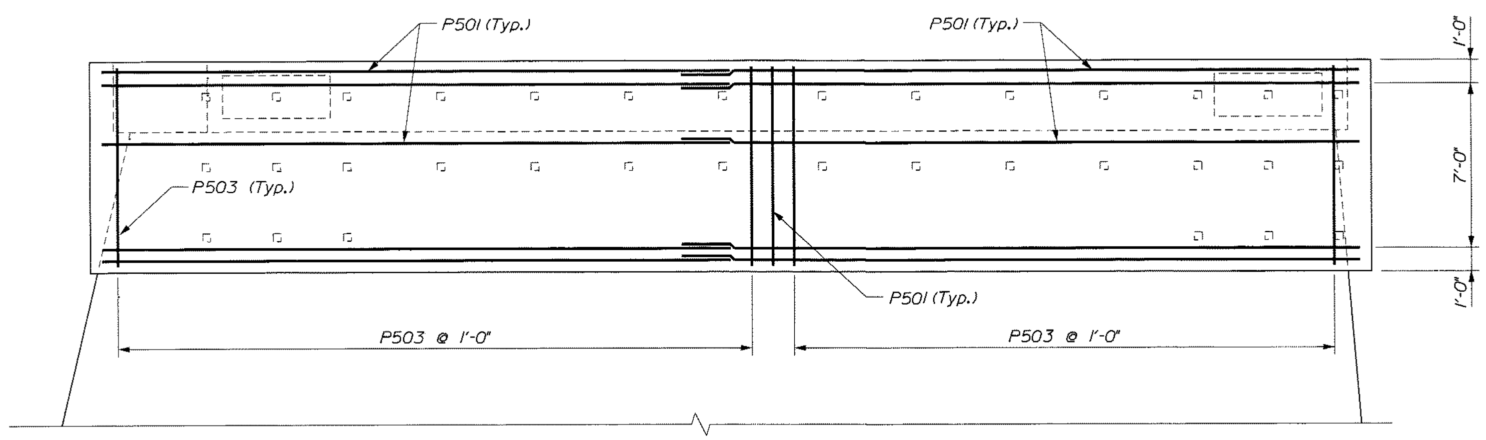
Sheet Number

3

Filename: H:\Utilities\work\z _UTPLAN.dgn   Division: BRIDGE   Username: Kevin.McLoggan   Date:7/14/2014



Pier Cap Reinforcing Plan



Pier Elevation

STRAIGHT BARS		
MARK	QTY.	LENGTH
P501	40	28'-0"
P502	10	6'-3"
P503	134	8'-6"
P504	20	10'-6"

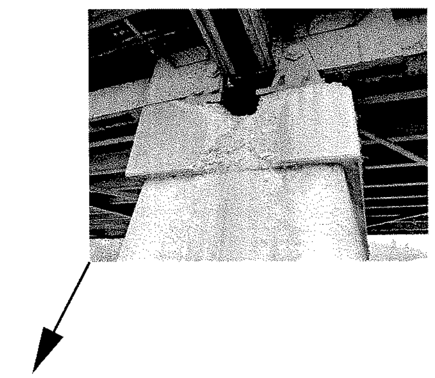
Bending Diagram

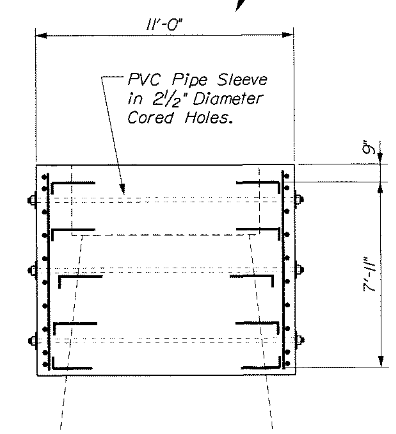
A

B

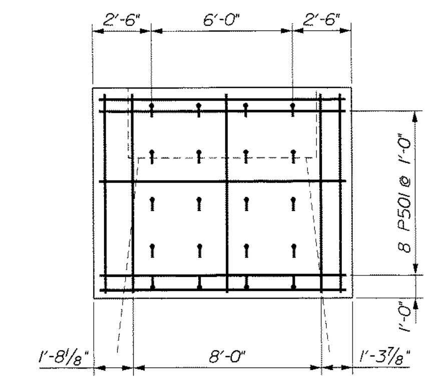
Type L

BENT BARS					
MARK	QTY.	LENGTH	TYPE	A	B
P550	315	2'-4"	L	1'-10"	6"





Pier Cap Section



Pier Cap End View

PIER REPAIR PROCEDURE

1. Set up an appropriate contamination/debris collection system.
2. Prevent feathered edges of concrete repair. Indicated areas are the approximate anticipated removal limits and are subject to change.
3. After the removal of the concrete the surface area should be cleaned of loose debris using high pressure water or air.
4. Exposed rebar shall be cleaned per an SSPC-SP-6 to remove loose scaly rust. If it is determined by the Resident that the rust is tight and bonded then the cleaning may be omitted.
5. Core 2 ½" diameter holes as shown for post tensioning. Insert 2" HDPE duct.
6. Drill and Anchor #5 Bars (Bar # P550) at 2'-0" O.C. as indicated on the plans. Bars shall be embedded a minimum of 12", place hooked bars no closer than 9" from edge of existing pier. Grout shall be from MaineDOT approved materials list.
7. Once all new anchored rebar and ducts are in place the surface shall be cleaned of loose debris prior to the placement of any new concrete.
8. Install all new additional reinforcement.
9. Construct and place forms and block outs.
10. Place new concrete. Formwork shall be placed in a manner to allow the concrete to be vibrated and reach all locations. Formwork shall be inspected and approved by the Resident prior to the placement of concrete.
11. Allow concrete to cure to 4350 psi.
12. Install plate anchorage assembly and thread bars.
13. Grout duct through grout tubes using an approved cable grout. Grout from one end only. Only grout one bar at a time. Remove nipple after the grout has hardened and insert plug.
14. Contractor to supply all required hardware, equipment and grout. All labor, equipment and materials required to post tension the pier cap will be incidental to the lump sum item "910.301 Special Work - Pier Repair and Post Tensioning".

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

WIN 21124.00

Bridge Plans

Bridge #3330

	BY	DATE
PROJ. MANAGER	B. Snowden	
DESIGN-DETAILED	K. McLoggan	7/9/14
CHECKED-REVIEWED		
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

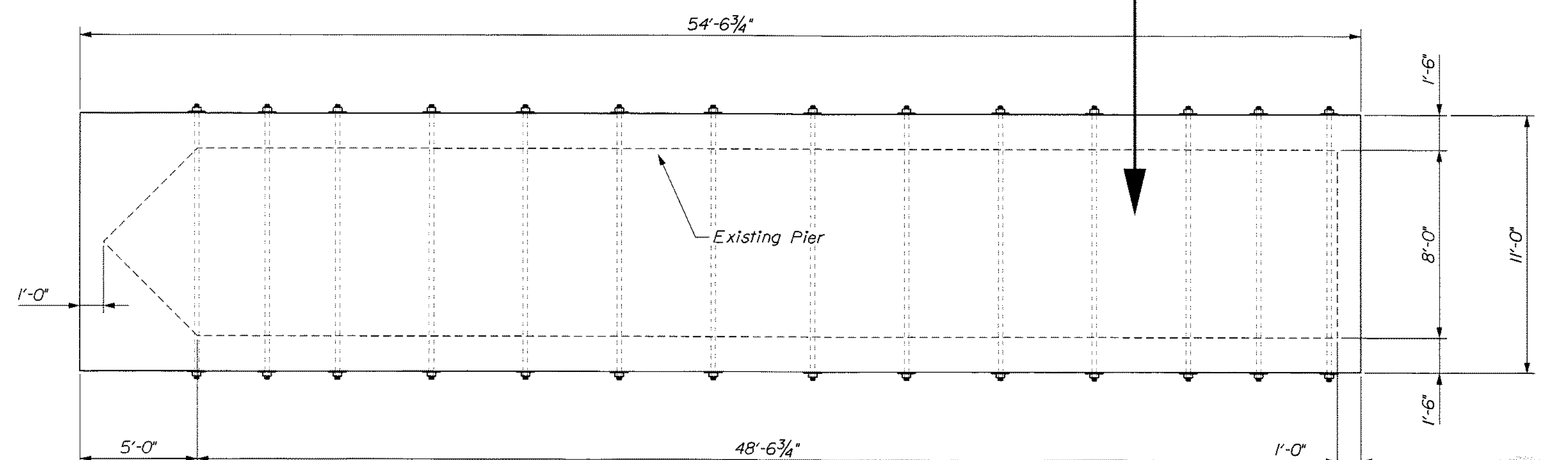
DATE

Lewiston - Auburn
Bernard Lown Peace Bridge

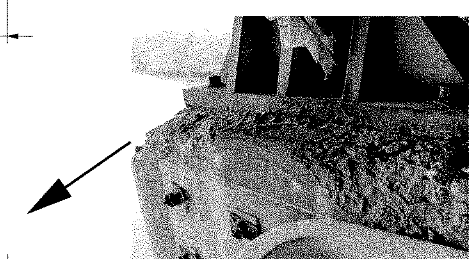
Pier Cap Rehabilitation

Sheet Number

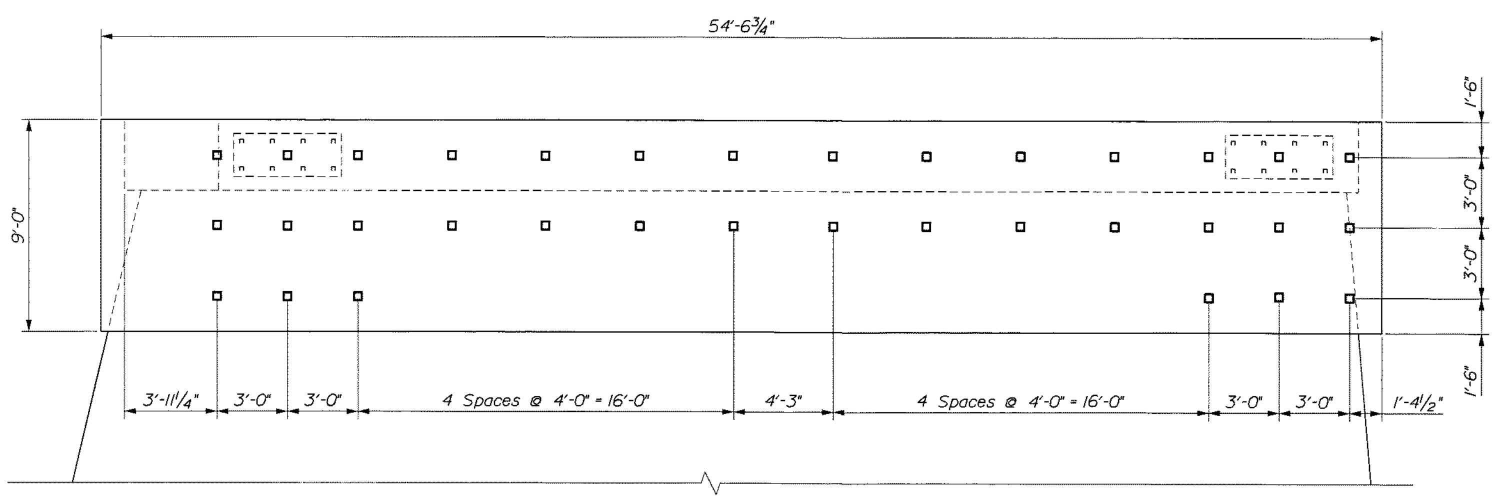
4



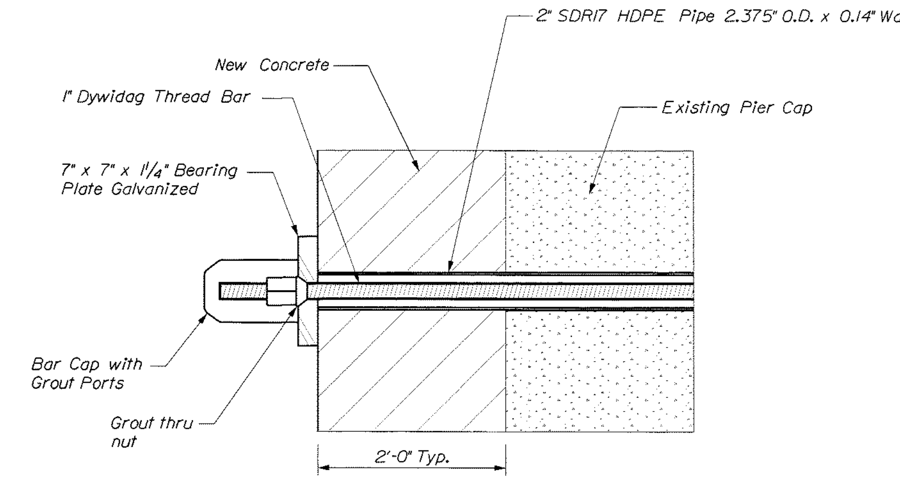
Pier Cap Plan



Far Side



Dywidag Location At Piie Cap



End Anchorage

PIER REPAIR NOTES

1. Removal of unsound concrete and placement of new pier concrete and reinforcement will be incidental to the lump sum item "910.301 Special Work - Pier Repair and Post Tensioning".

2. The contractor shall provide an acceptable means of access at the pier to allow the Resident to safely perform an inspection of all repair work to the concrete. Payment for access will be incidental to the lump sum item "910.301 Special Work - Pier Repair and Post Tensioning".

3. Chamfer all exposed edges ¾" unless noted otherwise.

4. All unsound concrete shall be removed to sound concrete as directed by the Engineer from the top of the pier to 9 feet below the top of the pier, prior to the placement of concrete. See photos and detail on Plan Sheets 4 & 5 for known areas of deteriorated concrete.

5. All post tensioning Thread Bars are to be 1" diameter, Grade 150ksi, and conform to the requirements of ASTM A722, Type II, or approved equal.

6. Thread Bars shall be tensioned and locked off at 89k.

7. All anchor plates shall conform to ASTM A709, Grade 50ksi and shall be galvanized in accordance with ASTM A123.

8. All cable grout shall conform to one of the following:
   - SikaGrout 300PT
   - Master Flow 816
   - Five Star Special Grout 400
   - Approved Equal

9. Use Class A/Method C concrete per Standard Specification Section 502. Concrete shall have a minimum of 7 days cure time and shall reach a compressive strength of 4350 psi before bars may be tensioned.

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

WIN 21124.00 Bridge Plans

Bridge #3330

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	B. Snowden	
CHECKED-REVIEWED	K. McLoggan	7/9/14
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE
P.E. NUMBER
DATE

Lewiston - Auburn
Bernard Lown Peace Bridge

Pier Cap Rehabilitation

Sheet Number
5

Filename: H:\Utilities\work\z_UTPLAN.dgn Division: BRIDGE Username: Kevin.McLoggan Date:7/14/2014

APPENDIX E: MISCELLANEOUS INFORMATION

- **BRIDGE LOAD RATING REPORT (2012)**
  Note: only the summary sheets are included here.

- **BRIDGE LOAD RATING REPORT ADDENDUM (2017)**
  Note: only memo and summary sheets are included here.

- **ENGINEERING REPORT "SOUTH BRIDGE #3330 OVER ANDROSCOGGIN RIVER, WIN 22599.00," BY VHB, DATED MARCH 18, 2016**
  Note: Appendices from that document are not included here.

Bridge Load Rating

Prepared for

Maine Department of Transportation

Bridge No. 3330

AUBURN, ANDROSCOGGIN COUNTY

CEDAR STREET

OVER

THE ANDROSCOGGIN RIVER

Date of Inspection: JUNE 7, 2012

Date of Rating: NOVEMBER 15, 2012

Prepared By:

PARSONS BRINCKERHOFF
75 ARLINGTON STREET
BOSTON, MA 02116

Checked By:

STATE OF MAINE
G.
Keith
Donington
D6329
LICENSED
PROFESSIONAL ENGINEER

G. Keith Donington

Bridge No:	3330	Owner:	State Highway Agency
Town/City:	Auburn	Maintainer:	State Highway Agency
Route Carried:	Cedar Street	Year Built	1936
Crosses:	Androscoggin River	Year(s) Rebuilt/Rehab:	1996

SUMMARY OF BRIDGE RATING

VEHICLE TYPE		RF	RT (TONS)	POSTING LOAD (TONS)
HL-93	INVENTORY	***0.55***	19.80	
	OPERATING	***0.72***	25.92	
HL-93 modified	INVENTORY	***0.00***	0.00	
	OPERATING	***0.00***	0.00	
CONFIGURATION 1		***0.82***	41.00	37.14
CONFIGURATION 2		***0.79***	37.13	32.90
CONFIGURATION 3		***0.81***	35.64	32.06
CONFIGURATION 4		***0.83***	36.52	33.31
CONFIGURATION 5		***0.81***	35.64	32.06
CONFIGURATION 6		***0.69***	26.19	21.14
CONFIGURATION 7		***0.76***	22.42	19.39
CONFIGURATION 8		***1.18***	22.07	OK

Group 1 Posting Analysis (Configuration 1)

Governing Posting: 37.14

Governing Load Model: CONFIGURATION 1

Group 2 Posting Analysis (Configurations 2 - 5)

Governing Posting: 32.06

Governing Load Model: CONFIGURATION 3

Group 3 Posting Analysis (Configurations 6 - 8)

Governing Posting: 19.39

Governing Load Model: CONFIGURATION 7

LRFR Evaluation Factors:

Live Load Distribution Factor:

Live Load DF Routine Commercial: 1.49

Live Load DF Special Hauling: 1.34

Impact Factor: 33%

Governing Condition Factor, ϕ_c: 0.85

System Factor, ϕ_s: 0.9

ADTT (one-way): 433

Please check all the boxes that apply:

- ☐ Bridge load rating is governed by substructure rating
- ☐ Connections control the load rating
- ☐ Exterior girder controls load rating
- ☐ As-built load rating
- ■ As-inspected load rating
- ☐ One Lane Loaded
- ☐ Advanced Analysis Used
- ☐ Actual Measurements Taken
- ☐ Finite Fatigue Life ________ years

Made by: CSS
Date: 11/15/2012
Checked by:AMC
Date:11/15/12

BREAKDOWN OF TRUSS BRIDGE RATING

Town/City: Auburn
Bridge No: 3330

Route Carried: Cedar Street
Crosses: Androscoggin River

LOAD RATING POINTS OF INTEREST

Bridge Component	HL-93		HL-93 Modified		MaineDOT Truck Configurations							
	Inv 72.0 kip	Oper 72.0 kip	Inv 90.0 kip	Oper 90.0 kip	1 100.0 kip	2 94.0 kip	3 88.0 kip	4 88.0 kip	5 88.0 kip	6 75.9 kip	7 59.0 kip	8 37.4 kip
Interior Stringer Positive Moment Mid Span	**0.67**	**0.87**			**0.97**	**0.94**	**0.96**	**0.98**	**0.96**	**0.82**	**0.90**	1.40
Interior Stringer Shear At Floor beam Connection	2.15	2.79			3.22	2.86	2.83	2.80	2.87	2.62	2.85	4.33
Exterior Stringer Positive Moment Mid Span	**0.55**	**0.72**			**0.82**	**0.79**	**0.81**	**0.83**	**0.81**	**0.69**	**0.76**	1.18
Exterior Stringer Shear At Floor beam Connection	2.33	3.02			3.48	3.09	3.06	3.02	3.10	2.84	3.08	4.68
Floor Beam Positive Moment Mid Span	**0.65**	**0.85**			**0.95**	**0.85**	**0.82**	**0.83**	**0.86**	**0.87**	**0.98**	1.53
Floor Beam Shear At Truss Connection	2.02	2.61			2.59	2.33	2.23	2.28	2.35	2.38	2.66	4.18
Floor Beam With Section Losses Positive Moment Mid Span	**0.65**	**0.85**			**0.95**	**0.85**	**0.82**	**0.83**	**0.86**	**0.87**	**0.98**	1.53
Floor Beam With Section Losses Shear At Truss Connection	1.64	2.13			2.10	1.90	1.82	1.85	1.91	1.94	2.17	3.40
Lower Chord Axial Tension L0-L1	1.32	1.71										
Lower Chord Axial Tension L1-L2	1.38	1.79										
Lower Chord Axial Tension L2-L3	1.29	1.67										
Lower Chord Axial Tension L3-L4	1.33	1.72										
Lower Chord Axial Tension L4-L5	1.29	1.67										
Lower Chord Axial Tension L5-L6	1.31	1.70										

Made by: CSS
Date: 11/15/2012
Checked by:AMC
Date:11/15/12

BREAKDOWN OF TRUSS BRIDGE RATING

Town/City: Auburn
Bridge No: 3330

Route Carried: Cedar Street
Crosses: Androscoggin River

LOAD RATING POINTS OF INTEREST

Bridge Component	HL-93		HL-93 Modified		MaineDOT Truck Configurations							
	Inv 72.0 kip	Oper 72.0 kip	Inv 90.0 kip	Oper 90.0 kip	1 100.0 kip	2 94.0 kip	3 88.0 kip	4 88.0 kip	5 88.0 kip	6 75.9 kip	7 59.0 kip	8 37.4 kip
Lower Chord Axial Tension L6-L7	1.32	1.71										
Lower Chord Axial Tension L7-L8	1.30	1.68										
Upper Chord Axial Compression U1-U3	1.30	1.68										
Upper Chord Axial Compression U3-U4	1.34	1.74										
Verticals Axial Tension L1-U1	2.07	2.68										
Verticals Axial Tension U3-L3	2.04	2.64										
Diagonal Axial Compression L0-U1	1.62	2.11										
Diagonal Axial Tension U1-L2	1.53	1.98										
Diagonal Axial Compression L2-U3	1.44	1.86										
Diagonal Axial Tension U3-L4	1.50	1.95										
Gusset Plate Bottom Chord L0	1.10	1.43										
Gusset Plate Bottom Chord L1	1.28	1.66										
Gusset Plate Bottom Chord L2	1.19	1.54										

MAINE SOUTH TRUSS BRIDGES

Made by: CSS
Date: 11/15/2012
Checked by:AMC
Date:11/15/12

BREAKDOWN OF TRUSS BRIDGE RATING

Town/City: Auburn
Bridge No: 3330

Route Carried: Cedar Street
Crosses: Androscoggin River

LOAD RATING POINTS OF INTEREST

Bridge Component	HL-93		HL-93 Modified		MaineDOT Truck Configurations							
	Inv 72.0 kip	Oper 72.0 kip	Inv 90.0 kip	Oper 90.0 kip	1 100.0 kip	2 94.0 kip	3 88.0 kip	4 88.0 kip	5 88.0 kip	6 75.9 kip	7 59.0 kip	8 37.4 kip
Gusset Plate Bottom Chord L3	1.25	1.62										
Gusset Plate Bottom Chord L4	1.02	1.33										
Gusset Plate Upper Chord U1	1.42	1.83										
Gusset Plate Upper Chord U3	1.02	1.33										
CONTROLLING RATING FACTORS	**0.55**	**0.72**			**0.82**	**0.79**	**0.81**	**0.83**	**0.81**	**0.69**	**0.76**	1.18

T·Y·LIN INTERNATIONAL

engineers | planners | scientists

MEMORANDUM

To:	Joel Kittredge, MaineDOT
From:	Daniel Myers, TYLI
Date:	February 8, 2017
Re:	Bridge #3330: Lewiston-Auburn Bernard Lown Peace Bridge: **Bridge Rating Report Addendum**
CC:	Heath Cowan, File

In 2012, a Bridge Rating Report was compiled for bridge #3330, the Bernard Lown Peace Bridge over the Androscoggin River between Lewiston and Auburn. That report was based upon the original 1936 plans, the 1936 shop drawings, and inspection reports.

However, no plans for the 1996 deck replacement were available at the time. In 2017, while preparing the Preliminary Design Report for WIN 22599.00, the 1996 deck replacement plans were found by the Department.

These 1996 plans show that shear connectors were added to the floorbeams and stringers. This addition dramatically increases the capacity of those elements. The stringers and floorbeams were the controlling elements for the 2012 Bridge Rating, with all of those elements rating below 1.0 for MaineDOT legal loads.

The attached Bridge Rating Report Addendum updates the flexural Bridge Ratings for the stringers and floorbeams based on the 1996 plans.

The stringers and floorbeams now all rate above 1.0 for HL-93 Inventory loads.

Flexure of the stringers and floorbeams no longer appear to govern the Bridge rating for this structure. Based on the Bridge Rating Breakdown from the 2012 Report, the apparent controlling elements are now "Gusset Plate Bottom Chord L4" and "Gusset Plate Upper Chord U3".

The apparent governing Bridge Rating Factors for Bridge #3330 are now 1.02 for HL-93 Inventory Loads and 1.33 for HL-93 Operating Loads, based on the breakdown in the 2012 Bridge Rating Report. These ratings have not been verified by T.Y. Lin International and are presented here for information only.

Bridge Load Rating Addendum

Prepared for

Maine Department of Transportation

Bridge No. 3330

Lewiston – Auburn

Bernard Lown Peace Bridge

OVER

Androscoggin River

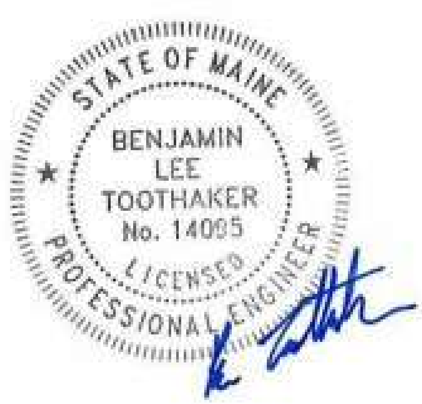
Date of Inspection: June 14, 2016

Date of Rating: February 8, 2017

Prepared By: Benjamin Toothaker, P.E.

Checked By: Daniel Myers, P.E.

T·Y·LIN INTERNATIONAL



Bridge No:	3330	Owner:	MaineDOT
Town/City:	Lewiston - Auburn	Maintainer:	MaineDOT
Route Carried:	Cedar St / Broad St	Year Built	1936
Crosses:	Androscoggin River	Year(s) Rebuilt/Rehab:	1996 (Deck)

SUMMARY OF BRIDGE RATING

This report serves as an addendum to the 2012 Load Rating Report. The 2012 Load Rating Report was compiled without access to plans from the 1996 deck replacement. During that deck replacement, changes were made to the structure, most notably the addition of shear connectors to the stringers and floorbeams. This report updates the load ratings for those elements of the bridge.

This report only includes flexural load ratings for the stringers and floorbeams. **The stringers and floorbeams are no longer the controlling elements for this bridge's load rating, based on comparison with the 2012 load rating breakdown tables.** Please refer to the 2012 report for ratings of other elements that now apparently control the structure's load rating.

LRFR Evaluation Factors:

Live Load Distribution Factor:	by element
Live Load LF Routine Commercial:	NA
Live Load LF Special Hauling:	NA
Impact Factor:	0.33
Governing Condition Factor, ϕ_c:	1.00
System Factor, ϕ_s:	1.0 str, 0.85 fb
ADTT (one-way):	108

Please check all the boxes that apply:

- ☐ Bridge load rating is governed by substructure rating
- ☐ Connections control the load rating
- ☐ Exterior girder controls load rating
- ■ As-built load rating
- ☐ As-inspected load rating
- ☐ One Lane Loaded
- ☐ Advanced Analysis Used
- ☐ Actual Measurements Taken
- ☐ Finite Fatigue Life ________ years

BREAKDOWN OF BRIDGE RATING

Town/City: Lewiston - Auburn
Bridge No: 3330

Route Carried: Cedar St / Broad St
Crosses: Androscoggin River

LOAD RATING POINTS OF INTEREST

Bridge Component	HL-93		HL-93 Modified		MaineDOT Truck Configurations							
	Inv 72.0 kip	Oper 72.0 kip	Inv 90.0 kip	Oper 90.0 kip	1 100.0 kip	2 94.0 kip	3 88.0 kip	4 88.0 kip	5 88.0 kip	6 75.9 kip	7 59.4 kip	8 37.4 kip
Exterior Stringer Strength I Positive Moment, 0.5L	2.04	2.64										
Exterior Stringer Service II Positive Moment, 0.5L	1.61											
Interior Stringer Strength I Positive Moment, 0.5L	2.14	2.77										
Interior Stringer Service II Positive Moment, 0.5L	1.69											
End Floorbeam Strength I Positive Moment, 0.5L	1.07	1.38										
End Floorbeam Service II Positive Moment, 0.5L	1.38											
Interior Floorbeam Strength I Positive Moment, 0.5L	1.06	1.37										
Interior Floorbeam Service II Positive Moment, 0.5L	1.34											
CONTROLLING RATING FACTORS	1.06	1.37										

DESCRIPTION OF BRIDGE

Bridge Number:	3330
Owner:	MaineDOT
Maintained By:	MaineDOT
Location:	Lewiston – Auburn Town Line
Route Carried:	Cedar Street (Lewiston) / Broad Street (Auburn)
Feature Intersected:	Androscoggin River
Latest NBI Inspection Date:	June 14, 2016
Field Verification Date (if applicable):	None
Date of Construction:	1936
Bridge Type:	Steel through-truss
Material Properties:	Structural Steel: Stringers: F_y=33 ksi (Based on 1936 plans F_s=18 ksi), Floorbeams: F_y=45 ksi (Based on 1936 plans $F_s=1.4*F_{s.stringer}$), Concrete: f'_c=4000 psi (1996 deck replacement)
Original Design Loading:	H20
Date(s) of Rebuild/Rehab :	1996
Description of Rebuild/Rehab :	Deck Replacement
Posting:	None
Superstructure:	3 simply-supported riveted steel through-trusses
Substructure:	2 reinforced concrete full-height abutments, 2 reinforced mass concrete piers.
Bearings:	Fixed bearings on SW end of each span, steel rocker bearings on expansion end of each span.
Bridge Spans:	3-235’ spans
Bridge Skew:	None
Bridge Width:	58’-6” out-to-out
Roadway Width:	40’-0” curb-to-curb
Roadway Surface:	Bituminous
Curbs:	Concrete
Sidewalk/Walkway/Median:	6’-0” sidewalk on outside of both sides of the truss
Utilities:	1 duct bank, 3 cables, 1 water line, 1 abandoned water line.
Bridge Railing:	Steel bridge railings
Approach Railing:	None
Wearing Surface Condition:	Satisfactory
Bridge Railing Condition:	Acceptable
Deck Condition:	Satisfactory
Beam Condition:	Satisfactory
Bearing Condition:	Satisfactory
Abutment Condition:	Satisfactory
Pier Condition:	Satisfactory

Bernard Lown Peace Bridge #3330

Bridge Rating Addendum Notes

1. The load rating analysis performed and reported herein was based upon MaineDOT supplied design plans, fabrication drawings, inspection reports, and photographs. No field visits were performed to verify dimensions or conditions.

2. The load rating analysis was completed using LRFR methodology.

3. In 2012 a comprehensive load rating of the Bernard Lown Peace Bridge was conducted, including all truss elements and the floor system. This load rating was based on the 1936 as-builts for the bridge. In 2017, plans for the 1996 deck replacement were found, and these showed that shear connectors were added to the floorbeams and stringers during that project.

4. The load rating completed in 2012 assumed 33 ksi steel for all members based on the age of the structure. The existing plans state that the stringers are made of carbon steel with Fs=18,000 psi and that the floorbeams are made of silicon steel with a 40% increase in allowable stress. Based on this information, 33 ksi steel is used for the stringers and 45 ksi steel is used for the floorbeams.

5. This Bridge Rating Report Addendum is an update to the floorbeam and stringer flexural load ratings from the 2012 report, based on the 1996 deck replacement plans.

6. Load rating calculations were completed in a MathCAD worksheet.

7. Based on the 1936 plans, the exterior stringers are assumed to be historic 24WF (B24), 24x9, 74.0 plf; the interior stringers are assumed to be historic 24WF (B24), 24x9, 80.0 plf; the interior floorbeams are assumed to be historic 36WF (B36a), 36x16 ½, 280.0 plf; and the end floorbeams are assumed to be historic 36WF (B36a), 36x16 ½, 230.0plf. The published properties for each of these beams was used in the analysis

8. No floorbeam or stringer shear load ratings were updated. No truss member load ratings or gusset plate load ratings were updated.

9. Strength I and Service II load combinations were considered during this load rating for bending of the composite stringers and floorbeams – no other load combinations or design elements were checked.

10. The plastic moment capacity of the composite stringers and floorbeams was used in the load rating analysis.

11. A 1” haunch equal to the flange width was included in the section properties for analysis purposes in accordance with MaineDOT Bridge Design Guide Section 7.1.2. The

remaining portion of the haunch identified in the plans and pictures was included as dead weight (DC1) only.

12. No reduction to multiple presence factors due to low truck traffic volume was considered in this analysis.

References:

1. Bridge Load Rating for Bridge No. 3330, Auburn, Androscoggin County, Cedar Street over the Androscoggin River, prepared by Parsons Brinkerhoff, November, 2012
2. MaineDOT Load Rating Guide, 2015
3. MaineDOT Bridge Design Guide, 2003 with updates through 2014
4. Manual for Bridge Evaluation Second Edition with Interims through 2016
5. AASHTO LRFD Bridge Design Specifications – 7th Edition, with Interims through 2016
6. AISC Historical Record Dimensions and Properties Rolled Shapes – Tenth Printing

Engineering Report

South Bridge #3330 over Androscoggin River

WIN 22599.00

PREPARED FOR

MaineDOT

PREPARED BY

vhb

2 Bedford Farms Drive, Suite 200
Bedford, NH 03110
603.391.3900

Revised March 18, 2016

MaineDOT WIN #22599.00
South Bridge over Androscoggin River

Purpose
This Engineering Report summarizes VHB's evaluation of alternatives for rehabilitating or replacing the Bernard Lown Peace Bridge over the Androscoggin River. The evaluations consider both construction cost and life-cycle cost.

Background
Bridge No. 3330 (a.k.a. Bernard Lown Peace Bridge or South Bridge) carries Cedar Street over the Androscoggin River between Auburn and Lewiston and was constructed circa 1936. The 3-span thru-truss structure is located on a horizontal tangent alignment with a slight vertical curve. Each span is simply supported and is 235' between centerline of bearings. The overall bridge length is about 713' between centerline of bearings at abutments. The bridge roadway width is 40' from curb-to-curb with four 10' lanes (2 in each direction). Sidewalks are cantilevered along both truss lines. The trusses are spaced at 43'-6" on center and the overall width of the superstructure is 58'-6". Timber piles support full-height concrete counterfort abutments and concrete wall-type piers.

Modifications to the bridge since its original construction include: roadway lighting installed along the upper portions of the trusses during the 1960's; deck and joints replaced with pier #2 repairs in 1996; bottom chord splice plate repairs and pier cap #1 strengthening completed in 2014.

Parsons Brinkerhoff prepared a detailed Inspection Report in 2012, which noted the bridge condition as fair to poor. The deck is in good condition, the superstructure is in poor condition, and the substructure is in poor condition. Superstructure condition issues are due to deterioration of the floorbeams, stringers, and lower lateral bracing connection plates. The truss is generally in good condition, with minor paint loss. Substructure condition issues are due to concrete deterioration and spalls at the abutments and piers.

The Department has also indicated that the truss and floorsystem have adequate capacity for legal loads. Therefore no structural evaluations or strengthening measures are considered or included in this report.

Replacement Evaluation
The bridge should be replaced in five to ten years if it is not rehabilitated. This allows time for funding allocation, additional studies, and engineering without allowing too much time for the bridge to deteriorate to an unacceptable condition.

Bridge replacement estimates are based on a four span (157'-200'-200'-157') superstructure with weathering steel plate girders and a composite concrete deck, located about 37' downstream of the existing centerline. The new superstructure includes three 11'-lanes of traffic with 5' shoulders (43' curb-to-curb) and 5' sidewalks on each side (56'-2" out-to-out). H-piles support concrete abutment extensions and concrete filled steel pipe piles support concrete wall-type piers. Construction is phased to allow two lanes of traffic (one in each direction) at all times with a 4' minimum pedestrian walkway. A vertical curve profile is provided for the necessary freeboard of the deeper superstructure and to tie-in with the existing approach grades to minimize project impacts.

A new bridge is expected to have a design life of 100 years or more at this location with routine preservation techniques and material enhancements near the bridge joints. For estimating purposes, the new bridge is assumed to open to traffic in 2026.

Refer to the Conceptual Plans (sheets 1 through 11) in Attachment B for more information and details of the bridge replacement concept.

Rehabilitation Evaluation

A major bridge rehabilitation is necessary to extend the life of the existing bridge another 30 years or more until a new bridge is constructed or another major rehabilitation is undertaken. At the end of this planning horizon, the existing bridge will be almost 110 years old and at the end of the expected material life of the concrete substructures and the design life of the rehabilitation work.

The 30-year rehabilitation includes the following work:

- Complete painting of truss and floor system with containment and environmental protection
- Abutment and pier concrete repairs
- Pier cap #2 construction
- New galvanized bridge rail
- Joint seal replacements and minor joint header repairs
- New approach railings
- Mill and overlay of the bridge and immediate approaches
- Potentially restriping the bridge for different lane and shoulder configuration
- Replacing the existing bridge with a new bridge that is opened to traffic in 2046

Refer to the Conceptual Plans (sheets 12 through 18) in Attachment B for more information and details of the 30-year rehabilitation concept.

VHB also evaluated a rehabilitation option that extends the life of the bridge 50 years followed by a bridge replacement.

The 50-year rehabilitation includes the following work:

- Similar work to the 30-year option except the bridge is replaced with a new bridge and opened in 2066
- Two-cycles of complete painting with containment and environmental protection (year 2016 and 2041)
- Floor system rehabilitation and strengthening (year 2046)
- Additional truss repairs (year 2046)
- Concrete pier shaft and cap reconstruction and abutment rehabilitation (year 2036)

Cost Estimates

Estimated construction costs and life-cycle cost analyses of the two concepts are provided in Attachment A. The estimated construction costs are provided in Table 1.

Description	Cost
Bridge Replacement	$15.1M ($377/sf)
Bridge Rehabilitation	$4.7M ($113/sf)

Table 1 – Construction Cost Estimates

The life-cycle cost analysis (LCCA) compares the bridge replacement concept to the bridge rehabilitation concepts and follows the guidance in the MaineDOT Bridge Design Guide using constant initial cost. VHB considered a 55-year planning horizon and evaluated all concepts using a discount rate of 4% (average rate during last 30 years). The residual value of the new bridge is included in the LCCA to accurately compare the net cost of the three different options. The residual value of the proposed bridge is based on a linear relationship of the bridge age at the end of the planning horizon compared to the service life of the bridge. The estimated life-cycle costs in year 2016 dollars are provided in Table 2.

Description	Life-cycle Cost
Replacement	$9.2M
30-year Rehabilitation	$8.1M
50-year Rehabilitation	$8.1M

Table 2 – LCCA for 55-year planning horizon

Recommendation

The life-cycle cost analysis indicates a rehabilitation is more cost-effective than a bridge replacement. Therefore, it is prudent to rehabilitate the bridge because the deck is in good condition and the piers have been repaired. A rehabilitation will address the current deificiencies and minimize the capital investment at this time. The estimated construction cost (in 2016 dollars) is $4.7M.

APPENDIX F: TRAFFIC AND ACCIDENT DATA

- **TRAFFIC DATA**
- **CRASH SUMMARY**

STATE OF MAINE

INTERDEPARTMENTAL MEMORANDUM

FILE: Auburn

CC: Lewiston

Date of Request: 10/11/2016

Return: 10/31/2016

Latest Date Needed By 10/18/2016

To:	**Ed Hanscom**	Dept.:	MDOT, Bridge Program
From:	**Kendra Zarella 4-3446**	Dept.:	Bridge Program
Subject:	**Request for Traffic Information**	Project Manager:	**Joel Kittredge**
TOWN(S):	Auburn, Lewiston	P.I.N.	**22599.00** Consultant Proj
COUNTY:	Androscoggin	ROUTE:	Cedar St.

LOCATION/ DESCRIPTION: Bridge Rehabilitation: Bernard Lown Peace Bridge #3330 on the Auburn/Lewiston town line carrying Cedar Street over the Androscoggin River

Please Check Box if Applicable:	Roadway Changes or Relocation (Attach Sketch)	Turning Movement needed (Provide Locations under Comments)	Other Please Describe Under Comments

Prep By: MAM

	Sec. 1	Sec. 2	Sec. 3	Sec. 4	Sec. 5
Description of Sections	**Auburn - Broad St. NE/O Riverside Drive @ South Bridge**				
1 Latest AADT (Year)	14920(2011)				
2 Current **2018** AADT	14920				
3 Future **2028** AADT	16410				
4 Future **2038** AADT	17900				
5 DHV - % of AADT	10%	%	%	%	%
6 Design Hourly Volume	1790				
7 % Heavy Trucks (AADT)	1%	%	%	%	%
8 % Heavy Trucks (DHV)	1%	%	%	%	%
9 Direct.Dist. (DHV)	60%	%	%	%	%
10 18-KIP Equivalent P 2.0	69				
11 18-KIP Equivalent P 2.5	66				

Notes or Remarks: 18-Kip ESALS is based on 20 year life

PLEASE PROVIDE: (1) PIN NUMBER, (2) THE CURRENT & FUTURE YEARS FOR WHICH YOU WANT AADT CALCULATED, AND SEND TO MIKE MORGAN. (A LOCATION MAP IS NO LONGER NEEDED.)

TRAFFIC REQUESTS WILL BE FILLED ON A FIRST COME / SERVE BASIS. PLEASE SEND WHEN PROJECT KICKS OFF!!!

Need Only Data Items Numbered

Comments:

Bernard Lown Peace Bridge, #3330, Lewiston-Auburn

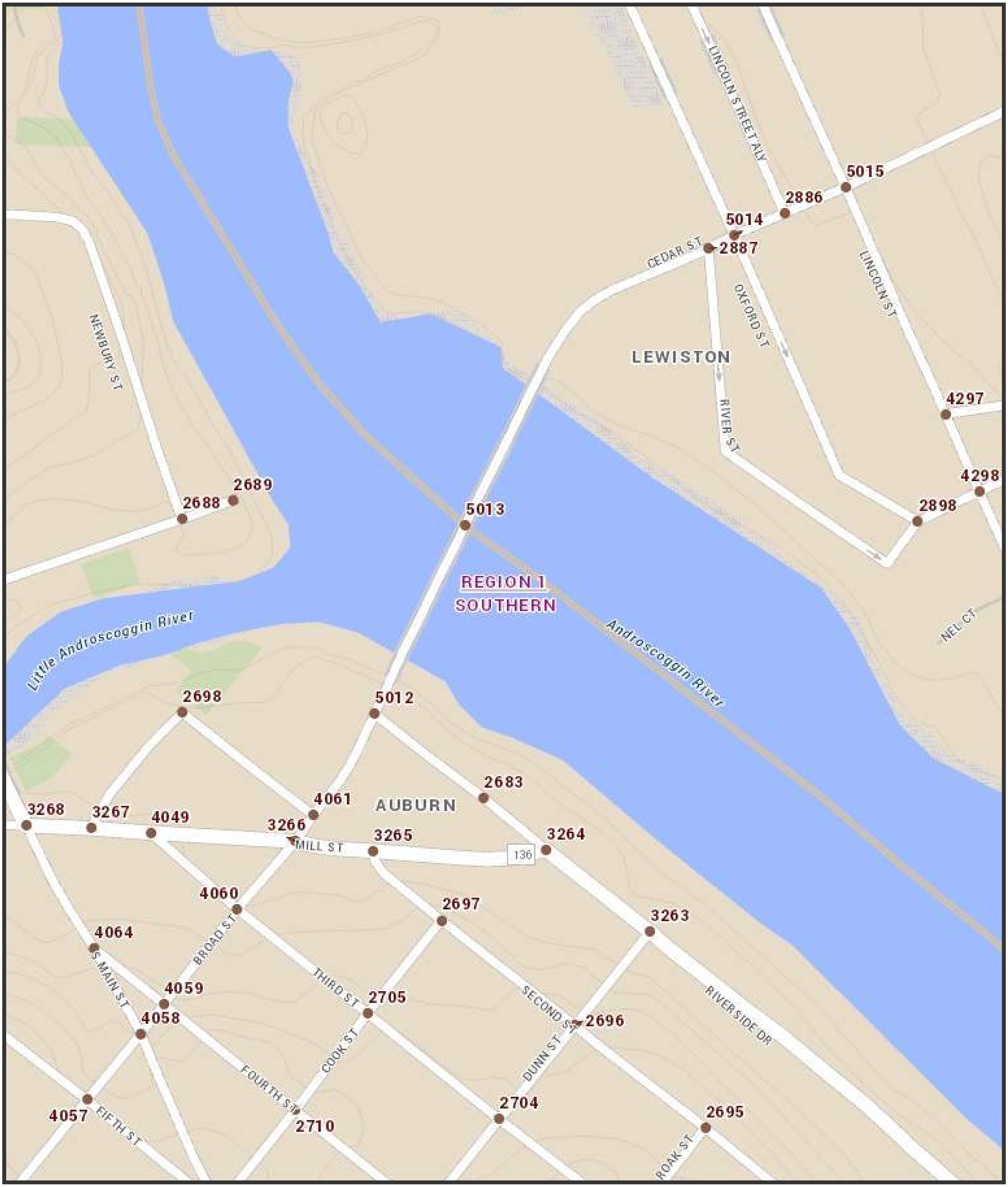
2011 Eastbound Volumes			Combined
Hour End	Peace Br	Longley Br	Longley Br
1	42	113	155
2	14	51	65
3	18	54	72
4	21	47	68
5	79	127	206
6	164	305	469
7	416	846	1262
8	699	**1417**	**2116**
9	619	1310	**1929**
10	433	1019	**1452**
11	426	986	1412
12	441	1007	**1448**
13	492	1157	**1649**
14	480	1147	**1627**
15	510	1222	**1732**
16	633	1229	**1862**
17	607	1252	**1859**
18	580	1208	**1788**
19	418	897	1315
20	273	641	914
21	182	480	662
22	130	347	477
23	117	215	332
24	65	149	214

2011 Westbound Volumes			Combined
Hour End	Peace Br	Longley Br	Longley Br
1	55	99	154
2	28	59	87
3	21	58	79
4	24	46	70
5	53	98	151
6	133	246	379
7	277	504	781
8	438	853	1291
9	486	922	1408
10	433	879	1312
11	484	936	1420
12	485	1061	1546
13	521	1114	**1635**
14	503	1133	**1636**
15	578	1148	**1726**
16	757	1390	**2147**
17	854	**1558**	**2412**
18	810	1366	**2176**
19	441	863	1304
20	343	673	1016
21	241	485	726
22	192	299	491
23	135	213	348
24	62	148	210

2011 Two-Way Volumes			Combined
Hour End	Peace Br	Longley Br	Longley Br
1	97	212	309
2	42	110	152
3	39	112	151
4	45	93	138
5	132	225	357
6	297	551	848
7	693	1350	2043
8	1137	2270	**3407**
9	1105	2232	**3337**
10	866	1898	2764
11	910	1922	**2832**
12	926	2068	**2994**
13	1013	2271	**3284**
14	983	2280	**3263**
15	1088	2370	**3458**
16	1390	2619	**4009**
17	1461	**2810**	**4271**
18	1390	2574	**3964**
19	859	1760	2619
20	616	1314	1930
21	423	965	1388
22	322	646	968
23	252	428	680
24	127	297	424

volume at or exceeding normal peak-hour volume on Longley Bridge
volume at or exceeding 80% of normal peak-hour volume on Longley Bridge

DEFAULT TITLE FROM MAP DOCUMENT



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0.065 Miles

1 inch = 0.07 miles

Date: 10/11/2016
Time: 10:31:41 AM

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☑ Crash Summary I ☑ Section Detail ☑ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☑ 1320 Summary

REPORT DESCRIPTION

WIN 22599 Bridge 3330 Auburn Lewiston

REPORT PARAMETERS

Year 2013, Start Month 1 through Year 2015 End Month: 12

Route: 0110047	Start Node: 5012	Start Offset: 0	☐ Exclude First Node
	End Node: 2887	End Offset: 0	☐ Exclude Last Node

Crash Summary I

Nodes

Node	Route - MP	Node Description	U/R	Total Crashes	K	A	B	C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
5012	0110047 - 2.91	Int of BROAD ST RIVERSIDE DR	2	2	0	0	0	0	2	0.0	5.632	0.12 Statewide Crash Rate:	0.33 0.13	0.00
5013	0110047 - 3	TL Auburn Lewiston	2	0	0	0	0	0	0	0.0	2.754	0.00 Statewide Crash Rate:	0.39 0.13	0.00
2887	0110047 - 3.16	Int of CEDAR ST, RIVER ST	2	2	0	0	0	1	1	50.0	5.545	0.12 Statewide Crash Rate:	0.33 0.13	0.00
Study Years: 3.00		NODE TOTALS:		4	0	0	0	1	3	25.0	13.931	0.10	0.26	0.37

Crash Summary I

Sections

Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	K	Injury Crashes A	B	C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
5012	5013	3117538	0 - 0.09	0110047 - 2.91	0.09	2	1	0	0	0	0	1	0.0	0.00496	67.24	440.84	0.00
Int of BROAD ST RIVERSIDE DR				RD INV 01 10047											Statewide Crash Rate: 186.22		
2887	5013	3104097	0 - 0.16	0110047 - 3	0.16	2	9	0	0	2	2	5	44.4	0.00881	340.38	383.49	0.00
Int of CEDAR ST, RIVER ST				RD INV 01 10047											Statewide Crash Rate: 186.22		
Study Years: 3.00				Section Totals:	0.25		10	0	0	2	2	6	40.0	0.01377	242.05	347.06	0.70
				Grand Totals:	0.25		14	0	0	2	3	9	35.7	0.01377	338.87	482.49	0.70

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	K	A	B	C	PD	Crash Report	Crash Date	Crash Mile Point	Injury Degree
5012	5013	3117538	0 - 0.09	0110047 - 2.91	1	0	0	0	0	1	2013-20682	08/17/2013	2.99	PD
2887	5013	3104097	0 - 0.16	0110047 - 3	9	0	0	2	2	5	2013-8376	03/31/2013	3.01	PD
											2015-41318	09/08/2015	3.02	PD
											2014-7884	03/04/2014	3.05	B
											2014-3758	01/31/2014	3.06	C
											2014-25059	09/10/2014	3.08	B
											2015-14432	05/11/2015	3.09	PD
											2014-17002	06/13/2014	3.10	PD
											2015-47381	11/09/2015	3.10	PD
											2013-21732	08/30/2013	3.14	C
				Totals:	10	0	0	2	2	6				

Crash Summary II - Characteristics

Crashes by Day and Hour

	AM												Hour of Day							PM						
Day Of Week	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	Un	Tot
SUNDAY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
MONDAY	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3
TUESDAY	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
THURSDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
FRIDAY	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
SATURDAY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	0	0	0	0	0	0	0	2	1	0	3	3	0	0	1	1	0	1	1	0	0	1	0	0	0	14

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	18	23-Bicyclist	0
2-(Sport) Utility Vehicle	4	24-Witness	0
3-Passenger Van	1	25-Other	0
4-Cargo Van (10K lbs or Less)	0	Total	32
5-Pickup	5		
6-Motor Home	0		
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	1		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	2		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	1		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	7	4	2	0	0	0	13
Ran Off Roadway	0	0	0	0	0	0	0
Failed to Yield Right-of-Way	0	1	0	0	0	0	1
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	0	0	0	0	0	0	0
Improper Turn	0	0	0	0	0	0	0
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	2	2	1	0	0	0	5
Failed to Keep in Proper Lane	1	1	0	1	0	0	3
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	1	0	0	0	0	0	1
Other Contributing Action	2	2	0	0	0	0	4
Unknown	1	2	1	0	0	0	4
Total	14	12	4	1	0	0	31

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	14	13	4	1	0	0	32
Physically Impaired or Handicapped	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total	14	13	4	1	0	0	32

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	3	0	0	0	0	3
20-24	3	0	0	0	0	3
25-29	2	0	0	0	0	2
30-39	3	0	0	0	0	3
40-49	9	0	0	0	0	9
50-59	5	0	0	0	0	5
60-69	3	0	0	0	0	3
70-79	2	0	0	0	0	2
80-Over	1	0	0	0	0	1
Unknown	0	0	0	1	0	1
Total	31	0	0	1	0	32

Crash Summary II - Characteristics

Most Harmful Event

Most Harmful Event	Total
1-Overturn / Rollover	0
2-Fire / Explosion	0
3-Immersion	0
4-Jackknife	0
5-Cargo / Equipment Loss Or Shift	0
6-Fell / Jumped from Motor Vehicle	0
7-Thrown or Falling Object	0
8-Other Non-Collision	0
9-Pedestrian	1
10-Pedalcycle	0
11-Railway Vehicle - Train, Engine	0
12-Animal	0
13-Motor Vehicle in Transport	22
14-Parked Motor Vehicle	0
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0
16-Work Zone / Maintenance Equipment	0
17-Other Non-Fixed Object	2
18-Impact Attenuator / Crash Cushion	0
19-Bridge Overhead Structure	0
20-Bridge Pier or Support	0
21-Bridge Rail	0
22-Cable Barrier	0
23-Culvert	0
24-Curb	0
25-Ditch	0
26-Embankment	0
27-Guardrail Face	0
28-Guardrail End	0
29-Concrete Traffic Barrier	0
30-Other Traffic Barrier	0
31-Tree (Standing)	0
32-Utility Pole / Light Support	0
33-Traffic Sign Support	0
34-Traffic Signal Support	0
35-Fence	0
36-Mailbox	0
37-Other Post Pole or Support	0
38-Other Fixed Object (wall, building, tunnel, etc.)	0
39-Unknown	6
40-Gate or Cable	0
41-Pressure Ridge	0
Total	31

Traffic Control Devices

Traffic Control Device	Total
1-Traffic Signals (Stop & Go)	0
2-Traffic Signals (Flashing)	0
3-Advisory/Warning Sign	0
4-Stop Signs - All Approaches	1
5-Stop Signs - Other	0
6-Yield Sign	0
7-Curve Warning Sign	1
8-Officer, Flagman, School Patrol	0
9-School Bus Stop Arm	0
10-School Zone Sign	0
11-R.R. Crossing Device	0
12-No Passing Zone	1
13-None	10
14-Other	1
Total	14

Injury Data

Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	2	5
C	3	4
PD	9	0
Total	14	9

Road Character

Road Grade	Total
1-Level	14
2-On Grade	0
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	14

Light

Light Condition	Total
1-Daylight	12
2-Dawn	0
3-Dusk	1
4-Dark - Lighted	1
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	14

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2013	2014	2015	Total
JANUARY	0	1	0	1
FEBRUARY	0	1	0	1
MARCH	1	1	1	3
APRIL	0	0	0	0
MAY	0	0	1	1
JUNE	0	1	0	1
JULY	0	0	0	0
AUGUST	2	1	0	3
SEPTEMBER	0	1	1	2
OCTOBER	0	0	1	1
NOVEMBER	0	0	1	1
DECEMBER	0	0	0	0
Total	3	6	5	14

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End / Sideswipe	0	3	2	0	0	1	4	0	0	0	0	0	0	10
Head-on / Sideswipe	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Intersection Movement	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Pedestrians	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	1	0	0	0	0	0	0	0	0	0	0	0	1
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	4	3	0	0	1	5	0	0	0	0	0	0	14

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	1	0	0	0	0	0	0	0	0	0	0	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	9	0	0	0	0	0	0	0	0	0	0	9
Dusk	1	0	0	0	0	0	0	0	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	1	0	0	0	0	0	0	0	0	0	1	2
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

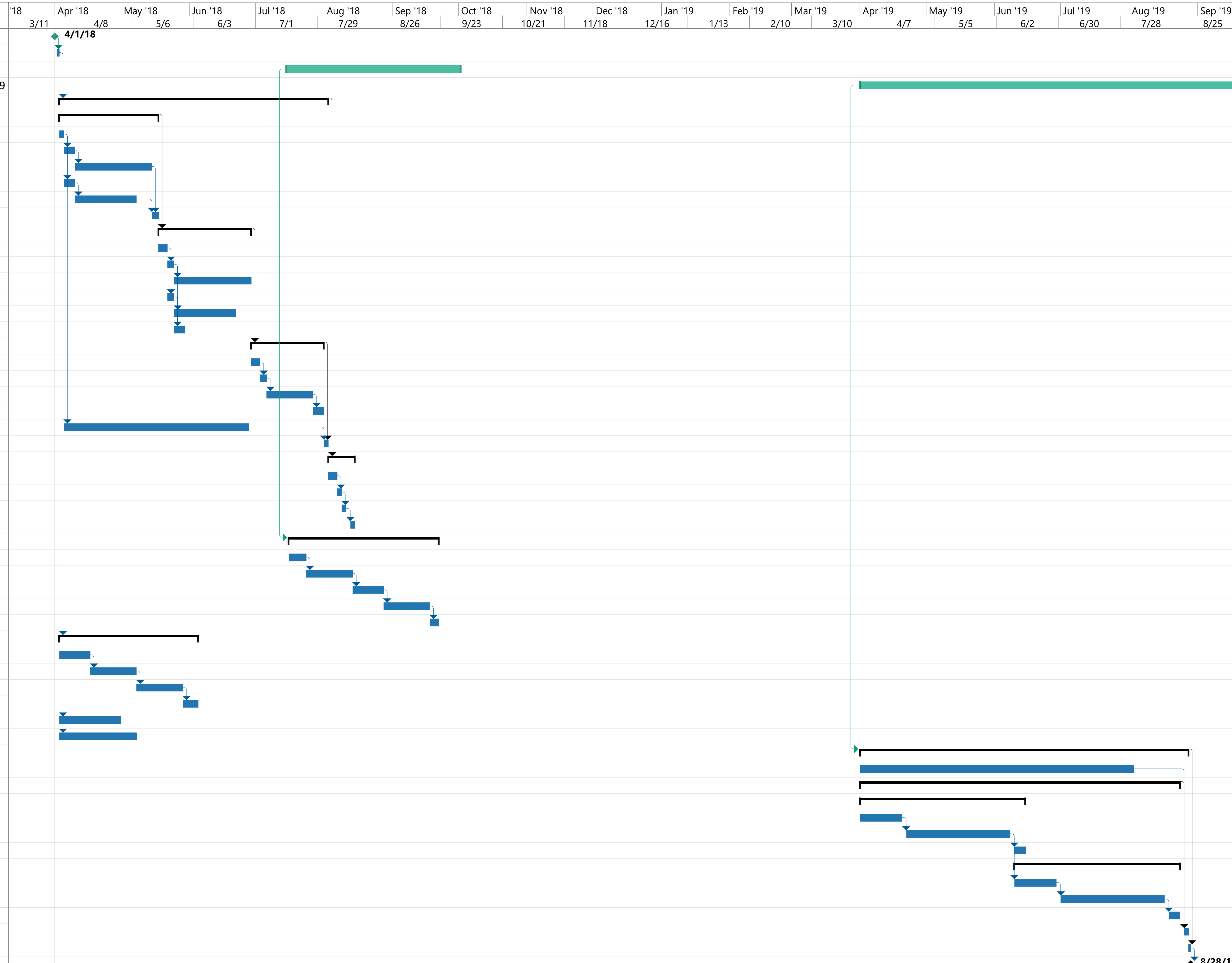
Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	12	0	0	0	0	0	0	0	0	0	0	14

APPENDIX G: ESTIMATED CONSTRUCTION SCHEDULE

ID	Task Name	Duration (Work	Start	Finish
1	**Begin Project**	0 days	4/1/18	4/1/18
2	**Mobilize**	1 day	4/2/18	4/2/18
3	>>Possible In-Stream Work Window<<	57 days	7/15/18	10/1/18
4	>>Painting Season<<	153 days	4/1/19	10/30/19
5	**Deck Rehabilitation**	**88 days**	**4/3/18**	**8/2/18**
6	**Phase I - Deck Rehab**	**33 days**	**4/3/18**	**5/17/18**
7	Set up MoT	2 days	4/3/18	4/4/18
8	Remove Wearing Surface	3 days	4/5/18	4/9/18
9	Deck Repair	25 days	4/10/18	5/14/18
10	Remove Traffic Rail	3 days	4/5/18	4/9/18
11	New Permanent Concrete Barrier	20 days	4/10/18	5/7/18
12	New Membrane and Base Pavement	3 days	5/15/18	5/17/18
13	**Phase II - Deck Rehab**	**30 days**	**5/18/18**	**6/28/18**
14	Set up MoT	2 days	5/18/18	5/21/18
15	Remove Wearing Surface	3 days	5/22/18	5/24/18
16	Deck Repair	25 days	5/25/18	6/28/18
17	Remove Traffic Rail	3 days	5/22/18	5/24/18
18	New Permanent Concrete Barrier	20 days	5/25/18	6/21/18
19	New Membrane and Base Pavement	3 days	5/25/18	5/29/18
20	**Phase III - Deck Rehab**	**23 days**	**6/29/18**	**7/31/18**
21	Set up MoT	2 days	6/29/18	7/2/18
22	Remove Wearing Surface	3 days	7/3/18	7/5/18
23	Deck Repair	15 days	7/6/18	7/26/18
24	New Membrane and Base Pavement	3 days	7/27/18	7/31/18
25	Deck Rehab - Underside	60 days	4/5/18	6/27/18
26	Remove MoT	2 days	8/1/18	8/2/18
27	**Approach and Final Paving Work**	**8 days**	**8/3/18**	**8/14/18**
28	Mill Approach	2 days	8/3/18	8/6/18
29	Final Paving	2 days	8/7/18	8/8/18
30	New Joint Seals	2 days	8/9/18	8/10/18
31	Stripe Bridge and Approaches	2 days	8/13/18	8/14/18
32	**Pier 1 - Encasement at water line**	**50 days**	**7/16/18**	**9/21/18**
33	Construct Access Road	6 days	7/16/18	7/23/18
34	Construct Cofferdam	15 days	7/24/18	8/13/18
35	Place forms and rebar	10 days	8/14/18	8/27/18
36	Place Concrete and cure	15 days	8/28/18	9/17/18
37	Remove Access Road	4 days	9/18/18	9/21/18
38	**Pier 2 - Pier cap encasement**	**45 days**	**4/3/18**	**6/4/18**
39	Construct Access	10 days	4/3/18	4/16/18
40	Place forms and rebar	15 days	4/17/18	5/7/18
41	Place Concrete and cure	15 days	5/8/18	5/28/18
42	Place PT bars	5 days	5/29/18	6/4/18
43	Abutment 1 Concrete Repairs	20 days	4/3/18	4/30/18
44	Abutment 2 Concrete Repairs	25 days	4/3/18	5/7/18
45	**Paint & Repair Structural Steel**	**107 days**	**4/1/19**	**8/27/19**
46	Paint Below Deck	90 days	4/1/19	8/2/19
47	**Paint Truss Superstructure**	**105 days**	**4/1/19**	**8/23/19**
48	**Phase I - Paint Truss Superstructure**	**55 days**	**4/1/19**	**6/14/19**
49	Set up MoT and Containment	15 days	4/1/19	4/19/19
50	Paint Phase I	35 days	4/22/19	6/7/19
51	Remove Containment	5 days	6/10/19	6/14/19
52	**Phase II - Paint Truss Superstructure**	**55 days**	**6/10/19**	**8/23/19**
53	Set up MoT and Containment	15 days	6/10/19	6/28/19
54	Paint Phase II	35 days	7/1/19	8/16/19
55	Remove Containment	5 days	8/19/19	8/23/19
56	Remove MoT	2 days	8/26/19	8/27/19
57	**Demobilize**	1 day	8/28/19	8/28/19
58	**End Project**	0 days	8/28/19	8/28/19



MaineDOT: Bernard Lown Peace Bridge (WIN 22599.00) PDR
Estimated Construction Schedule for Bridge Rehabilitation Alternative
Developed by Daniel Myers | Checked by David Sherlock | December 2016

Task Milestone ◆ Summary

APPENDIX H: PRELIMINARY COST ESTIMATES

- **PRELIMINARY COST ESTIMATES**
- **LIFE-CYCLE COST ANALYSIS**

Preliminary Cost Estimate

Alternative 2

PROJECT:	Lewiston/Auburn, Bernard Lown Peace Bridge #3330			**WIN:**		22599.00
Alternative 2:	Bridge Rehabilitation: 718' 3-Span Truss: Patch Deck, New Wearing Surface, Repair & Paint Truss, Repair Substructures Deck Area: 42,000 SF			**ESTIMATED BY:**		DSM

SUPERSTRUCTURE: DECK, BARRIER & LIGHTING	42,000	**SF**	×	$33.00	=	$1,386,000
SUPERSTRUCTURE: PAINT & STRUCTURAL STEEL REPAIR	42,000	**SF**	×	$100.00	=	$4,200,000
ABUTMENTS	2	**EA**	×	$46,000.00	=	$92,000
PIER 1 REHABILITATION	1	**EA**	×	$105,000.00	=	$105,000
PIER 2 REHABILITATION	1	**EA**	×	$250,000.00	=	$250,000
COFFERDAM (PIER 1)	1	**EA**	×	$125,000.00	=	$125,000
STRUCTURAL EXCAVATION & BORROW	0	**CY**	×	$0.00	=	$0
PLAIN RIPRAP	0	**CY**	×	$0.00	=	$0
EXISTING BRIDGE REMOVAL	0	**LS**	×	$0.00	=	$0
DETOUR AND/OR TEMPORARY BRIDGE	0	**LS**	×	$0.00	=	$0
REHABILITATION CONTINGENCIES (APPLIED TO REPAIR ITEMS ONLY)				25%	=	$250,000
MISCELLANEOUS (TCP'S, FIELD OFFICE, ETC.)				5%	=	$308,000
MOBILIZATION				10%	=	$672,000
				STRUCTURE SUBTOTAL	=	**$7,390,000**
APPROACHES	100	**LF**	×	$140.00	=	$14,000
MISCELLANEOUS				25%	=	$4,000
MOBILIZATION				10%	=	$2,000
				APPROACHES SUBTOTAL	=	**$20,000**
				TOTAL CONSTRUCTION COST	=	**$7,410,000**
PRELIMINARY ENGINEERING				7%	=	$490,000
RIGHT OF WAY					=	$10,000
CONSTRUCTION ENGINEERING				7%	=	$490,000
OTHER:					=	$0
				TOTAL PROJECT COST	=	**$8,400,000**

Preliminary Cost Estimate

Alternative 3

PROJECT:	Lewiston/Auburn, Bernard Lown Peace Bridge #3330	**WIN:**	22599.00
Alternative 3:	Bridge Replacement: 710' 4-Span Continuous Steel Girders With Concrete Deck on Shaft Piers and Stub Abutments Deck Area: 33,650 SF	**ESTIMATED BY:**	DSM

SUPERSTRUCTURE:	33,650	**SF**	×	$165.00	=	$5,553,000
ABUTMENTS	2	**EA**	×	$730,000.00	=	$1,460,000
PIERS	3	**EA**	×	$845,000.00	=	$2,535,000
COFFERDAMS (PIERS)	3	**EA**	×	$200,000.00	=	$600,000
COFFERDAMS (ABUTMENTS)	1	**EA**	×	$50,000.00	=	$50,000
STRUCTURAL EXCAVATION, BORROW, & DISPOSAL	7,550	**CY**	×	$95.00	=	$718,000
PLAIN RIPRAP	2,150	**CY**	×	$75.00	=	$162,000
EXISTING BRIDGE REMOVAL	1	**LS**	×	$1,100,000.00	=	$1,100,000
DETOUR AND/OR TEMPORARY BRIDGE	0	**LS**	×	$0.00	=	$0
REHABILITATION CONTINGENCIES				N/A	=	$0
MISCELLANEOUS (TCP'S, FIELD OFFICE, ETC.)				5%	=	$609,000
MOBILIZATION				7%	=	$896,000
				STRUCTURE SUBTOTAL	=	**$13,690,000**
APPROACHES	650	**LF**	×	$700.00	=	$455,000
MISCELLANEOUS				25%	=	$114,000
MOBILIZATION				7%	=	$40,000
				APPROACHES SUBTOTAL	=	**$610,000**
				TOTAL CONSTRUCTION COST	=	**$14,300,000**
PRELIMINARY ENGINEERING				7%	=	$1,000,000
RIGHT OF WAY					=	$550,000
CONSTRUCTION ENGINEERING				6%	=	$850,000
OTHER:					=	$0
				TOTAL PROJECT COST	=	**$16,700,000**

Life Cycle Cost Analysis of Preliminary Design Alternatives

Assumptions:

Comparison Time Horizon (H)	100	years	*At end of Replacement Design Life*
Discount Rate (D)	4%		*Commonly recommended value*
Design Life of Replacement Bridge	100	years	

Rehabilitation Alternative (Maintain Truss for 30 years)

Discrete Future Costs:	**Cost**	**Year**	**PV/FV***	**Present Value**
Rehabilitate Bridge	$ 8,400,000	0	1.00	$ 8,400,000
1st Wearing Surface	$ 120,000	15	0.56	$ 66,600
Replacement Structure	$ 16,700,000	30	0.31	$ 5,148,900
2nd Wearing Surface	$ 100,000	45	0.17	$ 17,100
3rd Wearing Surface	$ 100,000	60	0.10	$ 9,500
4th Wearing Surface	$ 100,000	75	0.05	$ 5,300
5th Wearing Surface	$ 100,000	90	0.03	$ 2,900
Remaining Value of Replacement Structure	$ (5,010,000)	100	0.02	$ (99,200)

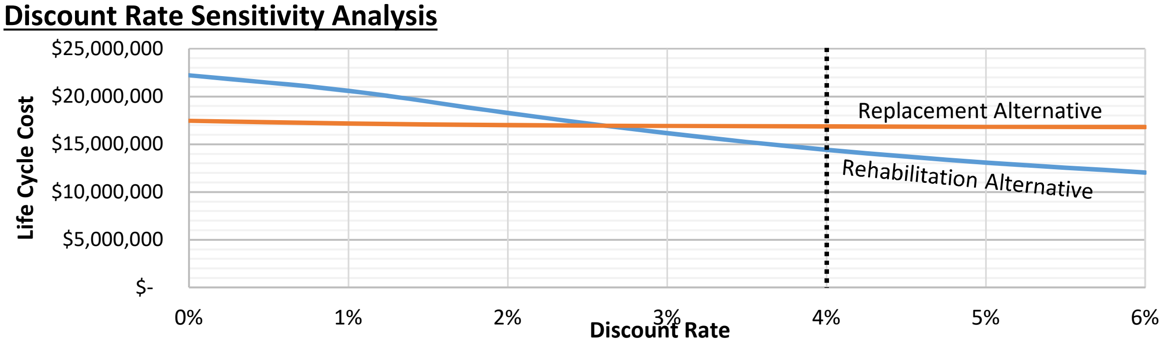
Reoccuring Future Costs:	**Cost**	**Years**	**PVOA***	**Present Value**
Inspection (cost per year, Rehab)	$ 30,000	30	17.29	$ 518,800
Maintenance (cost per year, Rehab)	$ 20,000	30	17.29	$ 345,800
Inspection (cost per year, Replacement)	$ 600	30-100	7.21	$ 4,300
Maintenance (cost per year, Replacement)	$ 1,000	30-100	7.21	$ 7,200
Total Dollar Cost minus Remaining Value (not Discounted)				$ 22,220,000
Total Life Cycle Cost of Rehabilitation Alternative @ 4% Discount Rate				**$ 14,430,000**

Replacement Alternative

Discrete Future Costs:	**Cost**	**Year**	**PV/FV***	**Present Value**
New Structure	$ 16,700,000	0	1.00	$ 16,700,000
1st Wearing Surface	$ 100,000	15	0.56	$ 55,500
2nd Wearing Surface	$ 100,000	30	0.31	$ 30,800
3rd Wearing Surface	$ 100,000	45	0.17	$ 17,100
4th Wearing Surface	$ 100,000	60	0.10	$ 9,500
5th Wearing Surface	$ 100,000	75	0.05	$ 5,300
6th Wearing Surface	$ 100,000	90	0.03	$ 2,900

Reoccuring Future Costs:	**Cost**	**Years**	**PVOA***	**Present Value**
Inspection (cost per year, Replacement)	$ 600	100	24.50	$ 14,700
Maintenance (cost per year, Replacement)	$ 1,000	100	24.50	$ 24,500
Total Dollar Cost minus Remaining Value (not Discounted)				$ 17,460,000
Total Life Cycle Cost of Replacement Alternative @ 4% Discount Rate				**$ 16,860,000**

Discount Rate Sensitivity Analysis



*PV/FV = Present Value of an Future Lump Sum, calculated as (1 / ((1 + D) ^ Year))
*PVOA = Present Value of an Ordinary Anuity, calculated as ((1 - (1 / (1 + D) ^ H)) / D)

FEDOCS —

PDF TO JOEL —

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

JUN - 2 2017

Joel Kittredge
Maine Department of Transportation
Bridge Program
16 State House Station
Augusta, ME 04333

WIN 22603.00

Re: NOAA Fisheries' comments on the analysis of alternatives for the proposed Frank J. Wood Bridge project.

Dear Mr. Kitteredge:

On Wednesday, April 5, you held a public meeting in Brunswick, Maine regarding alternatives for improvements being considered to the Frank J. Wood Bridge that spans the Androscoggin River on the Brunswick-Topsham town line in Maine.

In your March 10, 2017, analysis of alternatives, you identified five potential alternatives as follows:

1. A new 800 ft. bridge on the existing alignment;
2. A new 835 ft. bridge on a curved alignment upstream of the existing bridge;
3. Rehabilitation of the existing bridge;
4. Rehabilitation of the existing bridge, including the addition of a sidewalk; and,
5. A new 800ft bridge on a parallel alignment downstream of the existing bridge.

The summary of alternatives document dismissed alternatives 5 due to water rise/flood concerns.

A number of federally-listed species occur in the Androscoggin River near the bridge site. This includes the endangered Gulf of Maine distinct population segment (DPS) of Atlantic salmon, endangered shortnose sturgeon, and the Gulf of Maine DPS of Atlantic sturgeon. Additionally, the project area is designated as critical habitat for Atlantic salmon. This portion of the river is also used for spawning and rearing of shortnose and Atlantic sturgeon. On June 3, 2016, the main stem of the Androscoggin River from the Brunswick Dam downstream approximately 10 kilometers to where the river discharges to Merrymeeting Bay was proposed for designation as critical habitat for Atlantic sturgeon (81 FR 35701). The final rule is expected in July 2017. More information on these species can be found on our webpage (https://www.greateratlantic.fisheries.noaa.gov/protected/index.html).

The existing Frank J. Wood Bridge is located immediately downstream of Brookfield White Pine Hydro, LLC's Brunswick Hydroelectric Project (FERC License No. P-2284). Upstream fish passage at the Brunswick Hydroelectric Project is provided via a vertical slot fishway, located adjacent to the project powerhouse on river left, looking upstream. On December 13, 2013, after

formal ESA consultation with us, the Federal Energy Regulatory Commission amended the license for the Brunswick Hydroelectric Project to include an Interim Species Protection Plan (ISPP). The ISPP included conditions that require Brookfield to study and adaptively manage up- and downstream passage at the Brunswick Project, in consultation with us, to protect migrating Atlantic salmon.

We expect that a consultation, pursuant to section 7 of the ESA, will be required given that any of the proposed alternatives may affect ESA listed species and designated critical habitat. More information on the section 7 process can be found at https://www.greateratlantic.fisheries.noaa.gov/protected/section7/index.html.

Based on the currently available information, we highlight the following issues for your consideration as you determine the preferred alternative:

1. Alternatives 1, 2, and 5, would involve construction of a new bridge. The effects of bridge design considerations, including, but not limited to, effects on shade, sound, and to river hydraulics due to pier design, placement, and orientation, could negatively impact the functionality of the existing fishway at the Brunswick Dam.

2. We understand that at this stage, the design renderings for each of the alternatives are preliminary. However, the preliminary design for alternative 2, included in your *Summary of Alternatives* (a curved alignment upstream of the existing bridge) would have bridge project structures, such as piers, within closer proximity to the Brunswick Dam, including the existing fishway, than the other alternatives under consideration. As such, the potential impacts upon the function of the existing fishway would likely be more significant. Furthermore, the design and placement of bridge piers under this alternative could significantly restrict future options for infrastructural improvements to enhance fish passage at the Brunswick Project for endangered salmon and other diadromous species, should information gathered under the ISPP indicate such improvements are necessary.

3. Because the proposed bridge replacement and rehabilitation alternatives involve in-water work, we are concerned about the effects of driving piles, adding fill, vessel traffic, and elevated turbidity for the new bridge, as well as the effects of the old bridge demolition, on listed species in the river. Whereas Atlantic salmon primarily use the lower Androscoggin for migration, Atlantic sturgeon and shortnose sturgeon have been documented spawning over the hard bottom- rubble substrate directly downstream of the dam. The consideration of alternatives should take into account potential temporary and permanent impacts to these species and their habitats.

4. We are also concerned about the duration of the project and its potential impact to the behaviors of listed species. Atlantic salmon migrate upstream though the project area in May, June, and July. Shortnose sturgeon spawn in the project area in April and June, and Atlantic sturgeon spawn in the same area in June and July. While Atlantic salmon and both anticipated sturgeon species are iteroparous, sturgeon are a long lived species that do not spawn annually and the loss of a spawning cohort can be highly detrimental to the species recovery and survival. Any aborted migration or deferred spawning by Atlantic

salmon has a deleterious effect on the species ability to develop into a self-sustaining population.

Essential Fish Habitat and Fish and Wildlife Coordination Act
The Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act (FWCA) requires federal agencies to consult with one another on projects such as this. Insofar as a project involves Essential Fish Habitat (EFH), as this project does, this process is guided by the requirements of our EFH regulation at 50 CFR 600.920, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure.

The Androscoggin River and the Merrymeeting Bay are identified as EFH for Atlantic salmon. In addition to the federally-listed species discussed above, the area supports a number of other diadromous species including alewife, blueback herring, rainbow smelt, American shad, sea lamprey, American eel, and striped bass, and the Habitat Conservation Division consults under the Fish and Wildlife Coordination Act for these species. Many of these species are reported to pass through the fishway of the dam to reach upstream spawning or juvenile development habitat. In addition, some of these species serve as prey for federally-managed species, and are therefore considered a component of EFH. Lastly, a number of federally-managed species occur within the tidal waters downstream of the dam and may occur within the proximity of the proposed project, including winter flounder and windowpane flounder, bluefish, Atlantic mackerel, red hake, and white hake.

An EFH assessment that includes the effects of the various bridge alternatives being considered should be prepared for the proposed project, including evaluations of any temporary and permanent fish habitat impacts, especially potential alteration to habitats effecting migration for diadromous fish. In addition, the assessment should address adverse effects to fish species from underwater noise, turbidity, and other construction activities, as well as potential bridge shading and demolition activities.

Thank you for the opportunity to comment on the proposed alternatives; we look forward to continuing to work with you as the project moves forward. If you have any questions or need additional information regarding the Endangered Species Act, please contact Matt Buhyoff (Matt.Buhyoff@noaa.gov) at 207-866-4238 or Max Tritt (Max.Tritt@noaa.gov) at 207-866-3756. For questions or information regarding EFH or Fish and Wildlife Coordination Act consultations, please contact Michael Johnson (mike.r.johnson@noaa.gov) at 978-281-9130.

Sincerely,

Mark Murray-Brown

Mark Murray-Brown
Section 7 Coordinator
for Protected Resources

H:\Section 7 Team\Section 7\Non-Fisheries\FHWA_State DOTs\TA Letters\FHWA\Brunswick Bridge

CC: MTritt, MBuhyoff, ZJyllka, MJohnson

FJW/BROOKFIELD DISCUSSION 1-20-17

Meeting Minutes

- Brookfield / FERC concerns and issues
  - Facility relicensing coming up----starts in 2019---5 year process.
    - 5 year process does not fit with the condition of the existing structure's need for replacement by 2020+/-.
    - Will the facility even be relicensed?
  - Outside of fishway discussion, proposed replacement project will result in a simple filing of change of use within Brookfield's project boundaries.
  - Little concern with FERC – will not need separate NEPA
    - Send PDR or engineers document to Brookfiled/FERC when permitting is close to complete.
    - Looks like little impact. No need for separately appointed consultant review.
    - 90 days FERC approval from time of PDR submission?
  - Fishway concerns
    - Determine if the "performance" suffers. Performance applies to the effect on fish behavioral aspects----as-is existing vs. proposed.
    - How to address? How has this been done at other locations? Kristen to work with Brookfield and agencies to come up with testing regimen.
    - Section 7 will dictate further evaluation of performance.
    - If performance suffers, how to address? There is a lack of real estate to make improvements. Could result in a multi-million dollar fix. Who pays and who is liable?
    - Attaining or maintaining fishway performance will be a business decision. Brookfield will not assume the high risk level ($$$) associated with having to do future improvements to the fishway as a result of our bridge installation affecting performance.
    - Is it possible to do a lift by the powerhouse?
    - Where exactly is the concrete wall/patch that was cast in the vicinity of proposed pier #3. This was cast to push the fish toward the fishway? Need to locate. Action Item---Joel/Chris to forward pictures.
    - Will need to know what the temporary trestles look like and sit for Section 7.
    - "Flicker" (light, strobe), light/dark concerns for fish in the turning pool, and long term "vibrations and noise" are a concern for all species. How to model the sun? Need analysis to prove future condition is equal to or less than today's baseline.
    - Will joint noise at abutment #1 be an issue for the fish? Why not measure similar joint noise?

From:	Mike R Johnson - NOAA Federal
To:	Chamberlain, Kristen
Cc:	Ham, Eric; Boyden, Sarah; max.tritt@noaa.gov; matt.buhyoff@noaa.gov; dan.tierney@noaa.gov; donald.dow@noaa.gov; Maloney, Kelly; zachary.jylkka@noaa.gov; Richter, Robert; Gardner, David; Kittredge, Joel; Norman Baker; martin, cheryl; cassandra.chase@dot.gov; Frankhauser Jr, Wayne
Subject:	Re: FJW Fishway Follow-Up
Date:	Tuesday, August 01, 2017 2:24:22 PM

Kristen,

During the conference call yesterday ME DOT presented several alternative bridge alignments north of the existing bridge. Perhaps this was discussed during the first few minutes of the meeting while I was trying to call in, but I'm wondering about the bridge alignment alternatives south of the existing bridge and why they have been rejected. I recall during a site meeting last year that a southern alignment was a consideration. From a fishery perspective, all the alignments north of the existing bridge increase the potential adverse affects to species migrating through the fish ladder, and alignments south of the existing bridge would appear to reduce those impacts. As part of the EFH assessment, please include those other bridge alternatives not included in yesterday's conference call, as well as a discussion about why they have been rejected for further consideration.

Thanks,

Mike

On Wed, Jul 19, 2017 at 2:53 PM, Chamberlain, Kristen <Kristen.Chamberlain@maine.gov> wrote:

Hi-

I hope you are all are having a great summer! Since we met at the beginning of June regarding potential impacts from the Frank J. Wood Bridge project, you likely heard that MaineDOT/FHWA have formally announced that the preferred alternative is replacement on the upstream alignment and that we are preparing an Environmental Assessment (EA). At the same time, we are preparing to initiate consultation with NMFS on the preferred alternative. The interaction between the bridge project, Endangered Species, EFH, and impacts to Brookfield and the fishway are important pieces of the EA and MaineDOT's decision making process.

MaineDOT and TYLIN have done some follow up on a couple of items raised at the June 1st meeting. TYLIN has evaluated some alternative span arrangements for the upstream alternative that we would like to share and get feedback from both Brookfield and NMFS. TYLIN has also refined the shadow analysis to consider the internal shadow effect of the fish way itself. I'll be sending some material to review shortly, but at this time I'd like to try to schedule a phone call/meeting to explain where we are at and hear your thoughts.

Could you please indicate your availability in the Doodle Poll at this link:

https://doodle.com/poll/8rrwae2in8ua3pty

Thank you!

Kristen Chamberlain
Bridge, Multi Modal and Traffic Team Leader
Environmental Office
Maine Department of Transportation
(207) 557-5089

To: Norman Baker <norman.baker@tylin.com>
Subject: PHASE 2---FJW

Norm:

Please submit a draft proposal for Phase 2 scope/tasks with spreadsheet, but no hours or fee, for our favorite project.

Please anticipate a November and December 2018, PS&E and ADV, respectively, allowing time for Brookfield to shake-out. But, please plan for flexibility to accelerate to a June 2018 PS&E if the Brookfield obstacle(s) are *easily* surmounted.

Thanks---Joel

(207) 624-3101 Fax

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Michael R. Johnson
U.S. Department of Commerce
NOAA Fisheries
Greater Atlantic Regional Fisheries Office
(formerly, Northeast Regional Office)
Habitat Conservation Division
55 Great Republic Drive
Gloucester, MA 01930
978-281-9130
mike.r.johnson@noaa.gov
http://www.greateratlantic.fisheries.noaa.gov/

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Twitter	www.twitter.com/noaafisheries
YouTube	www.youtube.com/usnoaafisheriesgov

FEDOCS —

PDF TO JOEL —

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

JUN - 2 2017

Joel Kittredge
Maine Department of Transportation
Bridge Program
16 State House Station
Augusta, ME 04333

WIN 22603.00

Re: NOAA Fisheries' comments on the analysis of alternatives for the proposed Frank J. Wood Bridge project.

Dear Mr. Kitteredge:

On Wednesday, April 5, you held a public meeting in Brunswick, Maine regarding alternatives for improvements being considered to the Frank J. Wood Bridge that spans the Androscoggin River on the Brunswick-Topsham town line in Maine.

In your March 10, 2017, analysis of alternatives, you identified five potential alternatives as follows:

1. A new 800 ft. bridge on the existing alignment;
2. A new 835 ft. bridge on a curved alignment upstream of the existing bridge;
3. Rehabilitation of the existing bridge;
4. Rehabilitation of the existing bridge, including the addition of a sidewalk; and,
5. A new 800ft bridge on a parallel alignment downstream of the existing bridge.

The summary of alternatives document dismissed alternatives 5 due to water rise/flood concerns.

A number of federally-listed species occur in the Androscoggin River near the bridge site. This includes the endangered Gulf of Maine distinct population segment (DPS) of Atlantic salmon, endangered shortnose sturgeon, and the Gulf of Maine DPS of Atlantic sturgeon. Additionally, the project area is designated as critical habitat for Atlantic salmon. This portion of the river is also used for spawning and rearing of shortnose and Atlantic sturgeon. On June 3, 2016, the main stem of the Androscoggin River from the Brunswick Dam downstream approximately 10 kilometers to where the river discharges to Merrymeeting Bay was proposed for designation as critical habitat for Atlantic sturgeon (81 FR 35701). The final rule is expected in July 2017. More information on these species can be found on our webpage (https://www.greateratlantic.fisheries.noaa.gov/protected/index.html).

The existing Frank J. Wood Bridge is located immediately downstream of Brookfield White Pine Hydro, LLC's Brunswick Hydroelectric Project (FERC License No. P-2284). Upstream fish passage at the Brunswick Hydroelectric Project is provided via a vertical slot fishway, located adjacent to the project powerhouse on river left, looking upstream. On December 13, 2013, after

formal ESA consultation with us, the Federal Energy Regulatory Commission amended the license for the Brunswick Hydroelectric Project to include an Interim Species Protection Plan (ISPP). The ISPP included conditions that require Brookfield to study and adaptively manage up- and downstream passage at the Brunswick Project, in consultation with us, to protect migrating Atlantic salmon.

We expect that a consultation, pursuant to section 7 of the ESA, will be required given that any of the proposed alternatives may affect ESA listed species and designated critical habitat. More information on the section 7 process can be found at https://www.greateratlantic.fisheries.noaa.gov/protected/section7/index.html.

Based on the currently available information, we highlight the following issues for your consideration as you determine the preferred alternative:

1. Alternatives 1, 2, and 5, would involve construction of a new bridge. The effects of bridge design considerations, including, but not limited to, effects on shade, sound, and to river hydraulics due to pier design, placement, and orientation, could negatively impact the functionality of the existing fishway at the Brunswick Dam.

2. We understand that at this stage, the design renderings for each of the alternatives are preliminary. However, the preliminary design for alternative 2, included in your *Summary of Alternatives* (a curved alignment upstream of the existing bridge) would have bridge project structures, such as piers, within closer proximity to the Brunswick Dam, including the existing fishway, than the other alternatives under consideration. As such, the potential impacts upon the function of the existing fishway would likely be more significant. Furthermore, the design and placement of bridge piers under this alternative could significantly restrict future options for infrastructural improvements to enhance fish passage at the Brunswick Project for endangered salmon and other diadromous species, should information gathered under the ISPP indicate such improvements are necessary.

3. Because the proposed bridge replacement and rehabilitation alternatives involve in-water work, we are concerned about the effects of driving piles, adding fill, vessel traffic, and elevated turbidity for the new bridge, as well as the effects of the old bridge demolition, on listed species in the river. Whereas Atlantic salmon primarily use the lower Androscoggin for migration, Atlantic sturgeon and shortnose sturgeon have been documented spawning over the hard bottom- rubble substrate directly downstream of the dam. The consideration of alternatives should take into account potential temporary and permanent impacts to these species and their habitats.

4. We are also concerned about the duration of the project and its potential impact to the behaviors of listed species. Atlantic salmon migrate upstream though the project area in May, June, and July. Shortnose sturgeon spawn in the project area in April and June, and Atlantic sturgeon spawn in the same area in June and July. While Atlantic salmon and both anticipated sturgeon species are iteroparous, sturgeon are a long lived species that do not spawn annually and the loss of a spawning cohort can be highly detrimental to the species recovery and survival. Any aborted migration or deferred spawning by Atlantic

salmon has a deleterious effect on the species ability to develop into a self-sustaining population.

Essential Fish Habitat and Fish and Wildlife Coordination Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act (FWCA) requires federal agencies to consult with one another on projects such as this. Insofar as a project involves Essential Fish Habitat (EFH), as this project does, this process is guided by the requirements of our EFH regulation at 50 CFR 600.920, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure.

The Androscoggin River and the Merrymeeting Bay are identified as EFH for Atlantic salmon. In addition to the federally-listed species discussed above, the area supports a number of other diadromous species including alewife, blueback herring, rainbow smelt, American shad, sea lamprey, American eel, and striped bass, and the Habitat Conservation Division consults under the Fish and Wildlife Coordination Act for these species. Many of these species are reported to pass through the fishway of the dam to reach upstream spawning or juvenile development habitat. In addition, some of these species serve as prey for federally-managed species, and are therefore considered a component of EFH. Lastly, a number of federally-managed species occur within the tidal waters downstream of the dam and may occur within the proximity of the proposed project, including winter flounder and windowpane flounder, bluefish, Atlantic mackerel, red hake, and white hake.

An EFH assessment that includes the effects of the various bridge alternatives being considered should be prepared for the proposed project, including evaluations of any temporary and permanent fish habitat impacts, especially potential alteration to habitats effecting migration for diadromous fish. In addition, the assessment should address adverse effects to fish species from underwater noise, turbidity, and other construction activities, as well as potential bridge shading and demolition activities.

Thank you for the opportunity to comment on the proposed alternatives; we look forward to continuing to work with you as the project moves forward. If you have any questions or need additional information regarding the Endangered Species Act, please contact Matt Buhyoff (Matt.Buhyoff@noaa.gov) at 207-866-4238 or Max Tritt (Max.Tritt@noaa.gov) at 207-866-3756. For questions or information regarding EFH or Fish and Wildlife Coordination Act consultations, please contact Michael Johnson (mike.r.johnson@noaa.gov) at 978-281-9130.

Sincerely,

Mark Murray-Brown

Mark Murray-Brown
Section 7 Coordinator
for Protected Resources

H:\Section 7 Team\Section 7\Non-Fisheries\FHWA_State DOTs\TA Letters\FHWA\Brunswick Bridge

CC: MTritt, MBuhyoff, ZJyllka, MJohnson

FJW/BROOKFIELD DISCUSSION 1-20-17

Meeting Minutes

- Brookfield / FERC concerns and issues
  - Facility relicensing coming up----starts in 2019---5 year process.
    - 5 year process does not fit with the condition of the existing structure's need for replacement by 2020+/-.
    - Will the facility even be relicensed?
  - Outside of fishway discussion, proposed replacement project will result in a simple filing of change of use within Brookfield's project boundaries.
  - Little concern with FERC – will not need separate NEPA
    - Send PDR or engineers document to Brookfiled/FERC when permitting is close to complete.
    - Looks like little impact. No need for separately appointed consultant review.
    - 90 days FERC approval from time of PDR submission?
  - Fishway concerns
    - Determine if the "performance" suffers. Performance applies to the effect on fish behavioral aspects----as-is existing vs. proposed.
    - How to address? How has this been done at other locations? Kristen to work with Brookfield and agencies to come up with testing regimen.
    - Section 7 will dictate further evaluation of performance.
    - If performance suffers, how to address? There is a lack of real estate to make improvements. Could result in a multi-million dollar fix. Who pays and who is liable?
    - Attaining or maintaining fishway performance will be a business decision. Brookfield will not assume the high risk level ($$$) associated with having to do future improvements to the fishway as a result of our bridge installation affecting performance.
    - Is it possible to do a lift by the powerhouse?
    - Where exactly is the concrete wall/patch that was cast in the vicinity of proposed pier #3. This was cast to push the fish toward the fishway? Need to locate. Action Item---Joel/Chris to forward pictures.
    - Will need to know what the temporary trestles look like and sit for Section 7.
    - "Flicker" (light, strobe), light/dark concerns for fish in the turning pool, and long term "vibrations and noise" are a concern for all species. How to model the sun? Need analysis to prove future condition is equal to or less than today's baseline.
    - Will joint noise at abutment #1 be an issue for the fish? Why not measure similar joint noise?

From: Mike R Johnson - NOAA Federal
To: Chamberlain, Kristen
Cc: Ham, Eric; Boyden, Sarah; max.tritt@noaa.gov; matt.buhyoff@noaa.gov; dan.tierney@noaa.gov; donald.dow@noaa.gov; Maloney, Kelly; zachary.jylkka@noaa.gov; Richter, Robert; Gardner, David; Kittredge, Joel; Norman Baker; martin, cheryl; cassandra.chase@dot.gov; Frankhauser Jr, Wayne
Subject: Re: FJW Fishway Follow-Up
Date: Tuesday, August 01, 2017 2:24:22 PM

Kristen,

During the conference call yesterday ME DOT presented several alternative bridge alignments north of the existing bridge. Perhaps this was discussed during the first few minutes of the meeting while I was trying to call in, but I'm wondering about the bridge alignment alternatives south of the existing bridge and why they have been rejected. I recall during a site meeting last year that a southern alignment was a consideration. From a fishery perspective, all the alignments north of the existing bridge increase the potential adverse affects to species migrating through the fish ladder, and alignments south of the existing bridge would appear to reduce those impacts. As part of the EFH assessment, please include those other bridge alternatives not included in yesterday's conference call, as well as a discussion about why they have been rejected for further consideration.

Thanks,

Mike

On Wed, Jul 19, 2017 at 2:53 PM, Chamberlain, Kristen <Kristen.Chamberlain@maine.gov> wrote:

Hi-

I hope you are all are having a great summer! Since we met at the beginning of June regarding potential impacts from the Frank J. Wood Bridge project, you likely heard that MaineDOT/FHWA have formally announced that the preferred alternative is replacement on the upstream alignment and that we are preparing an Environmental Assessment (EA). At the same time, we are preparing to initiate consultation with NMFS on the preferred alternative. The interaction between the bridge project, Endangered Species, EFH, and impacts to Brookfield and the fishway are important pieces of the EA and MaineDOT's decision making process.

MaineDOT and TYLIN have done some follow up on a couple of items raised at the June 1st meeting. TYLIN has evaluated some alternative span arrangements for the upstream alternative that we would like to share and get feedback from both Brookfield and NMFS. TYLIN has also refined the shadow analysis to consider the internal shadow effect of the fish way itself. I'll be sending some material to review shortly, but at this time I'd like to try to schedule a phone call/meeting to explain where we are at and hear your thoughts.

Could you please indicate your availability in the Doodle Poll at this link:

https://doodle.com/poll/8rrwae2in8ua3pty

Thank you!

Kristen Chamberlain
Bridge, Multi Modal and Traffic Team Leader
Environmental Office
Maine Department of Transportation
(207) 557-5089

To: Norman Baker <norman.baker@tylin.com>
Subject: PHASE 2---FJW

Norm:

Please submit a draft proposal for Phase 2 scope/tasks with spreadsheet, but no hours or fee, for our favorite project.

Please anticipate a November and December 2018, PS&E and ADV, respectively, allowing time for Brookfield to shake-out. But, please plan for flexibility to accelerate to a June 2018 PS&E if the Brookfield obstacle(s) are *easily* surmounted.

Thanks---Joel

(207) 624-3101 Fax

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Michael R. Johnson
U.S. Department of Commerce
NOAA Fisheries
Greater Atlantic Regional Fisheries Office
(formerly, Northeast Regional Office)
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55 Great Republic Drive
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Twitter	www.twitter.com/noaafisheries
YouTube	www.youtube.com/usnoaafisheriesgov

the rusty portions of the existing bridge and glorious visions of a sunny sky with happy bikers and walkers of the new bridge with an eagle soaring above.

Over protests by both supporters of rehabilitation and new construction, no verbal public comment was allowed. Instead, “information booths” on various aspects of the project, attended by MDOT employees who lacked information and often knowledge about the project, were spread out so only a few of the hundreds of people present could hear questions and answers. There was no booth addressing rehabilitation options. The format of this meeting was an obvious attempt to silence the voices of opposition and to keep the record from being corrected.

At this public meeting and in statements to the press, MDOT repeatedly made a point of stating that the historic bridge was “not individually eligible for the National Register.” They never explained that under Section 106 and 4(f) an eligible resource in a potential NR district is to be treated the same an individually eligible resource. This led members of the public to conclude that the bridge was “not historic.”

June 2, 2017
Letter from NOAA- expressing concerns about fish ladder and new bridge. (Attachment 1)

June 27, 2017
MDOT Press release- Preferred alternative is UpStream replacement Alternative 2.

August 04, 2017
Preliminary Design Report Released. A full month after the preferred alternative is announced (again).

September 7, 2017
MDOT receives letter from Army Corps of Engineers, outlining required permits and reminding them that only the least harmful alternative may be approved. (EA Appendix 4).

September 8, 2017
Maine Preservation names The Frank J. Wood Bridge to their yearly list of Maine’s Most Endangered Historical Places List.

January 16, 2018
Addendum to Supplemental Supporting Information for a Finding of Effect, released stating the bridge is individually eligible for the National Register. This occurred after SHPO determined on the basis of additional information provided by a member of the Friends that the bridge is individually eligible for its association with the interurban rail system that once served Maine. FHWA concurred with this determination and MDOT reluctantly accepted it, without any public mention of the determination.

February 15, 2018
Friends Letter responding to Finding of Individual Eligibility sent to Cheryl Martin and placed in the record

March 6, 2018
EA Released with draft 4f.

March 28, 2018
The EA Public Meeting continued the pattern of presenting incomplete information with a clear bias toward new construction. A moderator was hired and the advertised "brief presentation" by MDOT dragged on for more than 45 minutes with very little information about environmental impacts but numerous pictures of the rusty portions of the bridge. This was the latest example of MDOT following through on what was directed in the April 22, 2016 email between Joel Kittredge and Norman Baker, outlining how to present the historic bridge in the worst possible light and the proposed new bridge in the best (above under that date).

There are several environmentally sensitive aspects to the setting and siting of the proposed new bridge. The existing bridge is a short distance downstream of a FERC licensed hydro-electric dam with associated fishway for several endangered species of fish. The proposed new bridge would be located between the existing bridge and the dam, curving outward toward the dam and covering the last exposed area of natural falls. Several species of endangered fish spawn in the area to be covered as well.

No mentioned was made of the likely fish ladder shading and potential MDOT liability from resulting impact to endangered species of fish caused by moving the bridge closer to the dam. No mention was made about the fill required in the wet lands for a new bridge approach and no mention was made about the historic bridge's newly identified individual eligibility during the presentation. The public comment period was opened up at 7:15 and people spoke in support of both rehabilitation and new construction. At 8 o'clock, with multiple people in line to speak, the moderator tried to shut the meeting down and only after loud protests from the audience was it allowed to continue for more than an hour of additional comment.

April 4, 2018
Email from Robert Shulock (Engineer) to John Graham-Friends with attached letter, outlining biases and assumptions made in TY Lin's engineering analysis. (Addendum 1)

April 9, 2018
Engineering Report from JDB Consulting Engineers, Inc., commissioned by the Friends outlining three alternatives and two recommendations, including Life Cycle Costs. All are within the range of TY Lin's quote for the new upstream bridge, including life cycle costs. The report's Alternative 3 is an alternative that should be studied further as it looks promising for solving MDOT's fracture critical concern while still retaining the existing bridge's structure and appearance. (See attached) It also highlights and

addresses several of the “scare” tactics MDOT used with Fracture Critical and the “Cadillac” future maintenance plan. (Attached)

April 9, 2018
Robert Shulock, Engineer provides a peer review of JDB Consulting Engineers’ Report. (Attached)

Historic Frank J. Wood Bridge Study

Bridge # 2016 Frank J. Wood Bridge US 201 & Rt. 24 Over the
Androscoggin River Brunswick, Cumberland County
Maine DOT Region 1 (Southern)

REHABILITATION RESTORATION CONSTRUCTION

Prepared for:

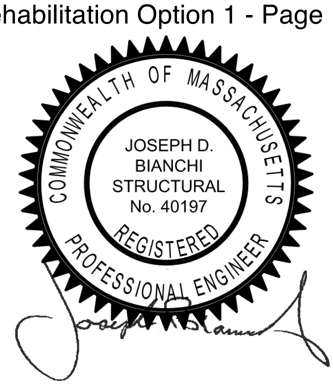
Friends of the Frank J. Wood Bridge
10 Pleasant St.
Topsham, ME 04086

Prepared by:

JDB Consulting Engineers, Inc.
835 Samoset Rd.
Eastham, MA 02642

April 9, 2018

Contents



April 9, 2018

DESCRIPTION OF BRIDGE

The Frank J. Wood Bridge, was originally built as two lane highway with a single railway line centered between the present two lane roadway in 1931, to provide access across the Androscoggin River for the towns of Topsham and points west to Brunswick. The superstructure consists of a three span 805-foot long northerly-positioned truss opposite to a southerly three span 803-foot long truss. The structural framework comprises of three parallel riveted steel Warren trusses with verticals. The bridge truss consists of three steel through spans approximately 310 ft. - 310 ft. - 175 ft. in length and each of three truss spans are simply supported.

The bridge deck consists of a 30-foot wide roadway and one 5-foot wide raised bracketed cantilever sidewalk.

The substructure consists of two concrete gravity abutments each side of two reinforced concrete interior monolithic river piers founded on ledge.

Information provided indicated that this crossing was repaired in 1985, 2006, and 2015. The bridge is a “fracture critical” structure, indicating it is vulnerable to sudden collapse if certain components fail, in this case associated to specific truss diagonals and verticals and the entire bottom chord elements and connections including the floorbeams.

Such a designation requires more detailed inspections. The bridge is now is presently posted for 25 tons. There is corrosion and section loss in the steel floor system supporting the deck, transverse cross beams, longitudinal stringers, and transverse floor beams. The floor system, bottom chords, and the concrete deck are currently in poor condition, and the bridge has a FHWA Sufficiency Rating of 25.4.

PAST INFORMATION USED IN INVESTIGATIVE EVALUATION

- TY Lin International Preliminary Design Report – Date: 08.04.17
- MaineDOT Inspection Report – Date: 08.01.16
- FHWA Letter Response – Date: 09.07.17
- Alternative Summary TY Lin International – Date: 03.10.17
- 106 Historic Finding – Date: 02.01.17
- Posting Limit and Detour DOT – Date: Not Dated
- Original Bridge Plans Partial Set Existing Cross Sections – Date: 1931
- Original Bridge Plans Partial Set Existing Substructure Plans – Date: 1931
- Original Bridge Plans Partial Set Existing Superstructure Plans – Date: 1931

- Parsons Bridge Rating Rating – Date: 03.01.13
- Parsons Bridge Rating Rating Appendix – Date: 03.01.13

VEHICLE LOAD RATING, CRITERIA AND RESULTS

The inventory load rating capacity along the newly proposed replacement and rehabilitated main truss and load carrying undercarriage members was determined in accordance with the most recent edition of the provisions found in "AASHTO LRFD Bridge Design Specifications," published by the American Association of State Highway and Transportation Officials (AASHTO).

The inventory load rating is the superimposed load capacity of which can safely be utilized on an existing structure for an indefinite period of time.

The live load used in establishing this evaluation, rating and proposed repairs were two standard AASHTO HL-93 (36 ton) truck lane load configurations.

The truck loading used in this investigation was used to produce the maximum stress.

All data (member sizes, effective member after corrosion losses etc.) required to rate and structurally evaluate this bridge, were obtained by others that can be found in the past information cited in the referenced section noted above and during several field visits completed by this office.

Results from TRAP (Truss Rating Analysis Program) output and model was used to provide forces along various critical truss members for the bridge rating computations completed March 2013 by Parsons were used in conjunction and verified with VA (Virtual Analysis) computer models when determining the various bridge rehabilitation options presented in this investigation.

Critical connections, members and truss gusset plates elements along this bridge crossing that control the present live load rating for the truss spans 2 and 3 total 31. A rating evaluation for truss span 3 was not evaluated in the rating report completed by Parsons since span 1 is structurally similar to truss span 3. A summary and breakdown of the load ratings pertaining to these specific critical areas can be found in the preceding “Bridge Rating Breakdown: Controlling Truss Elements of Concern” section of this investigative evaluation.

REHABILITATION OPTIONS

Approximately 50 percent of the main undercarriage load carrying stringer and floorbeam members along the trusses previously analyzed and rated were determined to be insufficient to receive HL-93 truck 36-ton load. The small transverse needle beams originally installed atop the stringers would need to be removed to rehabilitate these supporting stringer and floorbeam members. Also, all rehabilitation options would need to endure 75 years of use. Therefore, the most cost effective manner of repairs for these members would be the removal and replacement of all these members throughout the bridge.

The critical structural truss components investigated pertaining to the three options noted below would be required to receive and conform to or exceed the inventory load capacity for two HL-93 truck (36-ton) lane load truck configurations.

OPTION 1:
BETTERMENT REPAIRS EXODERMIC DECK REPLACEMENT WITH POLYMER EPOXY MEMBRANE WATERPROOF WEARING SURFACE

Since all truss spans are spatially stabile and the present undercarriage support system is structurally obsolete one recommended rehabilitation scheme proposed is to remove the entire deck, stringers, needle beams and individually replace all the floorbeams and bottom chord bracing after necessary repairs are completed to all the trusses.

After the removal of all pack and surface rust along all three trusses: all fracture critical truss pins located at the piers and abutments including all existing welds found along fracture critical diagonals, verticals and lower chords would be ultrasonically tested for internal inclusions or flaws.

Any welds found and containing detrimental internal inclusions or flaws after ultrasonic testing and any members or gusset and connection plates found to have excessive cross sectional loss due to corrosion would ether be replaced or splice repaired and the post-tensioning of truss elements would be implemented as needed. If any main support pins were found to contain internal flaws etc. the location, size and orientation would be assessed with respect to structural adequacy and the pin would be replaced or left in placed and monitored from time to time in the future. Refer Sheet 1 (Appendix A Photographs and Illustrations - Truss Betterment Repairs) for additional information.

All the trusses would be painted and then new floorbeams and stringer beams would be individually installed followed by the installation of new precast exodermic steel grid and concrete deck panels.

The exodermic deck would consist of a non-composite precast concrete 5 inch overlay with a 2 inch concrete overfill above the top of the steel bearing bars with a concrete cast in place in-filled stringer haunch atop and attached to preinstalled welded top flange stud connectors. Refer Sheet 2 (Appendix A Photographs and Illustrations - Exodermic Concrete Filled Steel Grid Deck) for additional information.

The bridge would need to remain closed until all construction was completed. Estimated cost of this option is: $13,500,000. This estimate includes a ±15% contingency for unforeseen conditions that may arise during the period of construction and painting all existing steel truss members.

The service life-cycle cost for this bridge project over a 100 year period is anticipated to be $17,500,000. This includes the construction cost, replacement of the proposed wearing surface and painting the steel trusses and undercarriage every 20 years.

A breakdown summary of all the costs for this option can be found at the end of this section.

Refer to Appendix B Construction Betterment Computations and Appendix C Construction Cost Estimates for Rehabilitation Option for a breakdown of items, computations and the unit cost of each item used in arriving in this estimate.

OPTION 1: COST ESTIMATE AND QUANTITIES

FRANK J. WOOD BRIDGE

PROJECT: REHABILITATION PRESERVATION Bridge # 2016
LOCATION: US 201 & Rt. 24 over Androscoggin River

Feb. 8, 2018

ESTIMATE OF QUANTITIES AND COST - BRIDGE BETTERMENTS				ESTIMATE	
REF. No.	DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
1	DEMOLITION SUPERSTRUCTURE	29750	SF	40	$ 1,190,000.00
2	NEW EXODERMIC BRIDGE DECK	28350	SF	91	$ 2,579,850.00
3	HOT MIX ASPHALT FOR MISCELLANEOUS BRIDGE WORK	144	TON	250	$ 36,000.00
4	SAFETY CONTROLS FOR CONSTRUCTION OPERATIONS	820	UD	80	$ 65,600.00
5	SAFETY SIGNING FOR CONSTRUCTION OPERATIONS	1600	SF	25	$ 40,000.00
6	TEMPORARY CONCRETE BARRIER REMOVED & RESET	810	FT	20	$ 16,200.00
7	REFLECTORIZED DRUM	34000	UD	0.6	$ 20,400.00
8	4000 PSI CEMENT CONCRETE ABUTMENT REPAIRS	12	CY	1000	$ 12,000.00
9	STRUCTURAL STEEL NEW STRINGERS COATED STEEL	501840	LBS	6	$ 3,011,040.00
10	STRUCTURAL STEEL FLOORBEAM COATED STEEL	250920	LBS	7	$ 1,756,440.00
11	STRUCTURAL STEEL NEW SPLICE CONNECTION & GUSSET PLATES	32500	LS	16	$ 520,000.00
12	TEMPORARY SUPPORTS FOR ALL UTILITIES I.E PIPES ETC.	1	LS	200000	$ 200,000.00
13	PAINTING TRUSS	1	LS	200000	$ 200,000.00
14	CONTINGENCY COST ESTIMATE 15 PERCENT				$ 1,447,129.50
15	ENGINEERING AND CONSTRUCTION INSPECTION				$2,400,000
	TOTAL PROJECT COST:				**$ 13,494,659.50**
	*** LIFE CYCLE SERIVE COSTS OF 100 YEARS:**				**$ 4,000,000.00**
	TOTAL PROJECT COST OVER A LIFE CYCLE SERVICE OF 100 YEARS:				**$ 17,494,659.50**

*Note Includes preventive long-term bridge maintenance costs: deck resurfacing twice over 100 years@$1,000,000 and the cost of painting steel superstructure useing a chemical bonded/neutralizing paint film every 20 years over 100 years@$3,000,000

OPTION 2:

BETTERMENT REPAIRS EXODERMIC DECK REPLACEMENT WITH BITUMINOUS CONCRETE WEARING SURFACE

Similar to option one above the same exodermic deck would consist of a non-composite precast concrete 5 inch overlay with a 2 inch concrete overfill above the steel bearing bars and a concrete cast in place in-filled stringer haunch atop and attached to preinstalled welded steel stud connectors was investigated. A 2½ inch bituminous concrete wearing surface over a rubberized waterproof membrane atop the concrete surface along the new exodermic deck would replace the polymer epoxy system proposed in option 1 above.

The bituminous concrete wearing traffic surface would provide more resistance to wear due to long-term traffic thus reducing required periodic maintenance intervals. However, the overall load resistance of existing truss members did not comply with inventory HL-93 truck loading requirements. Therefore since the degree of needed structural truss repairs and member replacement and reinforcement needed to accommodate this option is not cost effective this option was not explored and is not recommended.

OPTION 3:

NON-FRACTURE CRITICAL TRUSS RESTORATION: INDEPENDENT NEW PLATE GIRDER UNDERCARRIAGE SUPERSTRUCTURE

Due to the structural configuration of the sway portal and top chord bracing frames along all three truss spans along the Frank J. Bridge all truss spans are spatially stable. Additionally, the present undercarriage support system is structurally obsolete, therefore another alternate to the rehabilitation scheme discussed in Option 1 would similarly remove the entire existing undercarriage (deck, stringers, needle beams, lower chord bracing and floorbeams) under the roadway and replace this system with a steel plate girder superstructure with a fiber reinforced polymer deck and roadway surface after additional reinforcement is added, if needed, to all the top chord bracing and end portal sway frames to resist anticipated lateral seismic and wind forces as per AASHTO specifications.

The lateral bottom chord bracing elements were originally used and installed in the past to true up and align and maintain the truss-framing members during assembly and to resist crosswinds at the time of erection of this bridge.

However, to reduce possible wind vibrations after erection of the new steel girders, each outer fascia girder each side of the bridge would be connected to translate horizontal wind load forces from the lower bottom truss chords to these new members via a non-fracture critical vertical slip connection connected along the web at each cross diaphragm location along each girder.

Once the lateral truss bracing and trusses were structurally reinforced and existing structural undercarriage was removed two or three 80 ft. to 150 ft. long steel plate girder beam sections would be preassembled and would be positioned from the Tomsham end of this crossing and continuously spliced and bolted together longitudinally and rolled towards the opposite end of this river crossing. All steel plate girders would be supported and guided on temporary preinstalled heavy duty Hillman rollers until they reach the opposite end of the riverbank and abutment.

Intermediate temporary shores would be placed along the present existing ledge profile found along the riverbed as needed to support the steel girders and rollers as they are guided into their final seated position on the opposite existing abutment.

The steel plate girders would likely be simply supported and uncoupled over each pier once all sections were fully secured and erected in place.

Prior to the erection of the new steel girder spans mentioned above and similar to Option 1 all pack and surface rust would be removed along all three trusses and painted. After construction the present existing truss spans would act in a structurally non-functional manner independent of the new girder span with respect to anticipated live truck loads from the upper roadway and would remain in-place on each side of the newly installed steel plate girder spans.

Finally, the present day LRFD resistance rating factor, i.e. factor of safety with respect to the present critical member recently rated (Sidewalk Truss Span 2-Gusset Plate L0) with respect to the dead weight of this truss including all sway braces and top chord bracing after construction of the new girder bridge span is completed is expected to be more than 7 to 1.

Refer Sheet 3 (Appendix A Photographs and Illustrations - Preliminary Evaluation: Replacement of Existing Structural Undercarriage) for additional information.

The bridge would need to remain closed until all construction was completed. Estimated cost, service life-cycle cost and time frame to complete needed construction of this option is anticipated and would be similar to Option 1.

BRIDGE BETTERMENT RECOMMENDATIONS:

Option 1:

Option 1 is recommended based on the cost effectiveness and past long-term performance record that is inherent and can be expected with this deck system. This option should be completed in a construction period of 18 to 24 months if the present crossing is closed during this time period and a temporary detour is provided. The present sidewalk could remain open for pedestrians during construction with a few daily or weekly closures needed during critical construction operations at this bridge site.

Additionally, if the workday construction schedule is extended to an additional 4 hours so a crew of workmen are able to work along two continuous rotating shifts throughout the construction period the time required to complete this project could be expected to be reduced to 16 to 18 months. Also, if night work were allowed thus permitting two full work crew shifts on site during construction this additional extended workday would significantly reduce the bridge closure period.

This office does not recommend that the existing roadway crossing be completed in manner of phase construction when executing and completing the needed repairs outlined in option 1. Since construction costs would be significantly greater and any unforeseen structural condition that may arise when replacing or repairing various critical bridge and truss elements may prove unsafe to vehicles and pedestrians.

Option 3:

Option 3 similar to Option 1 is also recommended. This option is being mentioned and recommended based on the present age and past inherent fracture critical nature of this truss bridge.

Although construction betterment repairs outlined for Option 1 would provide an economically viable and safe bridge crossing and is recommended the rehabilitated bridge structure would remain a fracture critical bridge type and continue to require a greater degree of attention related to present day AASHTO design standards. Additionally, design standards with respect to such fracture critical bridge elements may change and newer technology presently not available could reveal that future problematic structural areas of concern that would need to be addressed at that time may adversely affect the anticipated long-term life and costs needed to remedy this truss bridge.

Therefore, Option 3 addresses and eliminates any and all future concerns related to the fracture critical design of the existing main trusses along this bridge crossing while maintaining the present crossing location and the overall historic nature and significance of this structure along the present site.

OTHER CONSIDERATIONS

As previously mentioned the Frank J. Wood Bridge is a fracture critical structure, i.e. if certain a member fails the bridge may collapse. However, its original design has and will still be able to maintain loads mandated and required by AASHTO if ether bridge rehabilitation option as outlined above is selected.

The original design of the Frank J. Wood Bridge accommodated the load configuration for two 15 ton, trucks (AASHTO H-15 truck) and also included one 103 ton electric train loading. Design for these loads exceeds present required statutory loads by more than 20 percent of which makes it less susceptible to the fatigue failure of fracture critical members than a bridge designed for today's loadings.

The robustness of the design is clearly shown in the "Breakdown of Bridge Rating" where the Operating LRFR Rating Factors for critical bridge components for the rehabilitated bridge are well above 1.0, ranging from 1.4 to 2.8 with a mean value of 1.6.

The Frank J. Wood Bridge when compared to two similar steel truss bridges, one that suffered collapse from the failure of critical members, and one that has not. The Interstate 35 highway bridge crossing the Mississippi River in Minneapolis, Minnesota collapsed on August 1, 2007. This collapse was brought about by inadequacies associated with the original design and extreme overloading on the day of the collapse.

National Transportation Safety Board (NTSB) and others determined that the partial removal of the concrete deck which restrained the top compression chord of the truss which led to the bucking failure of critical gusset plates included: the placement of 150 tons of sand and aggregate positioned and permitted during construction over inappropriately undersized gussets plates this load prompted the ultimate collapse and failure of this bridge. Additionally, all the primary gusset plates which failed and buckled causing this bridge collapse were under sized by a factor of two and were found to be ½ inch in thickness (Ref: Highway Accident Report – Collapse of I-35W Highway Bridge, Minneapolis, Minnesota, August 1, 2007; Page 128; Dated: November 14, 2008).

In contrast the gusset plates along the two main spans of the Frank J. Wood Bridge were designed and contain ¾ inch thick gusset plates, the main spans of Frank J. Wood Bridge is one third smaller than the 456 ft. main span I-35 bridge in Minnesota. Also, the Frank J. Wood Bridge has two travel lanes verses 8 travel lanes which the Minnesota bridge I-35 Bridge carried prior to its collapse.

One final comparative example, pertaining to the structural gusset plate performance and the inherent safety as related to the Frank J. Wood Bridge. The Gill-Montague truss bridge, in the towns of the same name that crosses the Connecticut River in Massachusetts presently in service contains a single 202 ft. truss span truss span that adjoins a three span truss is approximately 1,250 ft. long. The gusset plates along main center span of this truss bridge is 450 ft. long and were also designed with ¾ in. thick gusset plates in 1937 when this bridge was erected and built. Also, the single 202 ft. span along the Gill-Montague bridge were made up with 3/8" thick gussets plates while the steel gusset plates along the shorter 175 ft. long truss span Frank J. Wood Bridge span are 1/2 in. thick.

The preeminent test for any bridge is to safely accommodate all the loads it will be subjected to. The longevity and resistance of the Frank J. Wood Bridge design is proven based on its past accommodation as both a train and highway crossing and the overall performance it has exhibited over the last 87 years. If ether option 1 or 3 were implemented and selected for construction along this crossing each are an economical correct transportation solution for the local and regional community while maintaining a historic structure from our past for the next 100 years.

BREAKDOWN OF BRIDGE RATING

TOWN / CITY: Brunswick-Topsham BRIDGE NO.: #2016

CARRIES: U.S. 201 & Rt. 24 OVER: Androscoggin River

STRUCTURE NO: Proposed Bridge Rehabilitation BIN NO:

BRIDGE COMPONENT	INVENTORY LRFR RATING FACTORS		OPERATING LRFR RATING FACTORS	
	PRESENT HL-93 (36 TONS)	REHABILITATED HL-93 (36 TONS)	PRESENT HL-93 (36 TONS)	REHABILITATED HL-93 (36 TONS)
Span 2 Roadway				
Truss Members:				
U1-U2 Axial Compression	0.92	2.15	1.19	2.78
U2-U3 Axial Compression	0.94	1.46	1.22	1.90
U3-U5 Axial Compression	0.87	1.38	1.13	1.79
U5-U7 Axial Compression	0.90	1.41	1.17	1.82
U7-U9 Axial Compression	0.97	1.48	1.26	1.91
U7-L8 Axial Compression	0.85	1.13	1.10	1.46
Gusset Plates:				
L1 Bottom Chord	0.92	1.17	1.20	1.51
L2 Bottom Chord	0.99	1.41	1.28	1.83
L5 Bottom Chord	0.95	1.16	1.23	1.50
L9 Bottom Chord	0.99	1.21	1.29	1.57
L10 Bottom Chord	0.94	1.45	1.22	1.88
U1 Upper Chord	0.86	1.29	1.11	1.67

comments

HL-93 load rating factors less than 1 (36 tons) as reported in Maine DOT - Bridge Load Rating completed March 2013 by Parsons Brinckerhoff were reevaluated with respect proposed bridge rehabilitation.

BREAKDOWN OF BRIDGE RATING

TOWN / CITY: Brunswick-Topsham BRIDGE NO.: #2016

CARRIES: U.S. 201 & Rt. 24 OVER: Androscoggin River

STRUCTURE NO: Test BIN NO:

BRIDGE COMPONENT	INVENTORY LRFR RATING FACTORS		OPERATING LRFR RATING FACTORS	
	PRESENT HL-93 (36 TONS)	REHABILITATED HL-93 (36 TONS)	PRESENT HL-93 (36 TONS)	REHABILITATED HL-93 (36 TONS)
Span 2 Sidewalk				
Truss Members:				
L2-U3 Axial Compression	0.59	1.31	0.77	1.70
U7-L8 Axial Compression	0.86	1.08	1.12	1.40
L8-U9 Axial Tension	0.92	1.32	1.19	1.71
U9-L10 Axial Compression	0.96	1.43	1.25	1.85
Gusset Plates:				
L0 Bottom Chord	0.67	1.15	0.87	1.50
L10 Bottom Chord	0.71	1.17	0.92	1.51
U3 Upper Chord	0.94	1.14	1.22	1.47
U5 Upper Chord	0.93	1.10	1.21	1.42
U7 Upper Chord	0.94	1.10	1.21	1.42
U9 Upper Chord	0.98	1.15	1.27	1.50

comments

HL-93 load rating factors less than 1 (36 tons) as reported in Maine DOT - Bridge Load Rating completed March 2013 by Parsons Brinckerhoff were reevaluated with respect proposed bridge rehabilitation.

BREAKDOWN OF BRIDGE RATING

TOWN / CITY: Brunswick-Topsham   BRIDGE NO.: #2016

CARRIES: U.S. 201 & Rt. 24   OVER: Androscoggin River

STRUCTURE NO: Test   BIN NO:

BRIDGE COMPONENT	INVENTORY LRFR RATING FACTORS		OPERATING LRFR RATING FACTORS	
	PRESENT HL-93 (36 TONS)	REHABILITATED HL-93 (36 TONS)	PRESENT HL-93 (36 TONS)	REHABILITATED HL-93 (36 TONS)
Span 3 Roadway				
Truss Members:				
U3-L3 Axial Tension	0.89	1.07	1.15	1.38
Gusset Plates:				
L0 Bottom Chord	0.91	1.24	1.18	1.61
L1 Bottom Chord	0.88	1.05	1.14	1.36
L3 Bottom Chord	0.85	1.04	1.11	1.34
Span 3 Sidewalk				
Truss Members:				
U1-U3 Axial Compression	0.95	1.29	1.24	1.68
Gusset Plates:				
L0 Bottom Chord	0.72	1.06	0.94	1.38
U1 Upper Chord	0.94	1.23	1.22	1.59
U3 Upper Chord	0.99	1.17	1.28	1.52
ME Legal L3 Bottom Chrod	0.98	1.19		

comments

HL-93 load rating factors less than 1 (36 tons) as reported in Maine DOT - Bridge Load Rating completed March 2013 by Parsons Brinckerhoff were reevaluated with respect proposed bridge rehabilitation.

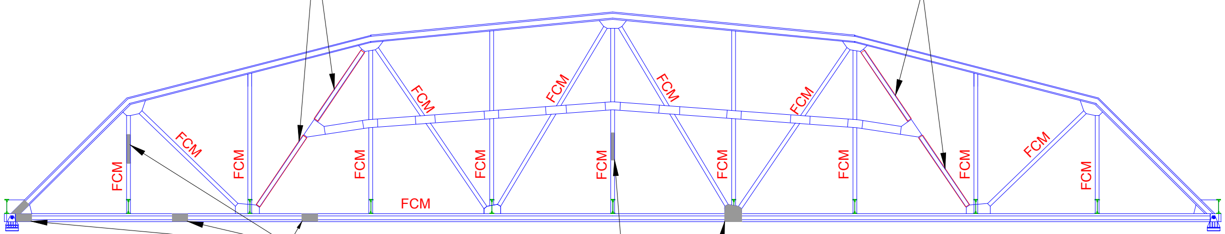
LIMITATIONS OF INVESTIGATION

The recommended structural repairs outlined above are conceptual in nature. The evaluation contained herein was based on observed measurements and conditions found when a field reconnaissance, tactile inspection was completed by others and the engineer and existing engineering data, plans and tests performed by the provided by others.

If additional engineering data, plans and tests are brought to the engineer's attention in the future the analyses, results, recommendations and restoration repairs presented herein may be altered as determined by the engineer.

APPENDIX A Photographs and Illustrations

TWO NEW 15 INCH STEEL CHANNELS: ONE EACH SIDE OF EXISTING 12 INCH WIDE STEEL TOP PLATE - AFTER ALL EXISTING PAINT AND CORROSION IS REMOVED



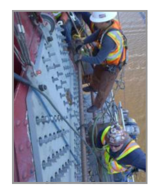
TYPICAL SPLICE AND/OR GUSSET PLATE CONNECTION: NEAR SIDE OF TRUSS REPAIRED PRIOR TO FAR SIDE OF TRUSS IF REQUIRED / THREE NEW PLATES (TWO OUTER PLATES OVER INNER FILLER PLATE) AFTER ALL EXISTING PAINT AND CORROSION IS REMOVED AND EACH RIVET HEAD IS TO BE GROUND FLUSH TO EXISTING GUSSET PLATE PLANE AND INDIVIDUALLY DRIVEN OUT AND REPLACED WITH A NEW LONGER HIGH STRENGTH BOLT UNTIL ALL EXISTING RIVETS ARE REPLACED. AFTERWARDS ALL THREE PLATES ARE INSTALLED (SEE NOTES)

NOTES:

1.0 NEW PLATES AND/OR TRUSS CHORD REPLACEMENT MAY BE REQUIRED AFTER CLEANING AND ULTRASONIC TESTING OF AREAS ALONG VARIOUS FRACTURE CRITICAL MEMBERS (FCM) IS COMPLETED TO DETERMINE IF SUCH REPAIRS ARE REQUIRED ALONG GUSSET PLATES AND TENSILE CONNECTIONS DUE TO INTERNAL INCLUSIONS, FLAWS AND/OR CRACKS WITHIN EXISTING TRUSS ELEMENT.

2.0 MEMBERS LABELED "FCM" ARE FRACTURE CRITICAL MEMBERS OF WHICH REQUIRE TESTING.

TYPICAL STRUCTURAL TRUSS BETTERMENT ELEVATION - SPAN 1 (SIMILAR ALL THREE TRUSS SPANS)



TRUSS GUSSET PLATE REPLACEMENT
53 YEAR OLD - BRAGA BRIDGE Somerset, Massachusetts

PARTIAL TRUSS CHORD REPLACEMENT AND SPLICE CONNECTION REPAIR
110 YEAR OLD - LOWER LEVEL BRIDGE Edmonton, Canada

STEEL TRUSS BETTERMENT REPAIRS COMPLETED FOR VARIOUS MAJOR BRIDGE CROSSINGS IN THE PAST

FRANK J. WOOD BRIDGE
PROPOSED BRIDGE BETTERMENTS
Brunswick-Topsham, ME

JDB Consulting Engineers Inc.
835 Samoset Rd., Eastham, MA 02642

OPTION 1
PRELIMINARY EVALUATION TRUSS REPAIRS - FOR HL-93 TRUCK LOAD

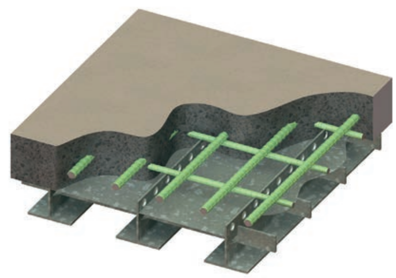
Exodermic® Deck

An Exodermic® bridge deck is comprised of a reinforced concrete slab on top of, and composite with an unfilled steel grid. This hybrid system was developed in the mid-1980's to maximize the compressive strength of the concrete and tensile strength of the steel. Horizontal shear transfer between the reinforced slab and WT members is developed through the partial embedment in the concrete of the top portion of the main bars, which are punched with 3/4" diameter holes to provide the composite action.

Under negative moment, the rebar in the reinforced concrete slab takes the tensile forces just as it would in a conventional deck, and the WT main bars handle the compressive forces. In positive moment regions the WT main bars are in tension, while the concrete is in compression.

Assuming 2" of cover over the rebar, the overall thickness of the system using standard components ranges from 6-1/4" to 9-1/4". Total deck weights range from 61-71 pounds per square foot (assuming normal weight concrete). Exodermic® decks have the best strength to weight ratio of the grid deck systems making it the most structurally efficient grid, which in return yields one of the most cost efficient lightweight deck systems available.

When required, a larger WT section can be used to achieve span capacities greater than what is shown in the design tables.



Case Study: Grand Island Bridge

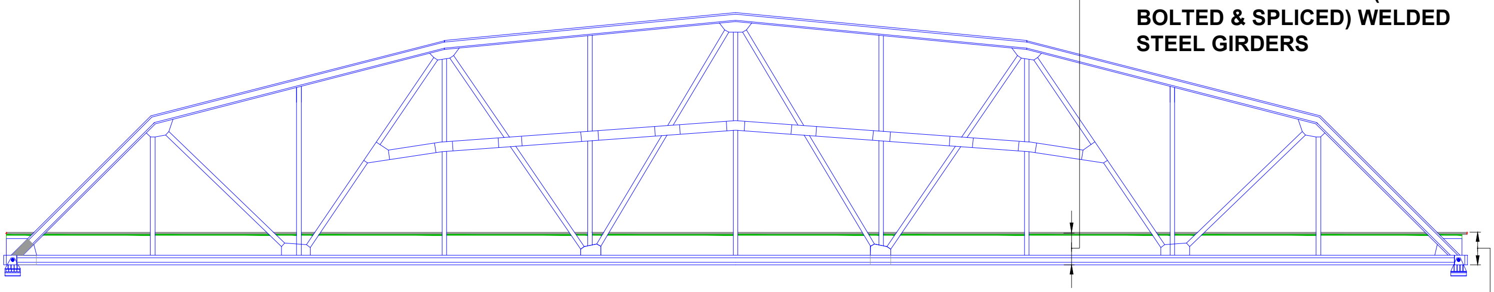
The Grand Island Bridges on Interstate 190 over the Niagara River between Tonawanda, Grand Island and Niagara Falls are a great example how grid deck systems help bridge owners follow through on FHWA's initiative to use prefabricated bridge technology to accelerate construction. The contractor on the northbound, South Grand Island Bridge replaced nearly 2,000 square feet of deteriorated bridge deck with new precast Exodermic® deck panels during every 7-8 hour nighttime closure. This construction schedule allowed the New York State Thruway Authority (NYSTA) to have all lanes open for morning and afternoon rush hour traffic and facilitated the early completion of this roughly 90,000 square foot redecking project.

> Grid Deck Advantage – Speed of Construction

Exodermic Concrete Filled Steel Grid Deck

REPLACEMENT OF PRESENT
EXISTING STRUCTURAL
UNDERCARRIAGE ALONG
ROADWAY WITH:

- NEW FIBER REINFORCED POLYMER (FRP) DECK OR EQUAL
- 7 - 8 NEW LONG-SPAN (FIELD BOLTED & SPLICED) WELDED STEEL GIRDERS



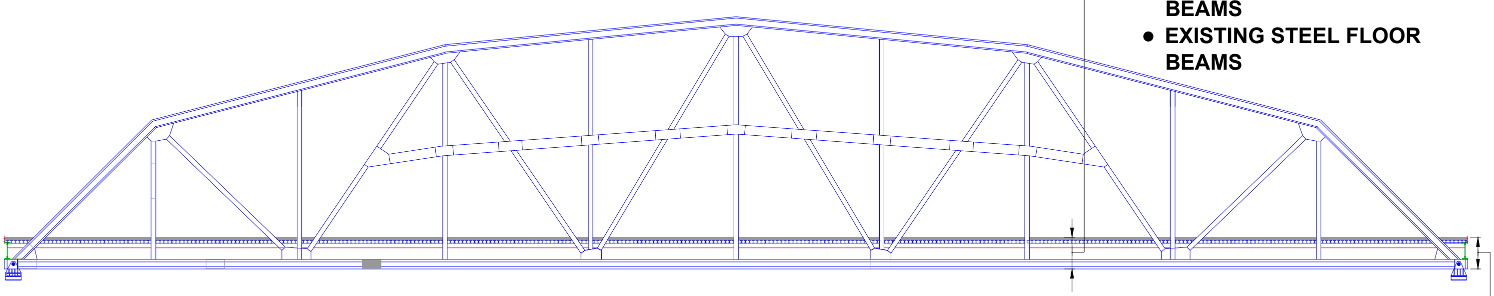
VERTICAL DEPTH OF PROPOSED NEW UNDERCARRIAGE ±7'-0"

STRUCTURALLY RETROFITTED NON-FRACTURE CRITICAL TRUSS
ELEVATION TRUSS SPAN 1 (SIMILAR ALL THREE TRUSS SPANS)

NOTE:
ALL EXISTING EXISTING TRUSSES, SWAY FRAMES AND TOP LATERAL CROSS BRACING FRAMES ARE TO BE STRUCTURALLY UPGRADED AS REQUIRED TO MEET OR EXCEED AASHTO LATERAL SEISMIC, WIND FORCE AND DISPLACEMENT REQUIREMENTS PRIOR TO INSTALLATION OF NEWLY PROPOSED ROADWAY UNDERCARRIAGE MEMBERS.

REMOVAL OF PRESENT
EXISTING STRUCTURAL
UNDERCARRIAGE ALONG
ROADWAY CONSISTING OF:

- EXISTING CONCRETE FILLED STEEL DECK
- EXISTING STEEL NEEDLE BEAMS
- EXISTING STEEL STRINGER BEAMS
- EXISTING STEEL FLOOR BEAMS



VERTICAL DEPTH EXISTING UNDERCARRIAGE ±6'-6"

EXISTING TRUSS ELEVATION
TRUSS SPAN 1 (SIMILAR ALL THREE TRUSS SPANS)

FRANK J. WOOD BRIDGE
PROPOSED BRIDGE BETTERMENTS
Brunswick-Topsham, ME

JDB Consulting Engineers Inc.
835 Samoset Rd., Eastham, MA 02642

OPTION 3
PRELIMINARY EVALUATION
REPLACEMENT OF EXISTING STRUCTURAL UNDERCARRIAGE - FOR HL-93 TRUCK LOAD

APPENDIX B Construction Betterment Computations

Interior Non-composite bridge beam design and rating W-section or plate girder :

Project: Bridge Rehabilitation
Date: January 25, 2018
Type: Frank J. Wood bridge interior stringer beams

■ INPUT DATA:

Beam span - S_s (ft.);
Centerline to centerline girders - C_b (ft.);
Dead load moment: exodermic steel grid deck with 2 in. concrete overfill 68 psf- + stringers beams 14 psf M_{D1} (ft. k);
Superimposed dead load moment: superimposed dead weight from polymer epoxy wearing surface 5 psf - M_{D2} (ft. k);
Live load moment including a dynamic load allowance of 1.33 for moving loads for HL-93 truck loading (maximum between Axle loadings) - M_{LL} (ft. k);
Live load moment including a dynamic load allowance of 1.33 for moving loads for HL-93 truck loading (maximum between Tandem loadings) - M_{LLTL} (ft. k);
Live load moment distribution factor for H-20, Type 3 and Type 3S2 truck loadings based on steel grid deck (Used only if level rule distribution factor: $g_{1\,ext}$ as computed below is less than DF) - DF (ft. k);
Live load moment for H-20, Type 3 and Type 3S2 truck loadings - M_{LLH20}, M_{LL3} & M_{LL3S2} (ft. k);
Number of lanes (for deflection use appropriate number of lanes) - N_L (unitless);
Number of beams - N_b (unitless);
Multiple presence factor for deflection using maximum number of lanes loaded / 1.2 for I lane; 1.0 for 2 lanes; 0.85 for 3 lanes; 0.65 for 4 lanes or more - m (unitless);

$S_s = 31.21$

31.21

$C_b = 5.5$

5.5

$$M_{DC} = \frac{1}{8}\left(C_b\,\text{ft} \times 1\,\text{ft} \times 89\,\frac{\text{lbs}}{\text{ft}^2}\right)\left(\frac{\text{kips}}{1000\,\text{lbs}}\right)(S_s)^2\left(\frac{1}{\text{kips}}\right)$$

59.6005

$$M_{DW} = \frac{1}{8}\left(C_b\,\text{ft} \times 1\,\text{ft} \times 5\,\frac{\text{lbs}}{\text{ft}^2}\right)\left(\frac{\text{kips}}{1000\,\text{lbs}}\right)(S_s)^2\left(\frac{1}{\text{kips}}\right)$$

3.34835

$$M_{LL} = 1.33 \left(\frac{150}{wl}\right)(2\, wl) + \left(0.64 \frac{kips}{ft} \times \frac{(S_s\, ft)^2}{8}\right)\left(\frac{1}{ft\ \ kips}\right)$$

476.925

$$M_{LLTL} = 1.33 \left(\left(25\, kips \times \frac{(S_s\, ft)}{2} - 25\, kips \times (2\, ft)\right)\left(\frac{1}{ft\ \ kips}\right) + \left(0.64 \frac{kips}{ft} \times \frac{(S_s\, ft)^2}{8}\right)\left(\frac{1}{ft\ \ kips}\right)\right)$$

556.007

$$DF = \frac{C_b}{5}$$

1.1

$$M_{LLH20} = \left(\frac{133}{wl}((1.33))(wl)(DF)\right)$$

194.579

$$M_{LL3} = \left(\frac{125}{wl}(1.33)(wl)(DF)\right)$$

182.875

$$M_{LL3S2} = \left(\frac{121}{wl}(1.33)(wl)(DF)\right)$$

177.023

$N_L = 2$

2

$N_b = 6$

6

$m = 1.0$

1.

Beam section: W24x76

Dimensions of beam: d, b_f (in.);
Area of beam supporting concrete slab - A_{sh} (in.^{2});
Moment of inertia of beam supporting concrete slab or deck - I_{sh} (in.^{4});
Yield strength of beam - F_y (ksi);
Modulus of elasticity of structural steel beam - E_b (ksi);
Modulus of elasticity of deck - E_c (ksi);
Depth of concrete deck in exodermic steel grid deck with 2 in. concrete overfill - t_s (in);
Over all depth of concrete deck in exodermic steel grid deck with 2 in. concrete overfill - t_{se} (in);

$b_f = 8.99$

8.99

$d = 23.9$

23.9

$A_{sh} = 22.4$

22.4

$I_{sh} = 2100$

2100

$F_y = 50$

50

$E_b = 29\,000$

29 000

$E_c = 3800$

3800

$t_s = 5$

5

$t_{se} = 7$

7

$$S_x = \frac{I_{sh}}{\frac{d}{2}}$$

175.732

Determine longitudinal stiffness parameter K_g

$$n = N[(\frac{E_b}{E_c})]$$

7.63158

$$e_g = N[\frac{d}{2} + (t_{se} - \frac{t_s}{2})]$$

16.45

$$K_g = n\,(I_{sh} + A_{sh}\,e_g^{\,2})$$

62 285.1

Determine interior distribution factors one lane loaded $g_{1\,int}$

$$g_{1\,int} = 0.06 + \left(\frac{C_b}{14}\right)^{0.4} \left(\frac{C_b}{S_s}\right)^{0.3} \left(\frac{K_g}{12\,S_s\,t_s^{\,3}}\right)^{0.1}$$

0.480644

Determine interior distribution factors for two or more lanes loaded $g_{2\,int}$

$$g_{2\,int} = 0.075 + \left(\frac{C_b}{9.5}\right)^{0.6} \left(\frac{C_b}{S_s}\right)^{0.2} \left(\frac{K_g}{12\,S_s\,t_s^{\,3}}\right)^{0.1}$$

0.598838

Determine maximum interior distribution factor based on one lane or two or more lanes loaded g_{int}

$$g_{int} = \mathrm{If}[g_{1\,int} > g_{2\,int},\, g_{1\,int},\, g_{2\,int}]$$

0.598838

Determine maximum live load truck and tandem load moment as a function of controlling interior distribution factor g_{ext}

$$M_{LLg} = g_{int} \times M_{LL}$$

285.601

$$M_{LLgTL} = g_{int} \times M_{LLTL}$$

332.958

Maximum live load deflection - HL-93 truck or 25% of HL-93 plus Design Lane Load - Two truck configurations are investigated (1) one center 32 kip axle of HL-93 truck is placed at centerline of span (Δ_{11} and Δ_{12}) and the other (2) two main 32 kip axles equally straddling centerline of span (Δ_{21} and Δ_{22}):

$$\Delta_{11} = N\,[((\frac{32\,S_s{}^3\,12^3}{48\,E_b\,I_{sh}}) + (\frac{(8)\,(\frac{S_s}{2} - 14)\,12^3}{24\,E_b\,I_{sh}})\,(3\,S_s{}^2 - 4\,(\frac{S_s}{2} - 14)^2) + (\frac{24\,(\frac{S_s}{2} - 14)\,(\frac{S_s}{2})\,12^3}{6\,E_b\,I_{sh}\,S_s})\,(S_s{}^2 - (\frac{S_s}{2} + 14)^2 - (\frac{S_s}{2})^2))\,1.33\,m\,(\frac{N_L}{N_b})]$$

```
0.26865
```

$$\Delta_{12} = N\,[((0.25 \times \Delta_{11}) + (\frac{5 \times 0.65\,S_s{}^4\,12^3}{384\,E_b\,I_{sh}})) \times m\,(\frac{N_L}{N_b})]$$

0.0983383

$$\Delta_{21} = N\,[((\frac{(32)\,(\frac{S_s}{2} - 7)\,12^3}{24\,E_b\,I_{sh}})\,(3\,S_s{}^2 - 4\,(\frac{S_s}{2} - 7)^2) + (\frac{8\,(\frac{S_s}{2} - 21)\,(\frac{S_s}{2})\,12^3}{6\,E_b\,I_{sh}\,S_s})\,(S_s{}^2 - (\frac{S_s}{2} - 21)^2 - (\frac{S_s}{2})^2))\,1.33\,m\,(\frac{N_L}{N_b})]$$

0.347267

$$\Delta_{22} = N\,[((0.25 \times \Delta_{21}) + (\frac{5 \times 0.65\,S_s{}^4\,12^3}{384\,E_b\,I_{sh}}))\,m\,(\frac{N_L}{N_b})]$$

0.10489

$\Delta_1 = \mathrm{If}\,[\Delta_{11} > \Delta_{12}, \Delta_{11}, \Delta_{12}]$

0.26865

$\Delta_2 = \mathrm{If}\,[\Delta_{21} > \Delta_{22}, \Delta_{21}, \Delta_{22}]$

0.347267

$\Delta = \text{If}[\Delta_1 > \Delta_2, \Delta_1, \Delta_2]$

0.347267

- SUMMARY:

STRESSES AT POINT OF APPLIED MOMENT

Stresses as a function of deck:

Maximum top and bottom flange fiber stress in beam - f_{bw} (ksi);

$$f_{bw} = \frac{M_{DC}\,12}{S_x}$$

4.06987

Stresses as a function of superimposed dead load:

Maximum top and bottom flange fiber stress support beam - f_{bd} (ksi);

$$f_{bd} = \frac{M_{DW}\,12}{S_x}$$

0.228644

Stresses as a function of live HL-93 Truck load:

Maximum top and bottom flange fiber stress in beam - f_{bl} (ksi);

$$f_{bl} = \frac{M_{LLg}\,12}{S_x}$$

19.5025

Stresses as a function of deck, superimposed dead load and live HL-93 Truck load:

Maximum top and bottom flange fiber stress in beam - f_{bs} (ksi);

$$f_{bs} = f_{bw} + f_{bd} + f_{bl}$$

23.801

Stresses as a function of live HL-93 Tandem load:

Maximum top and bottom flange fiber stress in beam - f_{bl} (ksi);

$$f_{blTL} = \frac{M_{LLgTL}\,12}{S_x}$$

22.7363

Stresses as a function of deck, superimposed dead load and live HL-93 Tandem load:

Maximum top and bottom flange fiber stress in beam - f_{bs} (ksi);

$$f_{bsTL} = f_{bw} + f_{bd} + f_{blTL}$$

27.0348

Allowable stresses:

Allowable steel stress - f_b (ksi);

$$f_b = F_y$$

50

Applied live HL-93 load deflection and maximum allowable live load deflection:

Applied Live Load Deflection - Δ (in.);
Maximum allowable live load deflection - Δ_{all} (in.);

$$\Delta$$

0.347267

$$\Delta_{all} = N\left[\frac{12\,S_s}{800}\right]$$

0.46815

INVENTORY HL-93 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Strength I Load Factors

$$\gamma_{DC} = 1.25$$

1.25

$$\gamma_{LLInventory} = 1.75$$

1.75

Service II Load Factors

$\gamma_{DCII} = 1.00$

1.

$\gamma_{LLInventoryII} = 1.30$

1.3

Inventory Rating Factor for Strength I Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bw} + f_{bd})}{\gamma_{LLInventory}\; f_{bl}}$$

1.30758

Inventory Rating Factor for Service II Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bw} + f_{bd})}{\gamma_{LLInventoryII}\; f_{bl}}$$

1.80259

INVENTORY HL-93 TANDEM RATING

Function of steel top and bottom flange fiber stress - R_b ;

Inventory Rating Factor for Strength I Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bw} + f_{bd})}{\gamma_{LLInventory}\; f_{blTL}}$$

1.1216

Inventory Rating Factor for Service II Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bw} + f_{bd})}{\gamma_{LLInventoryII}\; f_{blTL}}$$

1.54621

INVENTORY H-20 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl} = \frac{M_{LLH20}\ 12}{S_x}$$

13.287

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\ f_{bl}}(20\ \text{tons})$$

42.7609 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\ f_{bl}}(20\ \text{tons})$$

57.6289 tons

INVENTORY Type 3 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl3} = \frac{M_{LL3}\ 12}{S_x}$$

12.4878

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\ f_{bl3}}(25\ \text{tons})$$

56.872 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\ f_{bl3}}(25\ \text{tons})$$

76.6464 tons

INVENTORY Type 3S2 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl3S2} = \frac{M_{LL3S2}\,12}{S_x}$$

12.0881

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\ f_{bl3S2}}\,(36\ \text{tons})$$

84.6029 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\ f_{bl3S2}}\,(36\ \text{tons})$$

114.019 tons

Applied live load deflection and maximum allowable live load deflection:

Applied Live Load Deflection - Δ (in.);
Maximum allowable live load deflection - Δ_{all} (in.);

$$\Delta$$

0.347267

$$\Delta_{all} = N\,[\frac{12\,S_s}{800}]$$

0.46815

Exterior Non-composite bridge beam design and rating W-section or plate girder :

Project: Bridge Rehabilitation
Date: January 25, 2018
Type: Frank J. Wood bridge exterior stringer beams

▪ INPUT DATA:

Beam span - S_s (ft.);
Centerline to centerline girders - C_b (ft.);
Dead load moment: exodermic steel grid deck with 2 in. concrete overfill 68 psf- + stringers beams 14 psf M_{D1} (ft. k);
Superimposed dead load moment: superimposed dead weight from polymer epoxy wearing surface 5 psf - M_{D2} (ft. k);
Live load moment including a dynamic load allowance of 1.33 for moving loads for HL-93 truck loading (maximum between Axle loadings) - M_{LL} (ft. k);
Live load moment including a dynamic load allowance of 1.33 for moving loads for HL-93 truck loading (maximum between Tandem loadings) - M_{LLTL} (ft. k);
Live load moment distribution factor for H-20, Type 3 and Type 3S2 truck loadings based on steel grid deck (Used only if level rule distribution factor: $g_{1\,ext}$ as computed below is less than DF) - DF (ft. k);
Live load moment for H-20, Type 3 and Type 3S2 truck loadings - M_{LLH20} , M_{LL3} & M_{LL3S2} (ft. k);
Ratio: modulus of elasticity of beam to concrete composite deck - n (unitless);
k - factor: modulus of elasticity of beam to concrete composite deck at the time the superimposed dead load moment is applied - k (unitless);
Compressive strength of concrete deck - f_c (psi);
Number of lanes (for deflection use appropriate number of lanes) - N_{LL} (unitless);
Number of beams - N_{bb} (unitless);
Muliple presence factor for deflection using maximum number of lanes loaded / 1.2 for l lane; 1.0 for 2 lanes; 0.85 for 3 lanes; 0.65 for 4 lanes or more - m (unitless);

$S_s = 31.21$

31.21

$C_b = 5.5$

5.5

$$M_{DC} = \frac{1}{8} (C_b\ \text{ft} \times 1\ \text{ft} \times 89\ \frac{\text{lbs}}{\text{ft}^2}) (\frac{\text{kips}}{1000\ \text{lbs}}) (S_s)^2 (\frac{1}{\text{kips}})$$

59.6005

$$M_{DW} = \frac{1}{8}\left(C_b\ \mathrm{ft} \times 1\ \mathrm{ft} \times 5\ \frac{\mathrm{lbs}}{\mathrm{ft}^2}\right)\left(\frac{\mathrm{kips}}{1000\ \mathrm{lbs}}\right)(S_s)^2\left(\frac{1}{\mathrm{kips}}\right)$$

3.34835

$$M_{LL} = 1.33\left(\frac{150}{\mathrm{wl}}\right)(2\ \mathrm{wl}) + \left(0.64\ \frac{\mathrm{kips}}{\mathrm{ft}} \times \frac{(S_s\ \mathrm{ft})^2}{8}\right)\left(\frac{1}{\mathrm{ft}\ \ \mathrm{kips}}\right)$$

476.925

$$M_{LLTL} = 1.33\left(\left(25\ \mathrm{kips} \times \frac{(S_s\ \mathrm{ft})}{2} - 25\ \mathrm{kips} \times (2\ \mathrm{ft})\right)\left(\frac{1}{\mathrm{ft}\ \ \mathrm{kips}}\right) + \left(0.64\ \frac{\mathrm{kips}}{\mathrm{ft}} \times \frac{(S_s\ \mathrm{ft})^2}{8}\right)\left(\frac{1}{\mathrm{ft}\ \ \mathrm{kips}}\right)\right)$$

556.007

$$DF = \frac{C_b}{5}$$

1.1

$$M_{LLH20} = \left(\frac{133}{\mathrm{wl}}((1.33))(\mathrm{wl})(DF)\right)$$

194.579

$$M_{LL3} = \left(\frac{125}{\mathrm{wl}}(1.33)(\mathrm{wl})(DF)\right)$$

182.875

$$M_{LL3S2} = \left(\frac{121}{\mathrm{wl}}(1.33)(\mathrm{wl})(DF)\right)$$

177.023

$N_L = 2$

2

$N_b = 6$

6

$m = 1.0$

1.

Beam section: W24x84

Dimensions of beam: d, b_f (in.);
Area of beam supporting concrete slab - A_{sh} (in.^{2});
Moment of inertia of beam supporting concrete slab or deck - I_{sh} (in.^{4});
Yield strength of beam - F_y (ksi);

Modulus of elasticity of structural steel beam - E_b (ksi);
Modulus of elasticity of deck - E_c (ksi);
Depth of deck - t_s (in);

$b_f = 8.99$

8.99

$d = 24.1$

24.1

$A_{sh} = 24.7$

24.7

$I_{sh} = 2370$

2370

$F_y = 50$

50

$E_b = 29\,000$

29 000

$E_c = 3800$

3800

$t_s = 5$

5

$$S_x = \frac{I_{sh}}{\frac{d}{2}}$$

196.68

- SOLUTION:

Determine exterior distribution factors one lane loaded using lever rule with multiple presence factor m=1.2 one lane loaded- for steel grid deck $g_{1\,ext}$

$$g_{1\,ext} = 1.2\,(DF\ wl)\left(\frac{lane}{2\,wl}\right)\left(\frac{1}{lane}\right)$$

0.66

Two lanes loaded:

$m_2 = 1$

1

$N_{L2} = 2$

2

$X_{ext} = 13.75$

13.75

$$g_{2\,ext} = m_2\left(\left(\frac{N_{L2}}{N_b}\right) + \left(\frac{X_{ext}\ (11 + 3)}{2\,(13.75^2 + 8.25^2 + 2.75^2)}\right)\right)$$

0.69697

One lane loaded:

$m_1 = 1.2$

1.2

$N_{L1} = 1$

1

$$g_{3\,ext} = m_1\left(\left(\frac{N_{L1}}{N_b}\right) + \left(\frac{X_{ext}\ (11)}{2\,(13.75^2 + 8.25^2 + 2.75^2)}\right)\right)$$

0.542857

Determine maximum interior distribution factor based on one lane or two or more lanes loaded g_{ext}

$g_{11} = \text{If}[g_{1\,ext} > g_{2\,ext}, g_{1\,ext}, g_{2\,ext}]$

0.69697

$g_{ext} = \text{If}[g_{11} > g_{3\,ext}, g_{11}, g_{3\,ext}]$

0.69697

Determine maximum live load truck and tandem load moment as a function of controlling interior distribution factor g_{int}

$M_{LLg} = g_{ext} \times M_{LL}$

332.402

$M_{LLgTL} = g_{ext} \times M_{LLTL}$

387.52

Maximum live load deflection - HL-93 truck or 25% of HL-93 plus Design Lane Load - Two truck configurations are investigated (1) one center 32 kip axle of HL-93 truck is placed at

centerline of span (Δ_{11} and Δ_{12}) and the other (2) two main 32 kip axles equally straddling centerline of span (Δ_{21} and Δ_{22}):

$N_{L2} = 2$

2

$$\Delta_{11} = N[((\frac{32\, S_s^{3}\, 12^3}{48\, E_b\, I_{sh}}) + (\frac{(8)\,(\frac{S_s}{2} - 14)\, 12^3}{24\, E_b\, I_{sh}})\,(3\, S_s^{2} - 4\,(\frac{S_s}{2} - 14)^2) + (\frac{24\,(\frac{S_s}{2} - 14)\,(\frac{S_s}{2})\, 12^3}{6\, E_b\, I_{sh}\, S_s})\,(S_s^{2} - (\frac{S_s}{2} + 14)^2 - (\frac{S_s}{2})^2))\, 1.33\, m\,(\frac{N_L}{N_b})]$$

0.238045

$$\Delta_{12} = N[((0.25 \times \Delta_{11}) + (\frac{5 \times 0.65\, S_s^{4}\, 12^3}{384\, E_b\, I_{sh}})) \times m\,(\frac{N_L}{N_b})]$$

0.0871352

$$\Delta_{21} = N[((\frac{(32)\,(\frac{S_s}{2} - 7)\, 12^3}{24\, E_b\, I_{sh}})\,(3\, S_s^{2} - 4\,(\frac{S_s}{2} - 7)^2) + (\frac{8\,(\frac{S_s}{2} - 21)\,(\frac{S_s}{2})\, 12^3}{6\, E_b\, I_{sh}\, S_s})\,(S_s^{2} - (\frac{S_s}{2} - 21)^2 - (\frac{S_s}{2})^2))\, 1.33\, m\,(\frac{N_L}{N_b})]$$

0.307705

$$\Delta_{22} = N[((0.25 \times \Delta_{21}) + (\frac{5 \times 0.65\, S_s^{4}\, 12^3}{384\, E_b\, I_{sh}}))\, m\,(\frac{N_L}{N_b})]$$

0.0929403

$\Delta_1 = \mathrm{If}[\Delta_{11} > \Delta_{12}, \Delta_{11}, \Delta_{12}]$

0.238045

$\Delta_2 = \text{If}\,[\Delta_{21} > \Delta_{22}, \Delta_{21}, \Delta_{22}]$

0.307705

$\Delta = \text{If}\,[\Delta_1 > \Delta_2, \Delta_1, \Delta_2]$

0.307705

- SUMMARY:

STRESSES AT POINT OF APPLIED MOMENT

Stresses as a function of deck:

Maximum top and bottom flange fiber stress in beam - f_{bw} (ksi);

$$f_{bw} = \frac{M_{DC}\,12}{S_x}$$

3.63639

Stresses as a function of superimposed dead load:

Maximum top and bottom flange fiber stress support beam - f_{bd} (ksi);

$$f_{bd} = \frac{M_{DW}\,12}{S_x}$$

0.204291

Stresses as a function of live HL-93 Truck load:

Maximum top and bottom flange fiber stress in beam - f_{bl} (ksi);

$$f_{bl} = \frac{M_{LLg}\,12}{S_x}$$

20.2808

Stresses as a function of deck, superimposed dead load and live HL-93 Truck load:

Maximum top and bottom flange fiber stress in beam - f_{bs} (ksi);

$$f_{bs} = f_{bw} + f_{bd} + f_{bl}$$

24.1214

Stresses as a function of live HL-93 Tandem load:

Maximum top and bottom flange fiber stress in beam - f_{bl} (ksi);

$$f_{blTL} = \frac{M_{LLgTL} \, 12}{S_x}$$

23.6436

Stresses as a function of deck, superimposed dead load and live HL-93 Tandem load:

Maximum top and bottom flange fiber stress in beam - f_{bs} (ksi);

$$f_{bsTL} = f_{bw} + f_{bd} + f_{blTL}$$

27.4843

Allowable stresses:

Allowable steel stress - f_b (ksi);

$$f_b = F_y$$

50

Applied live HL-93 load deflection and maximum allowable live load deflection:

Applied Live Load Deflection - Δ (in.);
Maximum allowable live load deflection - Δ_{all} (in.);

$$\Delta$$

0.307705

$$\Delta_{all} = N \left[\frac{12 \, S_s}{800}\right]$$

0.46815

INVENTORY HL-93 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Strength I Load Factors

$$\gamma_{DC} = 1.25$$

1.25

$$\gamma_{LLInventory} = 1.75$$

1.75

Service II Load Factors

$\gamma_{DCII} = 1.00$

1.

$\gamma_{LLInventoryII} = 1.30$

1.3

Inventory Rating Factor for Strength I Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DC}(f_{bw} + f_{bd})}{\gamma_{LLInventory}\, f_{bl}}$$

1.27353

Inventory Rating Factor for Service II Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}(f_{bw} + f_{bd})}{\gamma_{LLInventoryII}\, f_{bl}}$$

1.75078

INVENTORY HL-93 TANDEM RATING

Function of steel top and bottom flange fiber stress - R_b ;

Inventory Rating Factor for Strength I Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DC}(f_{bw} + f_{bd})}{\gamma_{LLInventory}\, f_{blTL}}$$

1.09239

Inventory Rating Factor for Service II Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DCII}(f_{bw} + f_{bd})}{\gamma_{LLInventoryII}\, f_{blTL}}$$

1.50177

INVENTORY H-20 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl} = \frac{M_{LLH20}\,12}{S_x}$$

11.8718

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\ f_{bl}}(20\ tons)$$

47.8875 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\ f_{bl}}(20\ tons)$$

64.5301 tons

INVENTORY Type 3 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl3} = \frac{M_{LL3}\,12}{S_x}$$

11.1577

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\ f_{bl3}}(25\ tons)$$

63.6904 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\ f_{bl3}}(25\ tons)$$

85.8251 tons

INVENTORY Type 3S2 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl3S2} = \frac{M_{LL3S2}\,12}{S_x}$$

10.8006

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\;f_{bl3S2}}\,(36\,\text{tons})$$

94.746 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\;f_{bl3S2}}\,(36\,\text{tons})$$

127.674 tons

Applied live load deflection and maximum allowable live load deflection:

Applied Live Load Deflection - Δ (in.);
Maximum allowable live load deflection - Δ_{all} (in.);

Δ

0.307705

$$\Delta_{all} = N\,[\frac{12\,S_s}{800}]$$

0.46815

ASD bridge two lane non-composite floorbeam - stress check for HS-20 truck load and bridge load rating for HS-20, H-20, Type 3 and Type 3S2 Trucks and LRFR HL-93 Truck rating:

Note: Live load moments are based on a 9 foot travel lane width and one HL93 truck.

Project: Bridge Rehabilitation
Date: January 25, 2018
Type: Frank J. Wood bridge Spans 1 and 2 floorbeams

- INPUT DATA:

Beam span - S_b (ft.);
Centerline to centerline floorbeams - C_b (ft.);
Distance of unsupported compression flange between lateral connections - L_u (in.);
Dead load moment: exodermic steel grid deck with 2 in. concrete overfill 68 psf- + stringers beams 14 psf + floorbeam (194 lbs./ft.) 7 psf - M_{D1} (ft. k);
Superimposed dead load moment: superimposed dead weight from polymer epoxy wearing surface 5 psf - M_{D2} (ft. k);
Maximum live load reaction of HS-20 truck loading on to floorbeam (AASHTO Man. Condition of Evaluation Bridges Appendix D6B) - R_{LL} (k);
Maximum live load reaction of H-20 truck loading on to floorbeam (AASHTO Man. Condition of Evaluation Bridges Appendix D6B) - R_{H20} (k);
Maximum live load reaction of Type 3 truck loading on to floorbeam (AASHTO Man. Condition of Evaluation Bridges Appendix D6B) - R_3 (k);
Maximum live load reaction of Type 3S2 truck loading on to floorbeam (AASHTO Man. Condition of Evaluation Bridges Appendix D6B) - R_{3S2} (k);
Live load moment including impact for HS-20 truck loading - M_{LL} (ft. k);
Live load moment including impact for H-20 truck loading - M_{H20} (ft. k);
Live load moment including impact for Type 3 truck loading - M_3 (ft. k);
Live load moment including impact for Type 3S2 truck loading - M_{3S2} (ft. k);
Live load moment for HL-93 truck loading - M_{HL3} (ft. k);
Live load moment for HL-93 tandem truck loading - M_{HL3T} (ft. k);

$S_b = 32.22$

32.22

$C_b = 31.21$

31.21

$L_u = 1$

1

$R_{LL} = 28$

28

$R_{H20} = 19$

19

$R_3 = 21$

21

$R_{3\,S2} = 20$

20

$R_{HL3} = 28$

28

$R_{HL3T} = 23.5$

23.5

$$M_{D1} = N[((C_b\ ft \times (89\ \frac{lbs}{ft^2}))\ (\frac{kips}{1000\ lbs})\ (\frac{ft}{kips}))\ \frac{(S_b)^2}{8}]$$

360.45

$$M_{D2} = N[((C_b\ ft \times 1\ ft \times \frac{0.375\ in}{(\frac{12\ in}{ft})} \times 150\ \frac{lbs}{ft^3})\ (\frac{kips}{1000\ lbs})\ (\frac{1}{ft})\ (\frac{ft}{kips}))\ \frac{(S_b)^2}{8}]$$

18.9844

$M_D = M_{D1} + M_{D2}$

379.434

$$I_{IM} = If[(1 + \frac{50}{S_b + 125}) > 1.3, 1.3, (1 + \frac{50}{S_b + 125})]$$

1.3

$$M_{LL} = (S_b - 9 + \frac{2.25}{S_b})\ R_{LL}\ I_{IM}$$

847.75

$$M_{H20} = \left(S_b - 9 + \frac{2.25}{S_b}\right) R_{H20}\, I_{IM}$$

575.259

$$M_3 = \left(S_b - 9 + \frac{2.25}{S_b}\right) R_3\, I_{IM}$$

635.812

$$M_{3\,S2} = \left(S_b - 9 + \frac{2.25}{S_b}\right) R_{3\,S2}\, I_{IM}$$

605.536

$$M_{HL3} = \left(S_b - 9 + \frac{2.25}{S_b}\right) R_{HL3}$$

652.115

$$M_{HL3T} = \left(S_b - 9 + \frac{2.25}{S_b}\right) R_{HL3T}$$

547.311

Beam section: W36x194 no bottom plate

Width of compression flange - b_f (in.);
Thickness flange thickness - t_f (in.);
Thickness web thickness - t_w (in.);
Depth of web depth - d_w (in.);
Depth of beam - d (in.);
Moment of inertia of beam supporting deck - I_{sh} (in.^{4});
Section modulus of beam supporting deck - S_x (in.^{3});
Yield strength of beam supporting deck - F_y (ksi);
Modulus of elasticity of beam - E_m (ksi);

$b_f = 12.1$

12.1

$t_f = 1.26$

1.26

$t_w = 0.625$

0.625

$d_w = 33.98$

33.98

$d = 35.9$

35.9

$I_{sh} = 12100$

12100

$S_x = 663$

663

$F_y = 50$

50

$E_m = 29000$

29000

■ SOLUTION:

DEFLECTION:

Applied deflection HS-20 and HL-93:

$$\Delta_{app} = N[(\frac{R_{LL}\,(\frac{S_b}{2} \times 12 - 24)}{24\,E_m\,I_{sh}}) \times (3 \times (12\,S_b)^2 - 4 \times (\frac{S_b}{2} \times 12 - 24)^2) + (\frac{R_{LL}\,(\frac{S_b}{2} \times 12 - 96)}{24\,E_m\,I_{sh}}) \times (3 \times (12\,S_b)^2 - 4 \times (\frac{S_b}{2} \times 12 - 96)^2)]$$

0.320763

Allowable deflection:

$$\Delta_{all} = N[\frac{12\,S_b}{800}]$$

0.4833

STRESSES AT POINT OF APPLIED MOMENT:

Stresses as a function of deck and beam:

Maximum flange fiber stress in beam - f_d (ksi);

$$f_d = \frac{M_D\ 12}{S_x}$$

6.86759

Stresses as a function of HS-20 live load:

Maximum flange fiber stress in beam - f_{tl} (ksi);

$$f_{tl} = \frac{M_{LL}\ 12}{S_x}$$

15.3439

Stresses as a function of H-20 live load:

Maximum flange fiber stress in beam - f_{tl20} (ksi);

$$f_{tl20} = \frac{M_{H20}\ 12}{S_x}$$

10.4119

Stresses as a function of Type 3 live load:

Maximum flange fiber stress in beam - f_{tl3} (ksi);

$$f_{tl3} = \frac{M_3\ 12}{S_x}$$

11.5079

Stresses as a function of Type 3S2 live load:

Maximum flange fiber stress in beam - f_{tl3S2} (ksi);

$$f_{tl3S2} = \frac{M_{3\,S2}\ 12}{S_x}$$

10.9599

Allowable stresses:

Allowable steel stress - f_b (ksi);

$$J = \frac{(b_f \times t_w{}^3) + (b_f \times t_w{}^3) + (d_w \times t_w{}^3)}{3}$$

4.7347

$$I_c = \frac{(t_f \times b_f^3)}{12}$$

186.014

$F_{FS} = 1.82$

1.82

$$f_{b1} = \left(\frac{91\,000\,000}{F_{FS} \times S_x} \left(\frac{I_c}{12\, L_u}\right) \sqrt{0.772\, \frac{J}{I_c} + 9.87 \left(\frac{d}{12\, L_u}\right)^2} \right) \frac{1}{1000}$$

10 988.6

$$f_{b2} = 0.55 * F_y - \frac{14.4 \left(\frac{12\, L_u}{b_f}\right)^2}{1000}$$

27.4858

$f_b = \text{If}[f_{b1} > f_{b2}, f_{b2}, f_{b1}]$

27.4858

■ SUMMARY FOR HS-20, H-20, TYPE 3 AND TYPE 3S2 TRUCK LOAD RATINGS:

INVENTORY HS-20 TRUCK RATING:

Function of steel flange fiber stress - R_t (tons);

$$R_t = \frac{f_b - f_d}{f_{tl}} (36\ \text{tons})$$

48.3748 tons

INVENTORY H-20 TRUCK RATING:

Function of steel flange fiber stress - R_{t20} (tons);

$$R_{t20} = \frac{f_b - f_d}{f_{tl20}} (20\ \text{tons})$$

39.6051 tons

INVENTORY TYPE 3 TRUCK RATING:

Function of steel flange fiber stress - R_{t3} (tons);

$$R_{t3} = \frac{f_b - f_d}{f_{tl3}} (25\ \text{tons})$$

44.7914 tons

INVENTORY TYPE 3S2 TRUCK RATING:

Function of steel flange fiber stress - R_{t3} (tons);

$$R_{t3S2} = \frac{f_b - f_d}{f_{tl3S2}} (36\ \text{tons})$$

67.7247 tons

■ SUMMARY FOR HL-93 TRUCK LOAD RATING:

INVENTORY HL-93 TRUCK RATING:

Determine maximum live load truck load moment as a function of controlling interior distribution factor g_{int}

$$g_{int} = 1$$

1

$$M_{LL} = g_{int} \times 1.33 \times M_{HL3}$$

867.313

Stresses as a function of truck live load:

Maximum flange fiber stress in beam - f_{tlT} (ksi);

$$f_{tl} = \frac{M_{LL}\,12}{S_x}$$

15.698

Determine interior distribution factor lanes tandem loaded, since the two floor beams on ether side of the directly loaded floor beam evenly receives the remaining four foot spaced tandem load of g_{int} tandem

$$g_{intT} = 1$$

1

$$M_{LLT} = g_{intT} \times 1.33 \times M_{HL3T}$$

727.924

Stresses as a function of tandem live load:

Maximum flange fiber stress in beam - f_{tlT} (ksi);

$$f_{tlT} = \frac{M_{LLT}\, 12}{S_x}$$

13.1751

Strength I Load Factors

$$\gamma_{DC} = 1.25$$

1.25

$$\gamma_{LLInventory} = 1.75$$

1.75

Service II Load Factors

$$\gamma_{DCII} = 1.00$$

1.

$$\gamma_{LLInventoryII} = 1.30$$

1.3

ALLOWABLE STRESS

Allowable steel stress - f_b (ksi);

$$f_b = F_y$$

50

INVENTORY HL-93 TRUCK RATING

Function of steel flange fiber stress - R_b ;

Inventory Rating Factor for Strength I Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_d)}{\gamma_{LLInventory}\; f_{tl}}$$

1.50758

Inventory Rating Factor for Service II Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\, f_d}{\gamma_{LLInventoryII}\; f_{tl}}$$

2.11357

INVENTORY HL-93 TANDEM RATING

Function of steel top and bottom flange fiber stress - R_b ;

Inventory Rating Factor for Strength I Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_d)}{\gamma_{LLInventory}\; f_{tIT}}$$

1.79627

Inventory Rating Factor for Service II Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_d)}{\gamma_{LLInventoryII}\; f_{tIT}}$$

2.5183

Applied live load deflection and maximum allowable live load deflection:

Applied Live Load Deflection - Δ_{app} (in.);
Maximum allowable live load deflection - Δ_{all} (in.);

Δ_{app}

0.320763

$$\Delta_{all} = N\left[\frac{12\,S_b}{800}\right]$$

0.4833

Interior Non-composite bridge beam design and rating W-section or plate girder :

Project: Bridge Rehabilitation
Date: January 25, 2018
Type: Frank J. Wood bridge interior stringer beams

■ INPUT DATA:

Beam span - S_s (ft.);
Centerline to centerline girders - C_b (ft.);
Dead load moment: exodermic steel grid deck with 2 in. concrete overfill 68 psf- + stringers beams 12 psf M_{D1} (ft. k);
Superimposed dead load moment: superimposed dead weight from polymer epoxy wearing surface 5 psf - M_{D2} (ft. k);
Live load moment including a dynamic load allowance of 1.33 for moving loads for HL-93 truck loading (maximum between Axle loadings) - M_{LL} (ft. k);
Live load moment including a dynamic load allowance of 1.33 for moving loads for HL-93 truck loading (maximum between Tandem loadings) - M_{LLTL} (ft. k);
Live load moment distribution factor for H-20, Type 3 and Type 3S2 truck loadings based on steel grid deck (Used only if level rule distribution factor: $g_{1\,ext}$ as computed below is less than DF) - DF (ft. k);
Live load moment for H-20, Type 3 and Type 3S2 truck loadings - M_{LLH20} , M_{LL3} & M_{LL3S2} (ft. k);
Number of lanes (for deflection use appropriate number of lanes) - N_L (unitless);
Number of beams - N_b (unitless);
Multiple presence factor for deflection using maximum number of lanes loaded / 1.2 for I lane; 1.0 for 2 lanes; 0.85 for 3 lanes; 0.65 for 4 lanes or more - m (unitless);

$S_s = 22$

22

$C_b = 5.5$

5.5

$$M_{DC} = \frac{1}{8}(C_b\,\text{ft} \times 1\,\text{ft} \times 80\,\frac{\text{lbs}}{\text{ft}^2})(\frac{\text{kips}}{1000\,\text{lbs}})(S_s)^2(\frac{1}{\text{kips}})$$

26.62

$$M_{DW} = \frac{1}{8}(C_b\,\text{ft} \times 1\,\text{ft} \times 5\,\frac{\text{lbs}}{\text{ft}^2})(\frac{\text{kips}}{1000\,\text{lbs}})(S_s)^2(\frac{1}{\text{kips}})$$

1.66375

$$M_{LL} = 1.33\,(\frac{88}{wl})\,(2\,wl) + (0.64\,\frac{kips}{ft} \times \frac{(S_s\,ft)^2}{8})\,(\frac{1}{ft\;\;kips})$$

272.8

$$M_{LLTL} = 1.33\,((25\,kips \times \frac{(S_s\,ft)}{2} - 25\,kips \times (2\,ft))\,(\frac{1}{ft\;\;kips}) + (0.64\,\frac{kips}{ft} \times \frac{(S_s\,ft)^2}{8})\,(\frac{1}{ft\;\;kips}))$$

350.748

$$DF = \frac{C_b}{5}$$

1.1

$$M_{LLH20} = (\frac{88}{wl}((1.33))\,(wl)\,(DF))$$

128.744

$$M_{LL3} = (\frac{77.3}{wl}(1.33)\,(wl)\,(DF))$$

113.09

$$M_{LL3S2} = (\frac{70.5}{wl}(1.33)\,(wl)\,(DF))$$

103.142

$N_L = 2$

2

$N_b = 6$

6

$m = 1.0$

1.

Beam section: W21x62

Dimensions of beam: d, b_f (in.);
Area of beam supporting concrete slab - A_{sh} (in.^{2});
Moment of inertia of beam supporting concrete slab or deck - I_{sh} (in.^{4});
Yield strength of beam - F_y (ksi);
Modulus of elasticity of structural steel beam - E_b (ksi);
Modulus of elasticity of deck - E_c (ksi);
Depth of concrete deck in exodermic steel grid deck with 2 in. concrete overfill - t_s (in);
Over all depth of concrete deck in exodermic steel grid deck with 2 in. concrete overfill - t_{se} (in);

$b_f = 8.24$

8.24

$d = 21$

21

$A_{sh} = 18.3$

18.3

$I_{sh} = 1330$

1330

$F_y = 50$

50

$E_b = 29\,000$

29 000

$E_c = 3800$

3800

$t_s = 5$

5

$t_{se} = 7$

7

$$S_x = \frac{I_{sh}}{\frac{d}{2}}$$

$$\frac{380}{3}$$

Determine longitudinal stiffness parameter K_g

$$n = N[(\frac{E_b}{E_c})]$$

7.63158

$$e_g = N[\frac{d}{2} + (t_{se} - \frac{t_s}{2})]$$

15.

$$K_g = n\,(I_{sh} + A_{sh}\,e_g^{\,2})$$

41573.

Determine interior distribution factors one lane loaded $g_{1\,int}$

$$g_{1\,int} = 0.06 + (\frac{C_b}{14})^{0.4}\,(\frac{C_b}{S_s})^{0.3}\,(\frac{K_g}{12\,S_s\,t_s^{\,3}})^{0.1}$$

0.524628

Determine interior distribution factors for two or more lanes loaded $g_{2\,int}$

$$g_{2\,int} = 0.075 + (\frac{C_b}{9.5})^{0.6}\,(\frac{C_b}{S_s})^{0.2}\,(\frac{K_g}{12\,S_s\,t_s^{\,3}})^{0.1}$$

0.633729

Determine maximum interior distribution factor based on one lane or two or more lanes loaded g_{int}

$$g_{int} = \mathrm{If}[g_{1\,int} > g_{2\,int},\, g_{1\,int},\, g_{2\,int}]$$

0.633729

Determine maximum live load truck and tandem load moment as a function of controlling interior distribution factor g_{ext}

$$M_{LLg} = g_{int} \times M_{LL}$$

172.881

$$M_{LLgTL} = g_{int} \times M_{LLTL}$$

222.279

Maximum live load deflection - HL-93 truck or 25% of HL-93 plus Design Lane Load - Two truck configurations are investigated (1) one center 32 kip axle of HL-93 truck is placed at centerline of span (Δ_{11} and Δ_{12}) and the other (2) two main 32 kip axles equally straddling centerline of span (Δ_{21} and Δ_{22}):

$$\Delta_{11} = N[((\frac{32\,S_s^{\,3}\,12^3}{48\,E_b\,I_{sh}}) + (\frac{(8)\,(\frac{S_s}{2} - 14)\,12^3}{24\,E_b\,I_{sh}})\,(3\,S_s^{\,2} - 4\,(\frac{S_s}{2} - 14)^2) + (\frac{24\,(\frac{S_s}{2} - 14)\,(\frac{S_s}{2})\,12^3}{6\,E_b\,I_{sh}\,S_s})\,(S_s^{\,2} - (\frac{S_s}{2} + 14)^2 - (\frac{S_s}{2})^2))\,1.33\;m\,(\frac{N_L}{N_b})]$$

0.144093

$$\Delta_{12} = N[((0.25 \times \Delta_{11}) + (\frac{5\times 0.65\,S_s^{\,4}\,12^3}{384\,E_b\,I_{sh}}))\times\; m\,(\frac{N_L}{N_b})]$$

0.0416162

$$\Delta_{21} = N[((\frac{(32)\,(\frac{S_s}{2} - 7)\,12^3}{24\,E_b\,I_{sh}})\,(3\,S_s^{\,2} - 4\,(\frac{S_s}{2} - 7)^2) + (\frac{8\,(\frac{S_s}{2} - 21)\,(\frac{S_s}{2})\,12^3}{6\,E_b\,I_{sh}\,S_s})\,(S_s^{\,2} - (\frac{S_s}{2} - 21)^2 - (\frac{S_s}{2})^2))\,1.33\;m\,(\frac{N_L}{N_b})]$$

0.112207

$$\Delta_{22} = N[((0.25 \times \Delta_{21}) + (\frac{5\times 0.65\,S_s^{\,4}\,12^3}{384\,E_b\,I_{sh}}))\; m\,(\frac{N_L}{N_b})]$$

0.0389591

$\Delta_1 = \text{If}[\Delta_{11} > \Delta_{12}, \Delta_{11}, \Delta_{12}]$

0.144093

$\Delta_2 = \text{If}[\Delta_{21} > \Delta_{22}, \Delta_{21}, \Delta_{22}]$

0.112207

$\Delta = \text{If}[\Delta_1 > \Delta_2, \Delta_1, \Delta_2]$

0.144093

■ SUMMARY:

STRESSES AT POINT OF APPLIED MOMENT

Stresses as a function of deck:

Maximum top and bottom flange fiber stress in beam - f_{bw} (ksi);

$$f_{bw} = \frac{M_{DC}\,12}{S_x}$$

2.52189

Stresses as a function of superimposed dead load:

Maximum top and bottom flange fiber stress support beam - f_{bd} (ksi);

$$f_{bd} = \frac{M_{DW}\,12}{S_x}$$

0.157618

Stresses as a function of live HL-93 Truck load:

Maximum top and bottom flange fiber stress in beam - f_{bl} (ksi);

$$f_{bl} = \frac{M_{LLg}\,12}{S_x}$$

16.3782

Stresses as a function of deck, superimposed dead load and live HL-93 Truck load:

Maximum top and bottom flange fiber stress in beam - f_{bs} (ksi);

$$f_{bs} = f_{bw} + f_{bd} + f_{bl}$$

19.0577

Stresses as a function of live HL-93 Tandem load:

Maximum top and bottom flange fiber stress in beam - f_{bl} (ksi);

$$f_{blTL} = \frac{M_{LLgTL}\,12}{S_x}$$

21.058

Stresses as a function of deck, superimposed dead load and live HL-93 Tandem load:

Maximum top and bottom flange fiber stress in beam - f_{bs} (ksi);

$$f_{bsTL} = f_{bw} + f_{bd} + f_{blTL}$$

23.7375

Allowable stresses:

Allowable steel stress - f_b (ksi);

$$f_b = F_y$$

50

Applied live HL-93 load deflection and maximum allowable live load deflection:

Applied Live Load Deflection - Δ (in.);
Maximum allowable live load deflection - Δ_{all} (in.);

$$\Delta$$

0.144093

$$\Delta_{all} = N\left[\frac{12\,S_s}{800}\right]$$

0.33

INVENTORY HL-93 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Strength I Load Factors

$$\gamma_{DC} = 1.25$$

1.25

$$\gamma_{LLInventory} = 1.75$$

1.75

Service II Load Factors

$\gamma_{DCII} = 1.00$

1.

$\gamma_{LLInventoryII} = 1.30$

1.3

Inventory Rating Factor for Strength I Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bw} + f_{bd})}{\gamma_{LLInventory}\; f_{bl}}$$

1.62762

Inventory Rating Factor for Service II Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bw} + f_{bd})}{\gamma_{LLInventoryII}\; f_{bl}}$$

2.22249

INVENTORY HL-93 TANDEM RATING

Function of steel top and bottom flange fiber stress - R_b ;

Inventory Rating Factor for Strength I Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bw} + f_{bd})}{\gamma_{LLInventory}\; f_{blTL}}$$

1.26591

Inventory Rating Factor for Service II Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bw} + f_{bd})}{\gamma_{LLInventoryII}\; f_{blTL}}$$

1.72858

INVENTORY H-20 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl} = \frac{M_{LLH20}\,12}{S_x}$$

12.1968

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\;f_{bl}}\,(20\,\text{tons})$$

46.6661 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\;f_{bl}}\,(20\,\text{tons})$$

62.8694 tons

INVENTORY Type 3 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl3} = \frac{M_{LL3}\,12}{S_x}$$

10.7138

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\;f_{bl3}}\,(25\,\text{tons})$$

66.4071 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\;f_{bl3}}\,(25\,\text{tons})$$

89.4649 tons

INVENTORY Type 3S2 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl3S2} = \frac{M_{LL3S2}\, 12}{S_x}$$

9.7713

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\ f_{bl3S2}}\,(36\ \text{tons})$$

104.85 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\ f_{bl3S2}}\,(36\ \text{tons})$$

141.256 tons

Applied live load deflection and maximum allowable live load deflection:

Applied Live Load Deflection - Δ (in.);
Maximum allowable live load deflection - Δ_{all} (in.);

$$\Delta$$

0.144093

$$\Delta_{all} = N\left[\frac{12\, S_s}{800}\right]$$

0.33

Exterior Non-composite bridge beam design and rating W-section or plate girder :

Project: Bridge Rehabilitation
Date: January 25, 2018
Type: Frank J. Wood bridge exterior stringer beams

■ INPUT DATA:

Beam span - S_s (ft.);
Centerline to centerline girders - C_b (ft.);
Dead load moment: exodermic steel grid deck with 2 in. concrete overfill 68 psf- + stringers beams 12 psf M_{D1} (ft. k);
Superimposed dead load moment: superimposed dead weight from polymer epoxy wearing surface 5 psf - M_{D2} (ft. k);;
Live load moment including a dynamic load allowance of 1.33 for moving loads for HL-93 truck loading (maximum between Axle loadings) - M_{LL} (ft. k);
Live load moment including a dynamic load allowance of 1.33 for moving loads for HL-93 truck loading (maximum between Tandem loadings) - M_{LLTL} (ft. k);
Live load moment distribution factor for H-20, Type 3 and Type 3S2 truck loadings based on steel grid deck (Used only if level rule distribution factor: $g_{1\,ext}$ as computed below is less than DF) - DF (ft. k);
Live load moment for H-20, Type 3 and Type 3S2 truck loadings - M_{LLH20} , M_{LL3} & M_{LL3S2} (ft. k);
Ratio: modulus of elasticity of beam to concrete composite deck - n (unitless);
k - factor: modulus of elasticity of beam to concrete composite deck at the time the superimposed dead load moment is applied - k (unitless);
Compressive strength of concrete deck - f_c (psi);
Number of lanes (for deflection use appropriate number of lanes) - N_{LL} (unitless);
Number of beams - N_{bb} (unitless);
Muliple presence factor for deflection using maximum number of lanes loaded / 1.2 for l lane; 1.0 for 2 lanes; 0.85 for 3 lanes; 0.65 for 4 lanes or more - m (unitless);

$S_s = 22$

22

$C_b = 5.5$

5.5

$$M_{DC} = \frac{1}{8}\left(C_b\,\text{ft} \times 1\,\text{ft} \times 80\,\frac{\text{lbs}}{\text{ft}^2}\right)\left(\frac{\text{kips}}{1000\,\text{lbs}}\right)(S_s)^2\left(\frac{1}{\text{kips}}\right)$$

26.62

$$M_{DW} = \frac{1}{8} (C_b\, ft \times 1\, ft \times 5\, \frac{lbs}{ft^2}) (\frac{kips}{1000\, lbs}) (S_s)^2 (\frac{1}{kips})$$

1.66375

$$M_{LL} = 1.33 (\frac{88}{wl}) (2\, wl) + (0.64\, \frac{kips}{ft} \times \frac{(S_s\, ft)^2}{8}) (\frac{1}{ft\ \ kips})$$

272.8

$$M_{LLTL} = 1.33 ((25\, kips \times \frac{(S_s\, ft)}{2} - 25\, kips \times (2\, ft)) (\frac{1}{ft\ \ kips}) + (0.64\, \frac{kips}{ft} \times \frac{(S_s\, ft)^2}{8}) (\frac{1}{ft\ \ kips}))$$

350.748

$$DF = \frac{C_b}{5}$$

1.1

$$M_{LLH20} = (\frac{88}{wl} ((1.33)) (wl) (DF))$$

128.744

$$M_{LL3} = (\frac{77.3}{wl} (1.33) (wl) (DF))$$

113.09

$$M_{LL3S2} = (\frac{70.5}{wl} (1.33) (wl) (DF))$$

103.142

$N_L = 2$

2

$N_b = 6$

6

$m = 1.0$

1.

Beam section: W21x62

Dimensions of beam: d, b_f (in.);
Area of beam supporting concrete slab - A_{sh} (in.^{2});
Moment of inertia of beam supporting concrete slab or deck - I_{sh} (in.^{4});
Yield strength of beam - F_y (ksi);

Modulus of elasticity of structural steel beam - E_b (ksi);
Modulus of elasticity of deck - E_c (ksi);
Depth of deck - t_s (in);

$b_f = 8.24$

8.24

$d = 21$

21

$A_{sh} = 18.3$

18.3

$I_{sh} = 1330$

1330

$F_y = 50$

50

$E_b = 29000$

29000

$E_c = 3800$

3800

$t_s = 5$

5

$$S_x = \frac{I_{sh}}{\frac{d}{2}}$$

$$\frac{380}{3}$$

- SOLUTION:

Determine exterior distribution factors one lane loaded using lever rule with multiple presence factor m=1.2 one lane loaded- for steel grid deck $g_{1\,ext}$

$$g_{1\,ext} = 1.2\,(DF\ wl)\left(\frac{lane}{2\,wl}\right)\left(\frac{1}{lane}\right)$$

0.66

Two lanes loaded:

$m_2 = 1$

1

$N_{L2} = 2$

2

$X_{ext} = 13.75$

13.75

$$g_{2ext} = m_2 \left(\left(\frac{N_{L2}}{N_b}\right) + \left(\frac{X_{ext}\ (11 + 3)}{2\,(13.75^2 + 8.25^2 + 2.75^2)}\right)\right)$$

0.69697

One lane loaded:

$m_1 = 1.2$

1.2

$N_{L1} = 1$

1

$$g_{3ext} = m_1 \left(\left(\frac{N_{L1}}{N_b}\right) + \left(\frac{X_{ext}\ (11)}{2\,(13.75^2 + 8.25^2 + 2.75^2)}\right)\right)$$

0.542857

Determine maximum interior distribution factor based on one lane or two or more lanes loaded g_{ext}

$g_{11} = \text{If}[g_{1ext} > g_{2ext}, g_{1ext}, g_{2ext}]$

0.69697

$g_{ext} = \text{If}[g_{11} > g_{3ext}, g_{11}, g_{3ext}]$

0.69697

Determine maximum live load truck and tandem load moment as a function of controlling interior distribution factor g_{int}

$M_{LLg} = g_{ext} \times M_{LL}$

190.133

$M_{LLgTL} = g_{ext} \times M_{LLTL}$

244.46

Maximum live load deflection - HL-93 truck or 25% of HL-93 plus Design Lane Load - Two truck configurations are investigated (1) one center 32 kip axle of HL-93 truck is placed at

centerline of span (Δ_{11} and Δ_{12}) and the other (2) two main 32 kip axles equally straddling centerline of span (Δ_{21} and Δ_{22}):

$N_{L2} = 2$

2

$$\Delta_{11} = N[((\frac{32\,S_s^{\,3}\,12^3}{48\,E_b\,I_{sh}}) + (\frac{(8)\,(\frac{S_s}{2} - 14)\,12^3}{24\,E_b\,I_{sh}})\,(3\,S_s^{\,2} - 4\,(\frac{S_s}{2} - 14)^2) + (\frac{24\,(\frac{S_s}{2} - 14)\,(\frac{S_s}{2})\,12^3}{6\,E_b\,I_{sh}\,S_s})\,(S_s^{\,2} - (\frac{S_s}{2} + 14)^2 - (\frac{S_s}{2})^2))\,1.33\;m\,(\frac{N_L}{N_b})]$$

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0.144093
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$$\Delta_{12} = N[((0.25 \times \Delta_{11}) + (\frac{5 \times 0.65\,S_s^{\,4}\,12^3}{384\,E_b\,I_{sh}})) \times m\,(\frac{N_L}{N_b})]$$

0.0416162

$$\Delta_{21} = N[((\frac{(32)\,(\frac{S_s}{2} - 7)\,12^3}{24\,E_b\,I_{sh}})\,(3\,S_s^{\,2} - 4\,(\frac{S_s}{2} - 7)^2) + (\frac{8\,(\frac{S_s}{2} - 21)\,(\frac{S_s}{2})\,12^3}{6\,E_b\,I_{sh}\,S_s})\,(S_s^{\,2} - (\frac{S_s}{2} - 21)^2 - (\frac{S_s}{2})^2))\,1.33\;m\,(\frac{N_L}{N_b})]$$

0.112207

$$\Delta_{22} = N[((0.25 \times \Delta_{21}) + (\frac{5 \times 0.65\,S_s^{\,4}\,12^3}{384\,E_b\,I_{sh}}))\;m\,(\frac{N_L}{N_b})]$$

0.0389591

$\Delta_1 = \text{If}[\Delta_{11} > \Delta_{12}, \Delta_{11}, \Delta_{12}]$

0.144093

$\Delta_2 = \text{If}\,[\Delta_{21} > \Delta_{22}, \Delta_{21}, \Delta_{22}]$

0.112207

$\Delta = \text{If}\,[\Delta_1 > \Delta_2, \Delta_1, \Delta_2]$

0.144093

- SUMMARY:

STRESSES AT POINT OF APPLIED MOMENT

Stresses as a function of deck:

Maximum top and bottom flange fiber stress in beam - f_{bw} (ksi);

$$f_{bw} = \frac{M_{DC}\,12}{S_x}$$

2.52189

Stresses as a function of superimposed dead load:

Maximum top and bottom flange fiber stress support beam - f_{bd} (ksi);

$$f_{bd} = \frac{M_{DW}\,12}{S_x}$$

0.157618

Stresses as a function of live HL-93 Truck load:

Maximum top and bottom flange fiber stress in beam - f_{bl} (ksi);

$$f_{bl} = \frac{M_{LLg}\,12}{S_x}$$

18.0126

Stresses as a function of deck, superimposed dead load and live HL-93 Truck load:

Maximum top and bottom flange fiber stress in beam - f_{bs} (ksi);

$$f_{bs} = f_{bw} + f_{bd} + f_{bl}$$

20.6921

Stresses as a function of live HL-93 Tandem load:

Maximum top and bottom flange fiber stress in beam - f_{bl} (ksi);

$$f_{blTL} = \frac{M_{LLgTL}\ 12}{S_x}$$

23.1594

Stresses as a function of deck, superimposed dead load and live HL-93 Tandem load:

Maximum top and bottom flange fiber stress in beam - f_{bs} (ksi);

$$f_{bsTL} = f_{bw} + f_{bd} + f_{blTL}$$

25.8389

Allowable stresses:

Allowable steel stress - f_b (ksi);

$$f_b = F_y$$

50

Applied live HL-93 load deflection and maximum allowable live load deflection:

Applied Live Load Deflection - Δ (in.);
Maximum allowable live load deflection - Δ_{all} (in.);

$$\Delta$$

0.144093

$$\Delta_{all} = N\left[\frac{12\ S_s}{800}\right]$$

0.33

INVENTORY HL-93 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Strength I Load Factors

$$\gamma_{DC} = 1.25$$

1.25

$$\gamma_{LLInventory} = 1.75$$

1.75

Service II Load Factors

$\gamma_{DCII} = 1.00$

1.

$\gamma_{LLInventoryII} = 1.30$

1.3

Inventory Rating Factor for Strength I Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bw} + f_{bd})}{\gamma_{LLInventory}\; f_{bl}}$$

1.47993

Inventory Rating Factor for Service II Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bw} + f_{bd})}{\gamma_{LLInventoryII}\; f_{bl}}$$

2.02082

INVENTORY HL-93 TANDEM RATING

Function of steel top and bottom flange fiber stress - R_b ;

Inventory Rating Factor for Strength I Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bw} + f_{bd})}{\gamma_{LLInventory}\; f_{blTL}}$$

1.15104

Inventory Rating Factor for Service II Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bw} + f_{bd})}{\gamma_{LLInventoryII}\; f_{blTL}}$$

1.57173

INVENTORY H-20 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl} = \frac{M_{LLH20}\,12}{S_x}$$

12.1968

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\;f_{bl}}\,(20\,tons)$$

46.6661 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\;f_{bl}}\,(20\,tons)$$

62.8694 tons

INVENTORY Type 3 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl3} = \frac{M_{LL3}\,12}{S_x}$$

10.7138

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\;f_{bl3}}\,(25\,tons)$$

66.4071 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\;f_{bl3}}\,(25\,tons)$$

89.4649 tons

INVENTORY Type 3S2 TRUCK RATING

Function of steel top and bottom flange fiber stress - R_b ;

Stresses as a function of live truck load:

Maximum top and bottom flange fiber stress beam - f_{bl} (ksi);

$$f_{bl3S2} = \frac{M_{LL3S2}\, 12}{S_x}$$

9.7713

Inventory Rating Factor for Strength I Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_{bd})}{\gamma_{LLInventory}\; f_{bl3S2}}\,(36\ \text{tons})$$

104.85 tons

Inventory Rating Factor for Service II Load Factors-Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\,(f_{bd})}{\gamma_{LLInventoryII}\; f_{bl3S2}}\,(36\ \text{tons})$$

141.256 tons

Applied live load deflection and maximum allowable live load deflection:

Applied Live Load Deflection - Δ (in.);
Maximum allowable live load deflection - Δ_{all} (in.);

$$\Delta$$

0.144093

$$\Delta_{all} = N\left[\frac{12\, S_s}{800}\right]$$

0.33

ASD bridge two lane non-composite floorbeam - stress check for HS-20 truck load and bridge load rating for HS-20, H-20, Type 3 and Type 3S2 Trucks and LRFR HL-93 Truck rating:

Note: Live load moments are based on a 9 foot travel lane width and one HL93 truck.

Project: Bridge Rehabilitation
Date: January 25, 2018
Type: Frank J. Wood bridge Span 3 floorbeams

■ INPUT DATA:

Beam span - S_b (ft.);
Centerline to centerline floorbeams - C_b (ft.);
Distance of unsupported compression flange between lateral connections - L_u (in.);
Dead load moment: exodermic steel grid deck with 2 in. concrete overfill 68 psf- + stringers beams 12 psf + floorbeam (150 lbs./ft.) 7 psf - M_{D1} (ft. k);
Superimposed dead load moment: superimposed dead weight from polymer epoxy wearing surface 5 psf - M_{D2} (ft. k);
Maximum live load reaction of HS-20 truck loading on to floorbeam (AASHTO Man. Condition of Evaluation Bridges Appendix D6B) - R_{LL} (k);
Maximum live load reaction of H-20 truck loading on to floorbeam (AASHTO Man. Condition of Evaluation Bridges Appendix D6B) - R_{H20} (k);
Maximum live load reaction of Type 3 truck loading on to floorbeam (AASHTO Man. Condition of Evaluation Bridges Appendix D6B) - R_3 (k);
Maximum live load reaction of Type 3S2 truck loading on to floorbeam (AASHTO Man. Condition of Evaluation Bridges Appendix D6B) - R_{3S2} (k);
Live load moment including impact for HS-20 truck loading - M_{LL} (ft. k);
Live load moment including impact for H-20 truck loading - M_{H20} (ft. k);
Live load moment including impact for Type 3 truck loading - M_3 (ft. k);
Live load moment including impact for Type 3S2 truck loading - M_{3S2} (ft. k);
Live load moment for HL-93 truck loading - M_{HL3} (ft. k);
Live load moment for HL-93 tandem truck loading - M_{HL3T} (ft. k);

$S_b = 31.92$

31.92

$C_b = 22$

22

$L_u = 1$

1

$R_{LL} = 23.3$

23.3

$R_{H20} = 17.5$

17.5

$R_3 = 18$

18

$R_{3\,S2} = 16.5$

16.5

$R_{HL3} = 28$

28

$R_{HL3T} = 23.3$

23.3

$$M_{D1} = N[((C_b\,\text{ft} \times (87\,\frac{\text{lbs}}{\text{ft}^2}))\,(\frac{\text{kips}}{1000\,\text{lbs}})\,(\frac{\text{ft}}{\text{kips}}))\,\frac{(S_b)^2}{8}]$$

243.769

$$M_{D2} = N[((C_b\,\text{ft} \times 1\,\text{ft} \times \frac{0.375\,\text{in}}{(\frac{12\,\text{in}}{\text{ft}})} \times 150\,\frac{\text{lbs}}{\text{ft}^3})\,(\frac{\text{kips}}{1000\,\text{lbs}})\,(\frac{1}{\text{ft}})\,(\frac{\text{ft}}{\text{kips}}))\,\frac{(S_b)^2}{8}]$$

13.1341

$M_D = M_{D1} + M_{D2}$

256.903

$$I_{IM} = \text{If}[(1 + \frac{50}{S_b + 125}) > 1.3,\ 1.3,\ (1 + \frac{50}{S_b + 125})]$$

1.3

$$M_{LL} = (S_b - 9 + \frac{2.25}{S_b})\ R_{LL}\ I_{IM}$$

696.382

$M_{H20} = (S_b - 9 + \frac{2.25}{S_b})\ R_{H20}\ I_{IM}$

523.034

$M_3 = (S_b - 9 + \frac{2.25}{S_b})\ R_3\ I_{IM}$

537.977

$M_{3\,S2} = (S_b - 9 + \frac{2.25}{S_b})\ R_{3\,S2}\ I_{IM}$

493.146

$M_{HL3} = (S_b - 9 + \frac{2.25}{S_b})\ R_{HL3}$

643.734

$M_{HL3T} = (S_b - 9 + \frac{2.25}{S_b})\ R_{HL3T}$

535.678

Beam section: W36x150 no bottom plate

Width of compression flange - b_f (in.);
Thickness flange thickness - t_f (in.);
Thickness web thickness - t_w (in.);
Depth of web depth - d_w (in.);
Depth of beam - d (in.);
Moment of inertia of beam supporting deck - I_{sh} (in.^{4});
Section modulus of beam supporting deck - S_x (in.^{3});
Yield strength of beam supporting deck - F_y (ksi);
Modulus of elasticity of beam - E_m (ksi);

$b_f = 12$

12

$t_f = 0.94$

0.94

$t_w = 0.625$

0.625

$d_w = 34.02$

34.02

$d = 35.9$

35.9

$I_{sh} = 9400$

9400

$S_x = 504$

504

$F_y = 50$

50

$E_m = 29\,000$

29 000

■ SOLUTION:

DEFLECTION:

Applied deflection HS-20 and HL-93:

$$\Delta_{app} = N[(\frac{R_{LL}\,(\frac{S_b}{2}\times 12 - 24)}{24\,E_m\,I_{sh}}) \times (3\times(12\,S_b)^2 - 4\times(\frac{S_b}{2}\times 12 - 24)^2) + (\frac{R_{LL}\,(\frac{S_b}{2}\times 12 - 96)}{24\,E_m\,I_{sh}}) \times (3\times(12\,S_b)^2 - 4\times(\frac{S_b}{2}\times 12 - 96)^2)]$$

0.33295

Allowable deflection:

$$\Delta_{all} = N[\frac{12\,S_b}{800}]$$

0.4788

STRESSES AT POINT OF APPLIED MOMENT:

Stresses as a function of deck and beam:

Maximum flange fiber stress in beam - f_d (ksi);

$$f_d = \frac{M_D\,12}{S_x}$$

6.11673

Stresses as a function of HS-20 live load:

Maximum flange fiber stress in beam - f_{tl} (ksi);

$$f_{tl} = \frac{M_{LL}\,12}{S_x}$$

16.5805

Stresses as a function of H-20 live load:

Maximum flange fiber stress in beam - f_{tl20} (ksi);

$$f_{tl20} = \frac{M_{H20}\,12}{S_x}$$

12.4532

Stresses as a function of Type 3 live load:

Maximum flange fiber stress in beam - f_{tl3} (ksi);

$$f_{tl3} = \frac{M_3\,12}{S_x}$$

12.809

Stresses as a function of Type 3S2 live load:

Maximum flange fiber stress in beam - f_{tl3S2} (ksi);

$$f_{tl3S2} = \frac{M_{3\,S2}\,12}{S_x}$$

11.7416

Allowable stresses:

Allowable steel stress - f_b (ksi);

$$J = \frac{(b_f \times t_w^3) + (b_f \times t_w^3) + (d_w \times t_w^3)}{3}$$

4.72168

$$I_c = \frac{(t_f \times b_f^3)}{12}$$

135.36

$F_{FS} = 1.82$

1.82

$$f_{b1} = \left(\frac{91\,000\,000}{F_{FS} \times S_x}\left(\frac{I_c}{12\ L_u}\right)\sqrt{0.772\ \frac{J}{I_c} + 9.87\left(\frac{d}{12\ L_u}\right)^2}\right)\frac{1}{1000}$$

10 519.3

$$f_{b2} = 0.55 * F_y - \frac{14.4\left(\frac{12\ L_u}{b_f}\right)^2}{1000}$$

27.4856

$f_b = \text{If}[f_{b1} > f_{b2}, f_{b2}, f_{b1}]$

27.4856

▪ SUMMARY FOR HS-20, H-20, TYPE 3 AND TYPE 3S2 TRUCK LOAD RATINGS:

INVENTORY HS-20 TRUCK RATING:

Function of steel flange fiber stress - R_t (tons);

$$R_t = \frac{f_b - f_d}{f_{tl}}(36\ \text{tons})$$

46.3966 tons

INVENTORY H-20 TRUCK RATING:

Function of steel flange fiber stress - R_{t20} (tons);

$$R_{t20} = \frac{f_b - f_d}{f_{tl20}}(20\ \text{tons})$$

34.3187 tons

INVENTORY TYPE 3 TRUCK RATING:

Function of steel flange fiber stress - R_{t3} (tons);

$$R_{t3} = \frac{f_b - f_d}{f_{tl3}}(25\ \text{tons})$$

41.7068 tons

INVENTORY TYPE 3S2 TRUCK RATING:

Function of steel flange fiber stress - R_{t3} (tons);

$$R_{t3S2} = \frac{f_b - f_d}{f_{tl3S2}} (36\,\text{tons})$$

65.5176 tons

■ SUMMARY FOR HL-93 TRUCK LOAD RATING:

INVENTORY HL-93 TRUCK RATING:

Determine maximum live load truck load moment as a function of controlling interior distribution factor g_{int}

$$g_{int} = 1$$

1

$$M_{LL} = g_{int} \times 1.33 \times M_{HL3}$$

856.166

Stresses as a function of truck live load:

Maximum flange fiber stress in beam - f_{tlT} (ksi);

$$f_{tl} = \frac{M_{LL}\,12}{S_x}$$

20.3849

Determine interior distribution factor lanes tandem loaded, since the two floor beams on ether side of the directly loaded floor beam evenly receives the remaining four foot spaced tandem load of g_{int} tandem

$$g_{intT} = 1$$

1

$$M_{LLT} = g_{intT} \times 1.33 \times M_{HL3T}$$

712.452

Stresses as a function of tandem live load:

Maximum flange fiber stress in beam - f_{tlT} (ksi);

$$f_{tlT} = \frac{M_{LLT}\ 12}{S_x}$$

16.9631

Strength I Load Factors

$\gamma_{DC} = 1.25$

1.25

$\gamma_{LLInventory} = 1.75$

1.75

Service II Load Factors

$\gamma_{DCII} = 1.00$

1.

$\gamma_{LLInventoryII} = 1.30$

1.3

ALLOWABLE STRESS

Allowable steel stress - f_b (ksi);

$f_b = F_y$

50

INVENTORY HL-93 TRUCK RATING

Function of steel flange fiber stress - R_b ;

Inventory Rating Factor for Strength I Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DC}\,(f_d)}{\gamma_{LLInventory}\ f_{tl}}$$

1.18727

Inventory Rating Factor for Service II Load Factors HL-93 Truck Load

$$R_b = \frac{f_b - \gamma_{DCII}\, f_d}{\gamma_{LLInventoryII}\ f_{tl}}$$

1.65595

INVENTORY HL-93 TANDEM RATING

Function of steel top and bottom flange fiber stress - R_b ;

Inventory Rating Factor for Strength I Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DC} (f_d)}{\gamma_{LLInventory} \ f_{tlT}}$$

1.42676

Inventory Rating Factor for Service II Load Factors HL-93 Tandem Load

$$R_b = \frac{f_b - \gamma_{DCII} (f_d)}{\gamma_{LLInventoryII} \ f_{tlT}}$$

1.98998

Applied live load deflection and maximum allowable live load deflection:

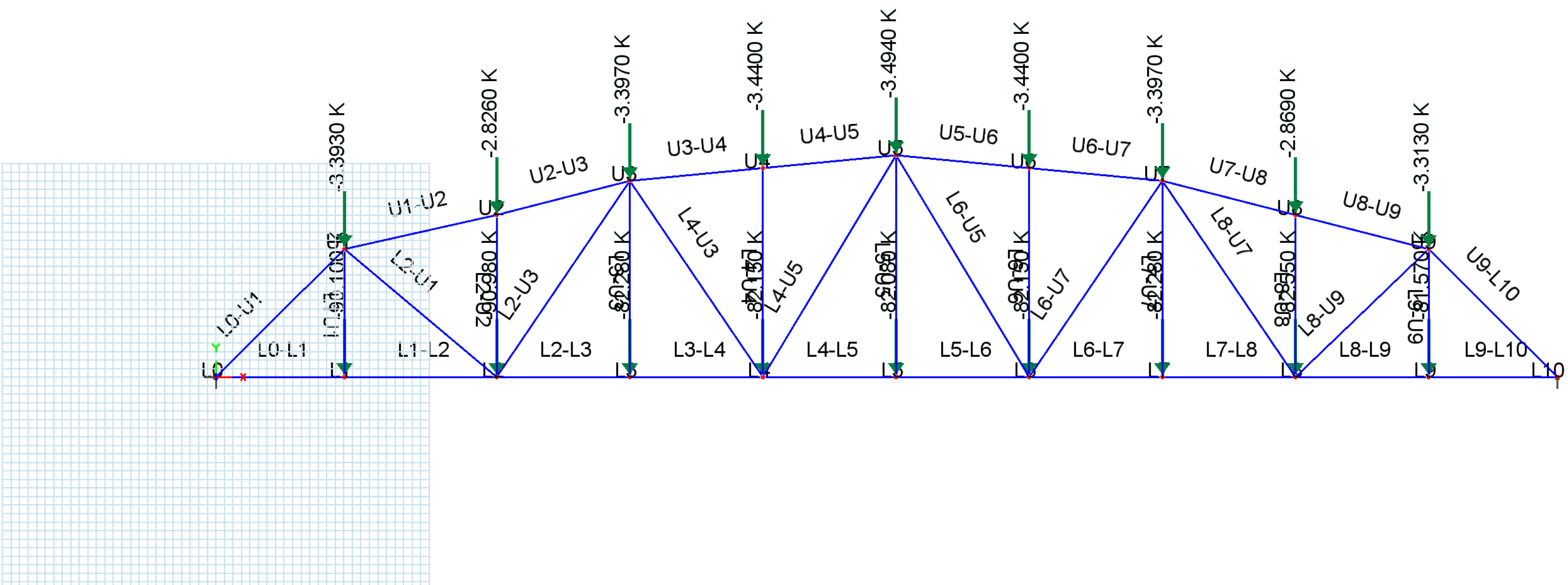
Applied Live Load Deflection - Δ_{app} (in.);
Maximum allowable live load deflection - Δ_{all} (in.);

$$\Delta_{app}$$

0.33295

$$\Delta_{all} = N\left[\frac{12\, S_b}{800}\right]$$

0.4788


-3.3930 K
-2.8260 K
-3.3970 K
-3.4400 K
-3.4940 K
-3.4400 K
-3.3970 K
-2.8690 K
-3.3130 K
U1-U2
U2-U3
U3-U4
U4-U5
U5-U6
U6-U7
U7-U8
U8-U9
L0-U1
L2-U1
L2-U3
L4-U3
L4-U5
L6-U5
L6-U7
L8-U7
L8-U9
U9-L10
L0-L1
L1-L2
L2-L3
L3-L4
L4-L5
L5-L6
L6-L7
L7-L8
L8-L9
L9-L10

1.0 Frank J. Wood Span 2 Roadway Truss - Present Dead Loads.vap

Company: JDB Consulting Engineers   Engineer: Joseph Bianchi
VisualAnalysis 7.00 Report

Table of Contents

Nodal Supports

Node	Fix DX	Fix DY
L0	Yes	Yes
L10	No	Yes

Nodes

Node	X ft	Y ft	Fix DX	Fix DY
L0	0.000	0.000	Yes	Yes
L1	30.165	0.000	No	No
U1	30.165	30.000	No	No
L2	65.832	0.000	No	No
U2	65.832	38.000	No	No
L3	97.040	0.000	No	No
U3	97.040	46.000	No	No
L4	128.248	0.000	No	No
U4	128.248	49.000	No	No
L5	159.457	0.000	No	No
U5	159.457	52.000	No	No
L6	190.665	0.000	No	No
U6	190.665	49.000	No	No
L7	221.873	0.000	No	No
U7	221.873	46.000	No	No
L8	253.082	0.000	No	No
U8	253.082	38.000	No	No
L9	284.29	0.000	No	No
U9	284.29	30.000	No	No
L10	314.458	0.000	No	Yes

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L0-L1	L0-L2	ASTM A99	L0	L1	30.165	Normal	Beam
L0-U1	L0-U1	ASTM A99	L0	U1	42.543	Normal	Bracing
L1-L2	L0-L2	ASTM A99	L1	L2	35.667	Normal	Beam
U1-U2	U1-U3	ASTM A99	U1	U2	36.553	Normal	Beam
L1U1	Verticals	ASTM A99	L1	U1	30.000	Normal	Column
L2-U1	L2-U1	ASTM A99	U1	L2	46.606	Normal	Bracing

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L2-U2	Verticals	ASTM A99	L2	U2	38.000	Normal	Column
L2-U3	1St. Diagonals	ASTM A99	L2	U3	55.587	Normal	Bracing
L2-L3	L2-L4	ASTM A99	L2	L3	31.208	Normal	Beam
U2-U3	U1-U3	ASTM A99	U2	U3	32.217	Normal	Beam
L3-U3	Verticals	ASTM A99	L3	U3	46.000	Normal	Column
L3-L4	L2-L4	ASTM A99	L3	L4	31.208	Normal	Beam
U3-U4	U3-U6	ASTM A99	U3	U4	31.352	Normal	Beam
L4-U3	1St. Diagonals	ASTM A99	U3	L4	55.587	Normal	Bracing
L4-U4	Verticals	ASTM A99	L4	U4	49.000	Normal	Column
L4-U5	2nd. Diagonals	ASTM A99	L4	U5	60.646	Normal	Bracing
L4-L5	L4-L6	ASTM A99	L4	L5	31.208	Normal	Beam
U4-U5	U3-U6	ASTM A99	U4	U5	31.352	Normal	Beam
L5-U5	Verticals	ASTM A99	L5	U5	52.000	Normal	Column
L5-L6	L4-L6	ASTM A99	L5	L6	31.208	Normal	Beam
U5-U6	U3-U6	ASTM A99	U5	U6	31.352	Normal	Beam
L6-U5	2nd. Diagonals	ASTM A99	U5	L6	60.646	Normal	Bracing
L6-U6	Verticals	ASTM A99	L6	U6	49.000	Normal	Column
L6-U7	1St. Diagonals	ASTM A99	L6	U7	55.587	Normal	Bracing
L6-L7	L6-L8	ASTM A99	L6	L7	31.208	Normal	Beam
U6-U7	U3-U6	ASTM A99	U6	U7	31.352	Normal	Beam
L7-U7	Verticals	ASTM A99	L7	U7	46.000	Normal	Column
L7-L8	L6-L8	ASTM A99	L7	L8	31.208	Normal	Beam
U7-U8	U7-U9	ASTM A99	U7	U8	32.217	Normal	Beam
L8-U7	1St. Diagonals	ASTM A99	U7	L8	55.587	Normal	Bracing
L8-U8	Verticals	ASTM A99	L8	U8	38.000	Normal	Column
L8-L9	L8-L10	ASTM A99	L8	L9	31.208	Normal	Beam
U8-U9	U7-U9	ASTM A99	U8	U9	32.217	Normal	Beam
L8-U9	l8-u9	ASTM A99	L8	U9	43.289	Normal	Bracing
L9-U9	Verticals	ASTM A99	L9	U9	30.000	Normal	Column
L9-L10	L8-L10	ASTM A99	L9	L10	30.168	Normal	Beam
U9-L10	U9-L10	ASTM A99	U9	L10	42.546	Normal	Bracing

Load Cases

Load Case	Design Checks	Seismic Type	Results	Analyze?	Envelope?
(1)D	-NA-	-NA-	Yes	Yes	No

Nodal Loads

Load Case	Node	Direction	Force K	Moment K-in
D	L1	DY	-90.100	0.000
D	U1	DY	-3.393	0.000
D	L2	DY	-90.980	0.000
D	U2	DY	-2.826	0.000
D	L3	DY	-82.280	0.000
D	U3	DY	-3.397	0.000
D	L4	DY	-82.150	0.000
D	U4	DY	-3.440	0.000
D	L5	DY	-82.080	0.000
D	U5	DY	-3.494	0.000
D	L6	DY	-82.150	0.000
D	U6	DY	-3.440	0.000
D	L7	DY	-82.280	0.000
D	U7	DY	-3.397	0.000
D	L8	DY	-82.550	0.000
D	U8	DY	-2.869	0.000
D	L9	DY	-81.570	0.000
D	U9	DY	-3.313	0.000

Load Case	Node	Direction	Force K	Moment K-in

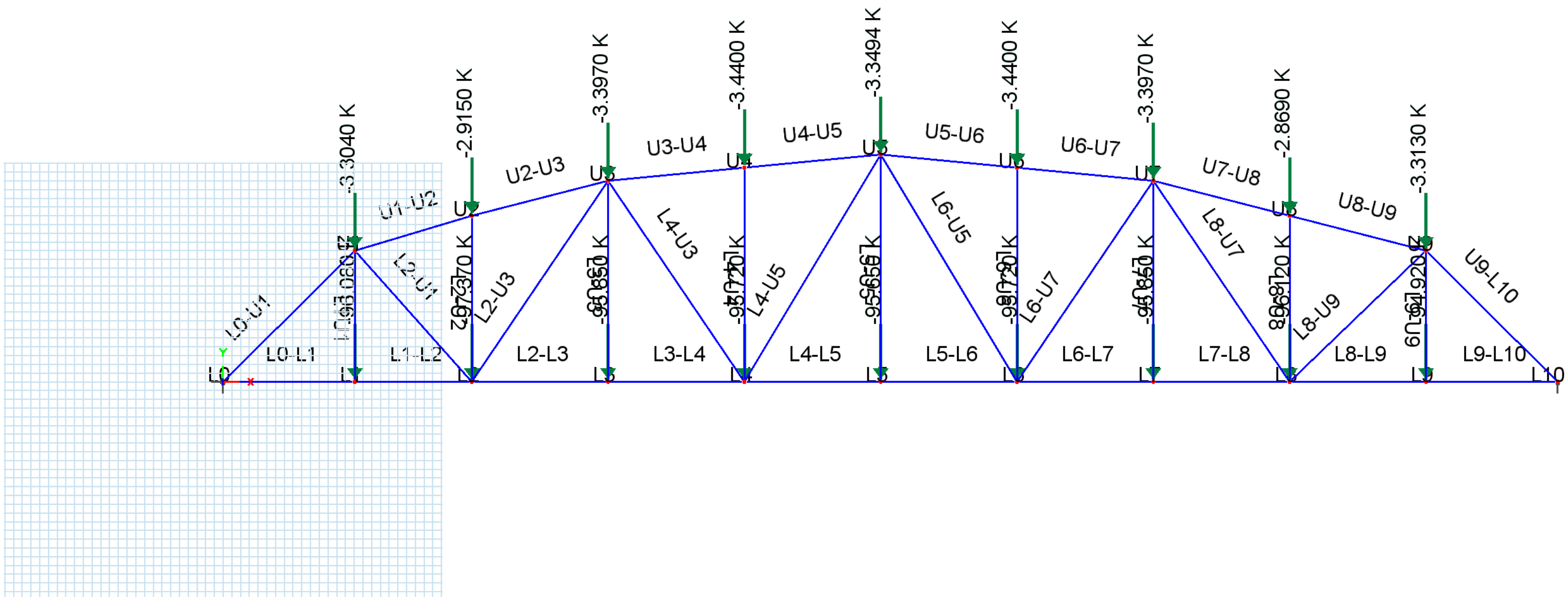
Nodal Displacements

Node	Result Case Name	DX in	DY in
L0	D	**-0.0000**	-0.0000
L1	D	0.1135	-0.9769
U1	D	0.7671	-0.9131
L2	D	0.2477	-1.8318
U2	D	0.8280	-1.8643
L3	D	0.3646	-2.3669
U3	D	0.7964	-2.2729
L4	D	0.4815	-2.5567
U4	D	0.6990	-2.5728
U5	D	0.5742	-2.5871
L5	D	0.5992	**-2.6936**
U6	D	0.4551	-2.5296
L6	D	0.7169	-2.5135
U7	D	0.3634	-2.1872
L7	D	0.8305	-2.2812
U8	D	0.3520	-1.7102
L8	D	0.9440	-1.6995
U9	D	0.4285	-0.8903
L9	D	1.0608	-0.9482
L10	D	**1.1737**	**-0.0000**

Member Extreme Results

Member	Fx (lc) K
L0-U1	-750.500 (1)
L0-U1	-737.106 (1)
L0-L1	527.386 (1)
L0-L1	527.386 (1)
U1-U2	-817.528 (1)
U1-U2	-815.265 (1)
L1-L2	527.386 (1)
L1-L2	527.386 (1)
L1U1	96.606 (1)
L1U1	98.549 (1)
L2-U1	349.998 (1)
L2-U1	353.577 (1)
L2-U2	-40.540 (1)
L2-U2	-38.080 (1)
U2-U3	-823.492 (1)
U2-U3	-821.229 (1)
L2-U3	-99.640 (1)
L2-U3	-93.526 (1)
L2-L3	850.829 (1)
L2-L3	850.829 (1)
L3-U3	92.278 (1)
L3-U3	95.256 (1)
U3-U4	**-910.718 (1)**
U3-U4	-909.757 (1)
L3-L4	850.829 (1)
L3-L4	850.829 (1)
L4-U3	95.321 (1)
L4-U3	101.435 (1)
L4-U4	-16.657 (1)

Member	Fx (lc) K
L4-U4	-13.484 (1)
U4-U5	-910.718 (1)
U4-U5	-909.757 (1)
L4-U5	38.007 (1)
L4-U5	46.691 (1)
L4-L5	**884.268 (1)**
L4-L5	884.268 (1)
L5-U5	92.397 (1)
L5-U5	95.764 (1)
U5-U6	-899.293 (1)
U5-U6	-898.332 (1)
L5-L6	884.268 (1)
L5-L6	884.268 (1)
L6-U5	15.907 (1)
L6-U5	24.591 (1)
L6-U6	-16.657 (1)
L6-U6	-13.484 (1)
U6-U7	-899.293 (1)
U6-U7	-898.332 (1)
L6-U7	118.220 (1)
L6-U7	124.334 (1)
L6-L7	826.6 (1)
L6-L7	826.6 (1)
L7-U7	92.278 (1)
L7-U7	95.256 (1)
U7-U8	-778.174 (1)
U7-U8	-775.993 (1)
L7-L8	826.6 (1)
L7-L8	826.6 (1)
L8-U7	-134.605 (1)
L8-U7	-128.491 (1)
L8-U8	-14.113 (1)
L8-U8	-11.653 (1)
U8-U9	-778.174 (1)
U8-U9	-775.993 (1)
L8-U9	315.218 (1)
L8-U9	318.286 (1)
L8-L9	524.390 (1)
L8-L9	524.390 (1)
L9-U9	87.636 (1)
L9-U9	89.579 (1)
U9-L10	-746.232 (1)
U9-L10	-732.839 (1)
L9-L10	524.390 (1)
L9-L10	524.390 (1)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-3.3970 K
-3.4400 K
-3.3494 K
-3.4400 K
-3.3970 K
-2.8690 K
-3.3130 K
L0-U1
U1-U2
U2-U3
U3-U4
U4-U5
U5-U6
U6-U7
U7-U8
U8-U9
U9-L10
L2-U1
L2-U3
L4-U3
L4-U5
L6-U5
L6-U7
L8-U7
L8-U9
L0-L1
L1-L2
L2-L3
L3-L4
L4-L5
L5-L6
L6-L7
L7-L8
L8-L9
L9-L10
L10

1.0 Frank J. Wood Span 2 Sidewalk Truss - Present Dead Loads.vap

Company: JDB Consulting Engineers   Engineer: Joseph Bianchi
VisualAnalysis 7.00 Report

Table of Contents

Nodal Supports

Node	Fix DX	Fix DY
L0	Yes	Yes
L10	No	Yes

Nodes

Node	X ft	Y ft	Fix DX	Fix DY
L0	0.000	0.000	Yes	Yes
L1	30.167	0.000	No	No
U1	30.167	30.000	No	No
L2	56.917	0.000	No	No
U2	56.917	38.000	No	No
L3	88.125	0.000	No	No
U3	88.125	46.000	No	No
L4	119.334	0.000	No	No
U4	119.334	49.000	No	No
L5	150.542	0.000	No	No
U5	150.542	52.000	No	No
L6	181.75	0.000	No	No
U6	181.75	49.000	No	No
L7	212.959	0.000	No	No
U7	212.959	46.000	No	No
L8	244.167	0.000	No	No
U8	244.167	38.000	No	No
L9	275.375	0.000	No	No
U9	275.375	30.000	No	No
L10	305.539	0.000	No	Yes

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L0-L1	L0-L2	ASTM A99	L0	L1	30.167	Normal	Beam
L0-U1	L0-U1	ASTM A99	L0	U1	42.544	Normal	Bracing
L1-L2	L0-L2	ASTM A99	L1	L2	26.750	Normal	Beam
U1-U2	U1-U3	ASTM A99	U1	U2	27.921	Normal	Beam
L1U1	Verticals	ASTM A99	L1	U1	30.000	Normal	Column
L2-U1	L2-U1	ASTM A99	U1	L2	40.194	Normal	Bracing

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L2-U2	Verticals	ASTM A99	L2	U2	38.000	Normal	Column
L2-U3	1St. Diagonals	ASTM A99	L2	U3	55.587	Normal	Bracing
L2-L3	L2-L4	ASTM A99	L2	L3	31.208	Normal	Beam
U2-U3	U1-U3	ASTM A99	U2	U3	32.217	Normal	Beam
L3-U3	Verticals	ASTM A99	L3	U3	46.000	Normal	Column
L3-L4	L2-L4	ASTM A99	L3	L4	31.208	Normal	Beam
U3-U4	U3-U6	ASTM A99	U3	U4	31.352	Normal	Beam
L4-U3	1St. Diagonals	ASTM A99	U3	L4	55.587	Normal	Bracing
L4-U4	Verticals	ASTM A99	L4	U4	49.000	Normal	Column
L4-U5	2nd. Diagonals	ASTM A99	L4	U5	60.646	Normal	Bracing
L4-L5	L4-L6	ASTM A99	L4	L5	31.208	Normal	Beam
U4-U5	U3-U6	ASTM A99	U4	U5	31.352	Normal	Beam
L5-U5	Verticals	ASTM A99	L5	U5	52.000	Normal	Column
L5-L6	L4-L6	ASTM A99	L5	L6	31.208	Normal	Beam
U5-U6	U3-U6	ASTM A99	U5	U6	31.352	Normal	Beam
L6-U5	2nd. Diagonals	ASTM A99	U5	L6	60.646	Normal	Bracing
L6-U6	Verticals	ASTM A99	L6	U6	49.000	Normal	Column
L6-U7	1St. Diagonals	ASTM A99	L6	U7	55.587	Normal	Bracing
L6-L7	L6-L8	ASTM A99	L6	L7	31.208	Normal	Beam
U6-U7	U3-U6	ASTM A99	U6	U7	31.352	Normal	Beam
L7-U7	Verticals	ASTM A99	L7	U7	46.000	Normal	Column
L7-L8	L6-L8	ASTM A99	L7	L8	31.208	Normal	Beam
U7-U8	U7-U9	ASTM A99	U7	U8	32.217	Normal	Beam
L8-U7	1St. Diagonals	ASTM A99	U7	L8	55.587	Normal	Bracing
L8-U8	Verticals	ASTM A99	L8	U8	38.000	Normal	Column
L8-L9	L8-L10	ASTM A99	L8	L9	31.208	Normal	Beam
L8-U9	L8-U9	ASTM A99	L8	U9	43.289	Normal	Bracing
U8-U9	U7-U9	ASTM A99	U8	U9	32.217	Normal	Beam
L9-U9	Verticals	ASTM A99	L9	U9	30.000	Normal	Column
L9-L10	L8-L10	ASTM A99	L9	L10	30.164	Normal	Beam
U9-L10	U9-L10	ASTM A99	U9	L10	42.542	Normal	Bracing

Load Cases

Load Case	Design Checks	Seismic Type	Results	Analyze?	Envelope?
(1)D	-NA-	-NA-	Yes	Yes	No

Nodal Loads

Load Case	Node	Direction	Force K	Moment K-in
D	L1	DY	-96.08	0.000
D	U1	DY	-3.304	0.000
D	L2	DY	-97.37	0.000
D	U2	DY	-2.915	0.000
D	L3	DY	-95.85	0.000
D	U3	DY	-3.397	0.000
D	L4	DY	-95.72	0.000
D	U4	DY	-3.440	0.000
D	L5	DY	-95.65	0.000
D	U5	DY	-3.349	0.000
D	L6	DY	-95.72	0.000
D	U6	DY	-3.440	0.000
D	L7	DY	-95.85	0.000
D	U7	DY	-3.397	0.000
D	L8	DY	-96.12	0.000
D	U8	DY	-2.869	0.000
D	L9	DY	-94.92	0.000
D	U9	DY	-3.313	0.000

Load Case	Node	Direction	Force K	Moment K-in

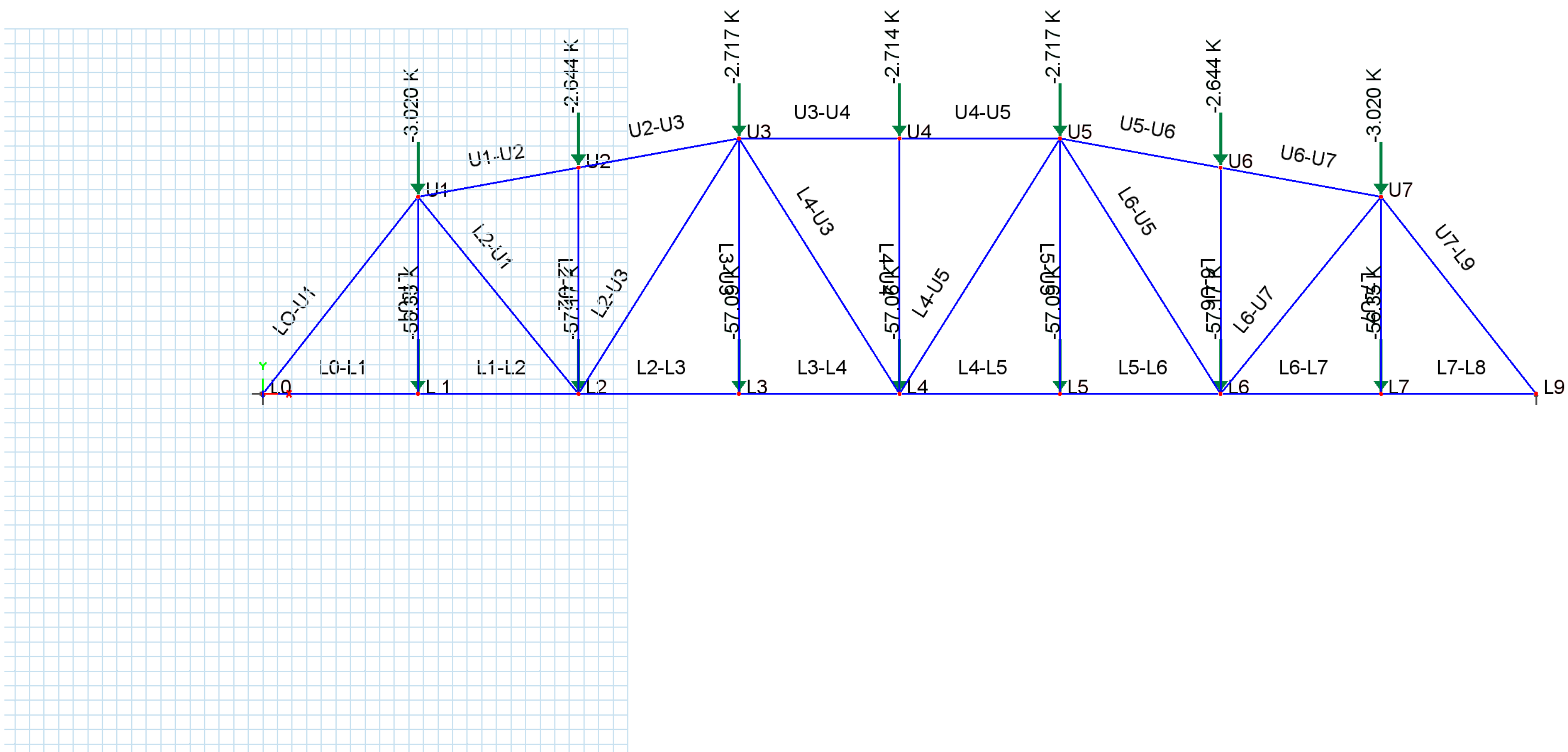
Nodal Displacements

Node	Result Case Name	DX in	DY in
L0	D	**0.0000**	-0.0000
L1	D	0.1129	-0.9610
U1	D	0.7314	-0.8935
L2	D	0.2130	-1.5659
U2	D	0.8120	-1.5488
L3	D	0.3254	-2.2016
U3	D	0.8213	-2.0933
L4	D	0.4378	-2.4508
U4	D	0.7346	-2.4678
L5	D	0.5517	**-2.6690**
U5	D	0.6194	-2.5458
U6	D	0.4951	-2.5556
L6	D	0.6655	-2.5387
U7	D	0.3991	-2.2702
L7	D	0.8401	-2.3748
U8	D	0.3931	-1.7676
L8	D	1.0147	-1.7564
U9	D	0.4706	-0.9391
L9	D	1.1282	-1.0062
L10	D	**1.2379**	**-0.0000**

Member Extreme Results

Member	Fx (lc) K
L0-U1	-835.684 (1)
L0-U1	-822.290 (1)
L0-L1	587.805 (1)
L0-L1	587.805 (1)
U1-U2	-824.368 (1)
U1-U2	-822.023 (1)
L1-L2	587.805 (1)
L1-L2	587.805 (1)
L1U1	102.384 (1)
L1U1	104.327 (1)
L2-U1	300.197 (1)
L2-U1	303.468 (1)
L2-U2	19.504 (1)
L2-U2	21.965 (1)
U2-U3	-815.355 (1)
U2-U3	-813.010 (1)
L2-U3	-164.012 (1)
L2-U3	-157.898 (1)
L2-L3	879.047 (1)
L2-L3	879.047 (1)
L3-U3	106.592 (1)
L3-U3	109.571 (1)
U3-U4	-960.618 (1)
U3-U4	-959.575 (1)
L3-L4	879.047 (1)
L3-L4	879.047 (1)
L4-U3	133.460 (1)
L4-U3	139.574 (1)
L4-U4	-17.511 (1)

Member	Fx (lc) K
L4-U4	-14.339 (1)
U4-U5	-960.618 (1)
U4-U5	-959.575 (1)
L4-U5	19.076 (1)
L4-U5	27.76 (1)
L4-L5	943.640 (1)
L4-L5	943.640 (1)
L5-U5	107.030 (1)
L5-U5	110.397 (1)
U5-U6	**-966.252 (1)**
U5-U6	-965.210 (1)
L5-L6	**943.640 (1)**
L5-L6	943.640 (1)
L6-U5	29.975 (1)
L6-U5	38.659 (1)
L6-U6	-17.511 (1)
L6-U6	-14.339 (1)
U6-U7	-966.252 (1)
U6-U7	-965.210 (1)
L6-U7	119.917 (1)
L6-U7	126.031 (1)
L6-L7	892.258 (1)
L6-L7	892.258 (1)
L7-U7	102.870 (1)
L7-U7	105.848 (1)
U7-U8	-844.065 (1)
U7-U8	-841.721 (1)
L7-L8	892.258 (1)
L7-L8	892.258 (1)
L8-U7	-138.008 (1)
L8-U7	-131.894 (1)
L8-U8	-14.772 (1)
L8-U8	-12.312 (1)
U8-U9	-844.065 (1)
U8-U9	-841.721 (1)
L8-U9	338.478 (1)
L8-U9	342.056 (1)
L8-L9	571.186 (1)
L8-L9	571.186 (1)
L9-U9	101.718 (1)
L9-U9	103.660 (1)
U9-L10	-811.724 (1)
U9-L10	-799.456 (1)
L9-L10	571.186 (1)
L9-L10	571.186 (1)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-2.644 K
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U1
U2
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U5
U6
U7
U1-U2
U2-U3
U3-U4
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L0-L1
L1-L2
L2-L3
L3-L4
L4-L5
L5-L6
L6-L7
L7-L8
L0
L 1
L2
L3
L4
L5
L6
L7
L9
-57.05 K
-57.04 K
-57.05 K

1.0 Frank J. Wood Span 3 Roadway Truss - Present Dead Loads.vap

Company: JDB Consulting Engineers   Engineer: Joseph Bianchi
VisualAnalysis 7.00 Report

Table of Contents

Nodal Supports

Node	Fix DX	Fix DY
L0	Yes	Yes
L9	No	Yes

Nodes

Node	X ft	Y ft	Fix DX	Fix DY
L 1	21.250	0.000	No	No
L0	0.000	0.000	Yes	Yes
U1	21.250	27.000	No	No
L2	43.250	0.000	No	No
U2	43.250	31.000	No	No
L3	65.250	0.000	No	No
U3	65.250	35.000	No	No
L4	87.250	0.000	No	No
U4	87.250	35.000	No	No
L5	109.25	0.000	No	No
U5	109.25	35.000	No	No
L6	131.25	0.000	No	No
U6	131.25	31.000	No	No
L7	153.25	0.000	No	No
U7	153.25	27.000	No	No
L9	174.50	0.000	No	Yes

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L0-L1	L0-L2	ASTM A57	L0	L 1	21.250	Normal	Beam
L1-U1	Vertical 1	ASTM A57	L 1	U1	27.000	Normal	Column
L1-L2	L0-L2	ASTM A57	L 1	L2	22.000	Normal	Beam
U1-U2	U1-U3	ASTM A57	U1	U2	22.361	Normal	Beam
L2-U1	Diagonal 1	ASTM A57	U1	L2	34.828	Normal	Bracing
L2-U2	Vertical 2	ASTM A57	L2	U2	31.000	Normal	Column
L2-U3	Diagonal 2	ASTM A57	L2	U3	41.340	Normal	Bracing
L2-L3	L2-L6	ASTM A57	L2	L3	22.000	Normal	Beam
U2-U3	U1-U3	ASTM A57	U2	U3	22.361	Normal	Beam
L3-U3	Vertical 1	ASTM A57	L3	U3	35.000	Normal	Column

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L3-L4	L2-L6	ASTM A57	L3	L4	22.000	Normal	Beam
U3-U4	U3-U5	ASTM A57	U3	U4	22.000	Normal	Beam
L4-U3	Diagonal 3	ASTM A57	U3	L4	41.340	Normal	Bracing
L4-U4	Vertical 2	ASTM A57	L4	U4	35.000	Normal	Column
L4-U5	Diagonal 3	ASTM A57	L4	U5	41.340	Normal	Bracing
L4-L5	L2-L6	ASTM A57	L4	L5	22.000	Normal	Beam
U4-U5	U3-U5	ASTM A57	U4	U5	22.000	Normal	Beam
L5-U5	Vertical 1	ASTM A57	L5	U5	35.000	Normal	Column
L5-L6	L2-L6	ASTM A57	L5	L6	22.000	Normal	Beam
U5-U6	U1-U3	ASTM A57	U5	U6	22.361	Normal	Beam
L6-U5	Diagonal 2	ASTM A57	U5	L6	41.340	Normal	Bracing
L6-U6	Vertical 2	ASTM A57	L6	U6	31.000	Normal	Column
L6-U7	Diagonal 1	ASTM A57	L6	U7	34.828	Normal	Bracing
L6-L7	L0-L2	ASTM A57	L6	L7	22.000	Normal	Beam
L7-U7	Vertical 1	ASTM A57	L7	U7	27.000	Normal	Column
L7-L8	L0-L2	ASTM A99	L7	L9	21.250	Normal	Beam
LO-U1	LO-U1	ASTM A57	L0	U1	34.359	Normal	Bracing
U6-U7	U1-U3	ASTM A57	U6	U7	22.361	Normal	Beam
U7-L9	LO-U1	ASTM A57	U7	L9	34.359	Normal	Bracing

Load Cases

Load Case	Design Checks	Seismic Type	Results	Analyze?	Envelope?
(1)D	-NA-	-NA-	Yes	Yes	No

Nodal Loads

Load Case	Node	Direction	Force K	Moment K-in
D	L 1	DY	-56.35	0.000
D	U1	DY	-3.020	0.000
D	L2	DY	-57.17	0.000
D	U2	DY	-2.644	0.000
D	L3	DY	-57.09	0.000
D	U3	DY	-2.717	0.000
D	L4	DY	-57.06	0.000
D	U4	DY	-2.714	0.000
D	L5	DY	-57.09	0.000
D	U5	DY	-2.717	0.000
D	L6	DY	-57.17	0.000
D	U6	DY	-2.644	0.000
D	L7	DY	-56.35	0.000
D	U7	DY	-3.020	0.000

Nodal Displacements

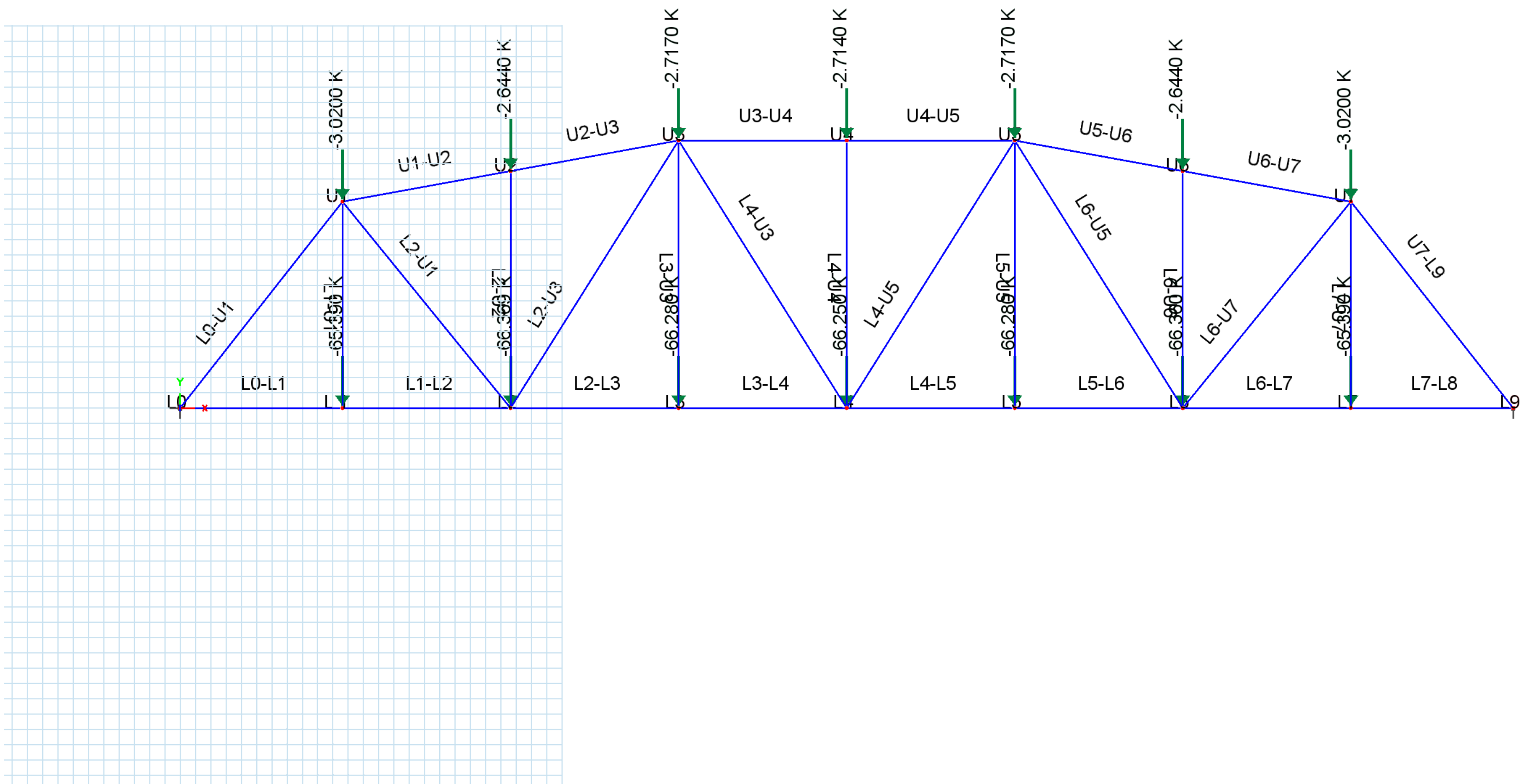
Node	Result Case Name	DX in	DY in
L 1	D	0.0872	-0.4943
L0	D	**-0.0000**	-0.0000
U1	D	0.4381	-0.4352
L2	D	0.1774	-0.8070
U2	D	0.4290	-0.8145
L3	D	0.2448	-1.0963
U3	D	0.3876	-1.0160
U4	D	0.3122	**-1.1473**

Node	Result Case Name	DX in	DY in
L4	D	0.3122	-1.1381
U5	D	0.2367	-1.0160
L5	D	0.3795	-1.0963
U6	D	0.1953	-0.8145
L6	D	0.4469	-0.8070
U7	D	0.1862	-0.4352
L7	D	0.5372	-0.4943
L9	D	**0.6243**	**-0.0000**

Member Extreme Results

Member	Fx (lc) K
L0-L1	188.366 (1)
L0-L1	188.366 (1)
L1-U1	57.75 (1)
L1-U1	58.762 (1)
U1-U2	-290.752 (1)
U1-U2	-290.275 (1)
L1-L2	188.366 (1)
L1-L2	188.366 (1)
L2-U1	153.463 (1)
L2-U1	155.119 (1)
L2-U2	-6.368 (1)
L2-U2	-5.311 (1)
U2-U3	-290.752 (1)
U2-U3	-290.275 (1)
L2-U3	-61.847 (1)
L2-U3	-59.939 (1)
L2-L3	318.233 (1)
L2-L3	318.233 (1)
L3-U3	60.314 (1)
L3-U3	61.626 (1)
U3-U4	**-339.860 (1)**
U3-U4	-339.860 (1)
L3-L4	318.233 (1)
L3-L4	318.233 (1)
L4-U3	39.984 (1)
L4-U3	41.296 (1)
L4-U4	-6.981 (1)
L4-U4	-5.788 (1)
U4-U5	-339.860 (1)
U4-U5	-339.860 (1)
L4-U5	39.984 (1)
L4-U5	41.296 (1)
L4-L5	318.233 (1)
L4-L5	318.233 (1)
L5-U5	60.314 (1)
L5-U5	61.626 (1)
U5-U6	-290.752 (1)
U5-U6	-290.275 (1)
L5-L6	318.233 (1)
L5-L6	**318.233 (1)**
L6-U5	-61.847 (1)
L6-U5	-59.939 (1)
L6-U6	-6.368 (1)
L6-U6	-5.311 (1)
U6-U7	-290.752 (1)
U6-U7	-290.275 (1)
L6-U7	153.463 (1)
L6-U7	155.119 (1)

Member	Fx (lc) K
L6-L7	188.366 (1)
L6-L7	188.366 (1)
L7-U7	57.75 (1)
L7-U7	58.762 (1)
L7-L8	188.366 (1)
L7-L8	188.366 (1)
LO-U1	-307.377 (1)
LO-U1	-301.764 (1)
U7-L9	-307.377 (1)
U7-L9	-301.764 (1)



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-2.6440 K
-2.7170 K
-2.7140 K
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-2.6440 K
-3.0200 K
U1-U2
U2-U3
U3-U4
U4-U5
U5-U6
U6-U7
U4
L0-U1
L2-U1
L2-U3
L4-U3
L4-U5
L6-U5
L6-U7
U7-L9
L0-L1
L1-L2
L2-L3
L3-L4
L4-L5
L5-L6
L6-L7
L7-L8
L0
L9

1.0 Frank J. Wood Span 3 Sidewalk Truss - Present Dead Loads.vap

Company: JDB Consulting Engineers Engineer: Joseph Bianchi
VisualAnalysis 7.00 Report

Table of Contents

Nodal Supports

Node	Fix DX	Fix DY
L0	Yes	Yes
L9	No	Yes

Nodes

Node	X ft	Y ft	Fix DX	Fix DY
L 1	21.250	0.000	No	No
L0	0.000	0.000	Yes	Yes
U1	21.250	27.000	No	No
L2	43.250	0.000	No	No
U2	43.250	31.000	No	No
L3	65.250	0.000	No	No
U3	65.250	35.000	No	No
L4	87.250	0.000	No	No
U4	87.250	35.000	No	No
L5	109.25	0.000	No	No
U5	109.25	35.000	No	No
L6	131.25	0.000	No	No
U6	131.25	31.000	No	No
L7	153.25	0.000	No	No
U7	153.25	27.000	No	No
L9	174.50	0.000	No	Yes

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L0-L1	L0-L2	ASTM A57	L0	L 1	21.250	Normal	Beam
L0-U1	LO-U1	ASTM A57	L0	U1	34.359	Normal	Bracing
L1-U1	Vertical 1	ASTM A57	L 1	U1	27.000	Normal	Column
L1-L2	L0-L2	ASTM A57	L 1	L2	22.000	Normal	Beam
U1-U2	U1-U3	ASTM A57	U1	U2	22.361	Normal	Beam
L2-U1	Diagonal 1	ASTM A57	U1	L2	34.828	Normal	Bracing
L2-U2	Vertical 2	ASTM A57	L2	U2	31.000	Normal	Column
L2-U3	Diagonal 1	ASTM A57	L2	U3	41.340	Normal	Bracing
L2-L3	L2-L6	ASTM A57	L2	L3	22.000	Normal	Beam
U2-U3	U1-U3	ASTM A57	U2	U3	22.361	Normal	Beam

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L3-U3	Vertical 1	ASTM A57	L3	U3	35.000	Normal	Column
L3-L4	L2-L6	ASTM A57	L3	L4	22.000	Normal	Beam
U3-U4	U3-U5	ASTM A57	U3	U4	22.000	Normal	Beam
L4-U3	Diagonal 2	ASTM A57	U3	L4	41.340	Normal	Bracing
L4-U4	Vertical 2	ASTM A57	L4	U4	35.000	Normal	Column
L4-U5	Diagonal 2	ASTM A57	L4	U5	41.340	Normal	Bracing
L4-L5	L2-L6	ASTM A57	L4	L5	22.000	Normal	Beam
U4-U5	U3-U5	ASTM A57	U4	U5	22.000	Normal	Beam
L5-U5	Vertical 1	ASTM A57	L5	U5	35.000	Normal	Column
L5-L6	L2-L6	ASTM A57	L5	L6	22.000	Normal	Beam
U5-U6	U1-U3	ASTM A57	U5	U6	22.361	Normal	Beam
L6-U5	W16x26	ASTM A57	U5	L6	41.340	Normal	Bracing
L6-U6	Vertical 2	ASTM A57	L6	U6	31.000	Normal	Column
L6-U7	Diagonal 1	ASTM A57	L6	U7	34.828	Normal	Bracing
L6-L7	L0-L2	ASTM A57	L6	L7	22.000	Normal	Beam
U6-U7	U1-U3	ASTM A57	U6	U7	22.361	Normal	Beam
L7-U7	Vertical 1	ASTM A57	L7	U7	27.000	Normal	Column
L7-L8	L0-L2	ASTM A99	L7	L9	21.250	Normal	Beam
U7-L9	LO-U1	ASTM A57	U7	L9	34.359	Normal	Bracing

Load Cases

Load Case	Design Checks	Seismic Type	Results	Analyze?	Envelope?
(1)D	-NA-	-NA-	Yes	Yes	No

Nodal Loads

Load Case	Node	Direction	Force K	Moment K-in
D	L 1	DY	-65.39	0.000
D	U1	DY	-3.020	0.000
D	L2	DY	-66.369	0.000
D	U2	DY	-2.644	0.000
D	L3	DY	-66.28	0.000
D	U3	DY	-2.717	0.000
D	L4	DY	-66.25	0.000
D	U4	DY	-2.714	0.000
D	L5	DY	-66.28	0.000
D	U5	DY	-2.717	0.000
D	L6	DY	-66.36	0.000
D	U6	DY	-2.644	0.000
D	L7	DY	-65.39	0.000
D	U7	DY	-3.020	0.000

Nodal Displacements

Node	Result Case Name	DX in	DY in
L 1	D	0.0619	-0.4751
L0	D	**-0.0000**	-0.0000
U1	D	0.4080	-0.4165
L2	D	0.1260	-0.7906
U2	D	0.3964	-0.7985
L3	D	0.1893	-1.0725
U3	D	0.3506	-0.9933
L4	D	0.2526	-1.1172

Node	Result Case Name	DX in	DY in
U4	D	0.2711	**-1.1269**
U5	D	0.1916	-1.0145
L5	D	0.3157	-1.0936
U6	D	0.1645	-0.7190
L6	D	0.3788	-0.7111
U7	D	0.1457	-0.3774
L7	D	0.4427	-0.4361
L9	D	**0.5045**	**-0.0000**

Member Extreme Results

Member	Fx (lc) K
L0-U1	-356.025 (1)
L0-U1	-349.860 (1)
L0-L1	218.282 (1)
L0-L1	218.282 (1)
L1-U1	67.675 (1)
L1-U1	68.871 (1)
U1-U2	-336.812 (1)
U1-U2	-336.280 (1)
L1-L2	218.282 (1)
L1-L2	218.282 (1)
L2-U1	177.571 (1)
L2-U1	179.687 (1)
L2-U2	-6.672 (1)
L2-U2	-5.616 (1)
U2-U3	-336.812 (1)
U2-U3	-336.280 (1)
L2-U3	-71.418 (1)
L2-U3	-68.674 (1)
L2-L3	**368.394 (1)**
L2-L3	368.394 (1)
L3-U3	70.254 (1)
L3-U3	71.804 (1)
U3-U4	**-392.993 (1)**
U3-U4	-392.993 (1)
L3-L4	368.394 (1)
L3-L4	368.394 (1)
L4-U3	45.33 (1)
L4-U3	47.119 (1)
L4-U4	-7.281 (1)
L4-U4	-6.088 (1)
U4-U5	-392.993 (1)
U4-U5	-392.993 (1)
L4-U5	46.921 (1)
L4-U5	48.71 (1)
L4-L5	367.548 (1)
L4-L5	367.548 (1)
L5-U5	70.254 (1)
L5-U5	71.804 (1)
U5-U6	-335.648 (1)
U5-U6	-335.116 (1)
L5-L6	367.548 (1)
L5-L6	367.548 (1)
L6-U5	-71.066 (1)
L6-U5	-70.150 (1)
L6-U6	-6.672 (1)
L6-U6	-5.616 (1)
U6-U7	-335.648 (1)
U6-U7	-335.116 (1)

Member	Fx (lc) K
L6–U7	176.780 (1)
L6–U7	178.897 (1)
L6–L7	217.636 (1)
L6–L7	217.636 (1)
L7–U7	67.675 (1)
L7–U7	68.871 (1)
L7–L8	217.636 (1)
L7–L8	217.636 (1)
U7–L9	−354.981 (1)
U7–L9	−348.816 (1)

1.0 Rehab Truss with Polymer Wearing Frank J. Wood Span 2 Roadway Truss - Present Dead Loads.vap

Company: JDB Consulting Engineers   Engineer: Joseph Bianchi
VisualAnalysis 7.00 Report

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Nodal Supports

Node	Fix DX	Fix DY
L0	Yes	Yes
L10	No	Yes

Nodes

Node	X ft	Y ft	Fix DX	Fix DY
L0	0.000	0.000	Yes	Yes
L1	30.165	0.000	No	No
U1	30.165	30.000	No	No
L2	65.832	0.000	No	No
U2	65.832	38.000	No	No
L3	97.040	0.000	No	No
U3	97.040	46.000	No	No
L4	128.248	0.000	No	No
U4	128.248	49.000	No	No
L5	159.457	0.000	No	No
U5	159.457	52.000	No	No
L6	190.665	0.000	No	No
U6	190.665	49.000	No	No
L7	221.873	0.000	No	No
U7	221.873	46.000	No	No
L8	253.082	0.000	No	No
U8	253.082	38.000	No	No
L9	284.29	0.000	No	No
U9	284.29	30.000	No	No
L10	314.458	0.000	No	Yes

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L0-L1	L0-L2	ASTM A99	L0	L1	30.165	Normal	Beam
L0-U1	L0-U1	ASTM A99	L0	U1	42.543	Normal	Bracing
L1-L2	L0-L2	ASTM A99	L1	L2	35.667	Normal	Beam
U1-U2	U1-U3	ASTM A99	U1	U2	36.553	Normal	Beam

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L1U1	Verticals	ASTM A99	L1	U1	30.000	Normal	Column
L2-U1	L2-U1	ASTM A99	U1	L2	46.606	Normal	Bracing
L2-U2	Verticals	ASTM A99	L2	U2	38.000	Normal	Column
L2-U3	1St. Diagonals	ASTM A99	L2	U3	55.587	Normal	Bracing
L2-L3	L2-L4	ASTM A99	L2	L3	31.208	Normal	Beam
U2-U3	U1-U3	ASTM A99	U2	U3	32.217	Normal	Beam
L3-U3	Verticals	ASTM A99	L3	U3	46.000	Normal	Column
L3-L4	L2-L4	ASTM A99	L3	L4	31.208	Normal	Beam
U3-U4	U3-U6	ASTM A99	U3	U4	31.352	Normal	Beam
L4-U3	1St. Diagonals	ASTM A99	U3	L4	55.587	Normal	Bracing
L4-U4	Verticals	ASTM A99	L4	U4	49.000	Normal	Column
L4-U5	2nd. Diagonals	ASTM A99	L4	U5	60.646	Normal	Bracing
L4-L5	L4-L6	ASTM A99	L4	L5	31.208	Normal	Beam
U4-U5	U3-U6	ASTM A99	U4	U5	31.352	Normal	Beam
L5-U5	Verticals	ASTM A99	L5	U5	52.000	Normal	Column
L5-L6	L4-L6	ASTM A99	L5	L6	31.208	Normal	Beam
U5-U6	U3-U6	ASTM A99	U5	U6	31.352	Normal	Beam
L6-U5	2nd. Diagonals	ASTM A99	U5	L6	60.646	Normal	Bracing
L6-U6	Verticals	ASTM A99	L6	U6	49.000	Normal	Column
L6-U7	1St. Diagonals	ASTM A99	L6	U7	55.587	Normal	Bracing
L6-L7	L6-L8	ASTM A99	L6	L7	31.208	Normal	Beam
U6-U7	U3-U6	ASTM A99	U6	U7	31.352	Normal	Beam
L7-U7	Verticals	ASTM A99	L7	U7	46.000	Normal	Column
L7-L8	L6-L8	ASTM A99	L7	L8	31.208	Normal	Beam
U7-U8	U7-U9	ASTM A99	U7	U8	32.217	Normal	Beam
L8-U7	1St. Diagonals	ASTM A99	U7	L8	55.587	Normal	Bracing
L8-U8	Verticals	ASTM A99	L8	U8	38.000	Normal	Column
L8-L9	L8-L10	ASTM A99	L8	L9	31.208	Normal	Beam
U8-U9	U7-U9	ASTM A99	U8	U9	32.217	Normal	Beam
L8-U9	l8-u9	ASTM A99	L8	U9	43.289	Normal	Bracing
L9-U9	Verticals	ASTM A99	L9	U9	30.000	Normal	Column
L9-L10	L8-L10	ASTM A99	L9	L10	30.168	Normal	Beam
U9-L10	U9-L10	ASTM A99	U9	L10	42.546	Normal	Bracing

Load Cases

Load Case	Design Checks	Seismic Type	Results	Analyze?	Envelope?
(1)D	-NA-	-NA-	Yes	Yes	No

Nodal Loads

Load Case	Node	Direction	Force K	Moment K-in
D	L1	DY	-50.30	0.000
D	U1	DY	-3.393	0.000
D	L2	DY	-50.30	0.000
D	U2	DY	-2.826	0.000
D	L3	DY	-50.30	0.000
D	U3	DY	-3.397	0.000
D	L4	DY	-50.30	0.000
D	U4	DY	-3.440	0.000
D	L5	DY	-50.30	0.000
D	U5	DY	-3.494	0.000
D	L6	DY	-50.30	0.000
D	U6	DY	-3.440	0.000
D	L7	DY	-50.30	0.000
D	U7	DY	-3.397	0.000
D	L8	DY	-50.30	0.000
D	U8	DY	-2.869	0.000

Load Case	Node	Direction	Force K	Moment K-in
D	L9	DY	-50.30	0.000
D	U9	DY	-3.313	0.000

Nodal Displacements

Node	Result Case Name	DX in	DY in
L0	D	**0.0000**	**-0.0000**
L1	D	0.0797	-0.6835
U1	D	0.5432	-0.6458
L2	D	0.1740	-1.3007
U2	D	0.5881	-1.3271
L3	D	0.2574	-1.6848
U3	D	0.5675	-1.6229
L4	D	0.3408	-1.8305
U4	D	0.4985	-1.8466
U5	D	0.4089	-1.8551
L5	D	0.4254	**-1.9256**
U6	D	0.3226	-1.8197
L6	D	0.5100	-1.8036
U7	D	0.2571	-1.5695
L7	D	0.5917	-1.6314
U8	D	0.2483	-1.2294
L8	D	0.6733	-1.2187
U9	D	0.3039	-0.6382
L9	D	0.7570	-0.6757
L10	D	**0.8380**	-0.0000

Member Extreme Results

Member	Fx (lc) K
L0-U1	-529.213 (1)
L0-U1	-515.821 (1)
L0-L1	370.486 (1)
L0-L1	370.486 (1)
U1-U2	-578.766 (1)
U1-U2	-576.503 (1)
L1-L2	370.486 (1)
L1-L2	370.486 (1)
L1U1	56.806 (1)
L1U1	58.748 (1)
L2-U1	250.594 (1)
L2-U1	254.172 (1)
L2-U2	-33.073 (1)
L2-U2	-30.613 (1)
U2-U3	-582.986 (1)
U2-U3	-580.723 (1)
L2-U3	-80.501 (1)
L2-U3	-74.388 (1)
L2-L3	607.110 (1)
L2-L3	607.110 (1)
L3-U3	60.297 (1)
L3-U3	63.275 (1)
U3-U4	**-652.984 (1)**
U3-U4	-652.024 (1)
L3-L4	607.110 (1)
L3-L4	607.110 (1)
L4-U3	72.465 (1)

Member	Fx (lc) K
L4-U3	78.578 (1)
L4-U4	-16.655 (1)
L4-U4	-13.483 (1)
U4-U5	-652.984 (1)
U4-U5	-652.024 (1)
L4-U5	22.917 (1)
L4-U5	31.60 (1)
L4-L5	**635.483 (1)**
L4-L5	635.483 (1)
L5-U5	60.616 (1)
L5-U5	63.982 (1)
U5-U6	-646.895 (1)
U5-U6	-645.934 (1)
L5-L6	635.483 (1)
L5-L6	635.483 (1)
L6-U5	11.137 (1)
L6-U5	19.82 (1)
L6-U6	-16.655 (1)
L6-U6	-13.483 (1)
U6-U7	-646.895 (1)
U6-U7	-645.934 (1)
L6-U7	84.671 (1)
L6-U7	90.784 (1)
L6-L7	594.196 (1)
L6-L7	594.196 (1)
L7-U7	60.297 (1)
L7-U7	63.275 (1)
U7-U8	-558.876 (1)
U7-U8	-556.695 (1)
L7-L8	594.196 (1)
L7-L8	594.196 (1)
L8-U7	-99.026 (1)
L8-U7	-92.912 (1)
L8-U8	-14.112 (1)
L8-U8	-11.652 (1)
U8-U9	-558.876 (1)
U8-U9	-556.695 (1)
L8-U9	226.194 (1)
L8-U9	229.261 (1)
L8-L9	376.142 (1)
L8-L9	376.142 (1)
L9-U9	56.365 (1)
L9-U9	58.308 (1)
U9-L10	-537.160 (1)
U9-L10	-523.768 (1)
L9-L10	376.142 (1)
L9-L10	376.142 (1)

2.0 Rehab Truss with Polymer Wearing Frank J. Wood Span 2 Sidewalk Truss - Present Dead Loads.vap

Company: JDB Consulting Engineers Engineer: Joseph Bianchi
VisualAnalysis 7.00 Report

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Nodal Supports

Node	Fix DX	Fix DY
L0	Yes	Yes
L10	No	Yes

Nodes

Node	X ft	Y ft	Fix DX	Fix DY
L0	0.000	0.000	Yes	Yes
L1	30.167	0.000	No	No
U1	30.167	30.000	No	No
L2	56.917	0.000	No	No
U2	56.917	38.000	No	No
L3	88.125	0.000	No	No
U3	88.125	46.000	No	No
L4	119.334	0.000	No	No
U4	119.334	49.000	No	No
L5	150.542	0.000	No	No
U5	150.542	52.000	No	No
L6	181.75	0.000	No	No
U6	181.75	49.000	No	No
L7	212.959	0.000	No	No
U7	212.959	46.000	No	No
L8	244.167	0.000	No	No
U8	244.167	38.000	No	No
L9	275.375	0.000	No	No
U9	275.375	30.000	No	No
L10	305.539	0.000	No	Yes

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L0-L1	L0-L2	ASTM A99	L0	L1	30.167	Normal	Beam
L0-U1	L0-U1	ASTM A99	L0	U1	42.544	Normal	Bracing
L1-L2	L0-L2	ASTM A99	L1	L2	26.750	Normal	Beam
U1-U2	U1-U3	ASTM A99	U1	U2	27.921	Normal	Beam

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L1U1	Verticals	ASTM A99	L1	U1	30.000	Normal	Column
L2-U1	L2-U1	ASTM A99	U1	L2	40.194	Normal	Bracing
L2-U2	Verticals	ASTM A99	L2	U2	38.000	Normal	Column
L2-U3	1St. Diagonals	ASTM A99	L2	U3	55.587	Normal	Bracing
L2-L3	L2-L4	ASTM A99	L2	L3	31.208	Normal	Beam
U2-U3	U1-U3	ASTM A99	U2	U3	32.217	Normal	Beam
L3-U3	Verticals	ASTM A99	L3	U3	46.000	Normal	Column
L3-L4	L2-L4	ASTM A99	L3	L4	31.208	Normal	Beam
U3-U4	U3-U6	ASTM A99	U3	U4	31.352	Normal	Beam
L4-U3	1St. Diagonals	ASTM A99	U3	L4	55.587	Normal	Bracing
L4-U4	Verticals	ASTM A99	L4	U4	49.000	Normal	Column
L4-U5	2nd. Diagonals	ASTM A99	L4	U5	60.646	Normal	Bracing
L4-L5	L4-L6	ASTM A99	L4	L5	31.208	Normal	Beam
U4-U5	U3-U6	ASTM A99	U4	U5	31.352	Normal	Beam
L5-U5	Verticals	ASTM A99	L5	U5	52.000	Normal	Column
L5-L6	L4-L6	ASTM A99	L5	L6	31.208	Normal	Beam
U5-U6	U3-U6	ASTM A99	U5	U6	31.352	Normal	Beam
L6-U5	2nd. Diagonals	ASTM A99	U5	L6	60.646	Normal	Bracing
L6-U6	Verticals	ASTM A99	L6	U6	49.000	Normal	Column
L6-U7	1St. Diagonals	ASTM A99	L6	U7	55.587	Normal	Bracing
L6-L7	L6-L8	ASTM A99	L6	L7	31.208	Normal	Beam
U6-U7	U3-U6	ASTM A99	U6	U7	31.352	Normal	Beam
L7-U7	Verticals	ASTM A99	L7	U7	46.000	Normal	Column
L7-L8	L6-L8	ASTM A99	L7	L8	31.208	Normal	Beam
U7-U8	U7-U9	ASTM A99	U7	U8	32.217	Normal	Beam
L8-U7	1St. Diagonals	ASTM A99	U7	L8	55.587	Normal	Bracing
L8-U8	Verticals	ASTM A99	L8	U8	38.000	Normal	Column
L8-L9	L8-L10	ASTM A99	L8	L9	31.208	Normal	Beam
L8-U9	L8-U9	ASTM A99	L8	U9	43.289	Normal	Bracing
U8-U9	U7-U9	ASTM A99	U8	U9	32.217	Normal	Beam
L9-U9	Verticals	ASTM A99	L9	U9	30.000	Normal	Column
L9-L10	L8-L10	ASTM A99	L9	L10	30.164	Normal	Beam
U9-L10	U9-L10	ASTM A99	U9	L10	42.542	Normal	Bracing

Load Cases

Load Case	Design Checks	Seismic Type	Results	Analyze?	Envelope?
(1)D	-NA-	-NA-	Yes	Yes	No

Nodal Loads

Load Case	Node	Direction	Force K	Moment K-in
D	L1	DY	-65.80	0.000
D	U1	DY	-3.304	0.000
D	L2	DY	-65.80	0.000
D	U2	DY	-2.915	0.000
D	L3	DY	-65.80	0.000
D	U3	DY	-3.397	0.000
D	L4	DY	-65.80	0.000
D	U4	DY	-3.440	0.000
D	L5	DY	-65.80	0.000
D	U5	DY	-3.349	0.000
D	L6	DY	-65.80	0.000
D	U6	DY	-3.440	0.000
D	L7	DY	-65.80	0.000
D	U7	DY	-3.397	0.000
D	L8	DY	-65.80	0.000
D	U8	DY	-2.869	0.000

Load Case	Node	Direction	Force K	Moment K-in
D	L9	DY	-65.80	0.000
D	U9	DY	-3.313	0.000

Nodal Displacements

Node	Result Case Name	DX in	DY in
L0	D	**0.0000**	-0.0000
L1	D	0.0867	-0.7346
U1	D	0.5624	-0.6868
L2	D	0.1635	-1.2047
U2	D	0.6254	-1.1942
L3	D	0.2502	-1.6921
U3	D	0.6327	-1.6137
L4	D	0.3368	-1.8908
U4	D	0.5663	-1.9081
L5	D	0.4248	**-2.0541**
U5	D	0.4770	-1.9646
U6	D	0.3807	-1.9755
L6	D	0.5128	-1.9583
U7	D	0.3072	-1.7499
L7	D	0.6473	-1.8245
U8	D	0.3023	-1.3638
L8	D	0.7819	-1.3525
U9	D	0.3628	-0.7229
L9	D	0.8692	-0.7711
L10	D	**0.9536**	**-0.0000**

Member Extreme Results

Member	Fx (lc) K
L0-U1	-643.243 (1)
L0-U1	-629.632 (1)
L0-L1	451.275 (1)
L0-L1	451.275 (1)
U1-U2	-634.082 (1)
U1-U2	-631.699 (1)
L1-L2	451.275 (1)
L1-L2	451.275 (1)
L1U1	72.207 (1)
L1U1	74.181 (1)
L2-U1	231.357 (1)
L2-U1	234.682 (1)
L2-U2	11.531 (1)
L2-U2	14.032 (1)
U2-U3	-627.152 (1)
U2-U3	-624.769 (1)
L2-U3	-130.233 (1)
L2-U3	-124.019 (1)
L2-L3	677.727 (1)
L2-L3	677.727 (1)
L3-U3	76.717 (1)
L3-U3	79.744 (1)
U3-U4	-741.846 (1)
U3-U4	-740.786 (1)
L3-L4	677.727 (1)
L3-L4	677.727 (1)
L4-U3	104.096 (1)

Member	Fx (lc) K
L4-U3	110.310 (1)
L4-U4	-17.741 (1)
L4-U4	-14.516 (1)
U4-U5	-741.846 (1)
U4-U5	-740.786 (1)
L4-U5	13.046 (1)
L4-U5	21.871 (1)
L4-L5	728.930 (1)
L4-L5	**728.930 (1)**
L5-U5	77.366 (1)
L5-U5	80.788 (1)
U5-U6	**-745.956 (1)**
U5-U6	-744.896 (1)
L5-L6	728.930 (1)
L5-L6	728.930 (1)
L6-U5	20.996 (1)
L6-U5	29.822 (1)
L6-U6	-17.741 (1)
L6-U6	-14.516 (1)
U6-U7	-745.956 (1)
U6-U7	-744.896 (1)
L6-U7	93.573 (1)
L6-U7	99.786 (1)
L6-L7	687.727 (1)
L6-L7	687.727 (1)
L7-U7	72.934 (1)
L7-U7	75.961 (1)
U7-U8	-649.905 (1)
U7-U8	-647.523 (1)
L7-L8	687.727 (1)
L7-L8	687.727 (1)
L8-U7	-108.785 (1)
L8-U7	-102.571 (1)
L8-U8	-14.966 (1)
L8-U8	-12.465 (1)
U8-U9	-649.905 (1)
U8-U9	-647.523 (1)
L8-U9	260.335 (1)
L8-U9	263.972 (1)
L8-L9	439.403 (1)
L8-L9	439.403 (1)
L9-U9	72.708 (1)
L9-U9	74.683 (1)
U9-L10	-625.960 (1)
U9-L10	-613.491 (1)
L9-L10	439.403 (1)
L9-L10	439.403 (1)

4.0 Rehab Truss with Polymer Wearing Frank J. Wood Span 3 Sidewalk Truss - Present Dead Loads.vap

Company: JDB Consulting Engineers   Engineer: Joseph Bianchi
VisualAnalysis 7.00 Report

Table of Contents

Nodal Supports

Node	Fix DX	Fix DY
L0	Yes	Yes
L8	No	Yes

Nodes

Node	X ft	Y ft	Fix DX	Fix DY
L 1	21.250	0.000	No	No
L0	0.000	0.000	Yes	Yes
U1	21.250	27.000	No	No
L2	43.250	0.000	No	No
U2	43.250	31.000	No	No
L3	65.250	0.000	No	No
U3	65.250	35.000	No	No
L4	87.250	0.000	No	No
U4	87.250	35.000	No	No
L5	109.25	0.000	No	No
U5	109.25	35.000	No	No
L6	131.25	0.000	No	No
U6	131.25	31.000	No	No
L7	153.25	0.000	No	No
U7	153.25	27.000	No	No
L8	174.50	0.000	No	Yes

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L0-L1	L0-L2	ASTM A57	L0	L 1	21.250	Normal	Beam
L0-U1	LO-U1	ASTM A57	L0	U1	34.359	Normal	Bracing
L1-U1	Vertical 1	ASTM A57	L 1	U1	27.000	Normal	Column
L1-L2	L0-L2	ASTM A57	L 1	L2	22.000	Normal	Beam
U1-U2	U1-U3	ASTM A57	U1	U2	22.361	Normal	Beam
L2-U1	Diagonal 1	ASTM A57	U1	L2	34.828	Normal	Bracing
L2-U2	Vertical 2	ASTM A57	L2	U2	31.000	Normal	Column
L2-U3	Diagonal 1	ASTM A57	L2	U3	41.340	Normal	Bracing

Member	Section	Material	(1)Node	(2)Node	Length ft	One Way	Framing
L2-L3	L2-L6	ASTM A57	L2	L3	22.000	Normal	Beam
U2-U3	U1-U3	ASTM A57	U2	U3	22.361	Normal	Beam
L3-U3	Vertical 1	ASTM A57	L3	U3	35.000	Normal	Column
L3-L4	L2-L6	ASTM A57	L3	L4	22.000	Normal	Beam
U3-U4	U3-U5	ASTM A57	U3	U4	22.000	Normal	Beam
L4-U3	Diagonal 2	ASTM A57	U3	L4	41.340	Normal	Bracing
L4-U4	Vertical 2	ASTM A57	L4	U4	35.000	Normal	Column
L4-U5	Diagonal 2	ASTM A57	L4	U5	41.340	Normal	Bracing
L4-L5	L2-L6	ASTM A57	L4	L5	22.000	Normal	Beam
U4-U5	U3-U5	ASTM A57	U4	U5	22.000	Normal	Beam
L5-U5	Vertical 1	ASTM A57	L5	U5	35.000	Normal	Column
L5-L6	L2-L6	ASTM A57	L5	L6	22.000	Normal	Beam
U5-U6	U1-U3	ASTM A57	U5	U6	22.361	Normal	Beam
L6-U5	W16x26	ASTM A57	U5	L6	41.340	Normal	Bracing
L6-U6	Vertical 2	ASTM A57	L6	U6	31.000	Normal	Column
L6-U7	Diagonal 1	ASTM A57	L6	U7	34.828	Normal	Bracing
L6-L7	L0-L2	ASTM A57	L6	L7	22.000	Normal	Beam
U6-U7	U1-U3	ASTM A57	U6	U7	22.361	Normal	Beam
L7-U7	Vertical 1	ASTM A57	L7	U7	27.000	Normal	Column
L7-L8	L0-L2	ASTM A99	L7	L8	21.250	Normal	Beam
U7-L8	LO-U1	ASTM A57	U7	L8	34.359	Normal	Bracing

Load Cases

Load Case	Design Checks	Seismic Type	Results	Analyze?	Envelope?
(1)D	-NA-	-NA-	Yes	Yes	No

Nodal Loads

Load Case	Node	Direction	Force K	Moment K-in
D	L 1	DY	-45.00	0.000
D	U1	DY	-3.020	0.000
D	L2	DY	-45.00	0.000
D	U2	DY	-2.644	0.000
D	L3	DY	-45.00	0.000
D	U3	DY	-2.717	0.000
D	L4	DY	-45.00	0.000
D	U4	DY	-2.714	0.000
D	L5	DY	-45.00	0.000
D	U5	DY	-2.717	0.000
D	L6	DY	-45.00	0.000
D	U6	DY	-2.644	0.000
D	L7	DY	-45.00	0.000
D	U7	DY	-3.020	0.000

Nodal Displacements

Node	Result Case Name	DX in	DY in
L 1	D	0.0464	-0.3536
L0	D	**-0.0000**	-0.0000
U1	D	0.3058	-0.3122
L2	D	0.0945	-0.5922
U2	D	0.2975	-0.6006
L3	D	0.1419	-0.8001

Node	Result Case Name	DX in	DY in
U3	D	0.2628	-0.7440
L4	D	0.1893	-0.8365
U4	D	0.2033	**-0.8468**
U5	D	0.1437	-0.7592
L5	D	0.2365	-0.8153
U6	D	0.1231	-0.5399
L6	D	0.2838	-0.5315
U7	D	0.1095	-0.2824
L7	D	0.3316	-0.3238
L8	D	**0.3779**	**-0.0000**

Member Extreme Results

Member	Fx (lc) K
L0-U1	-268.172 (1)
L0-U1	-261.273 (1)
L0-L1	163.721 (1)
L0-L1	163.721 (1)
L1-U1	47.557 (1)
L1-U1	48.895 (1)
U1-U2	-252.366 (1)
U1-U2	-251.771 (1)
L1-L2	163.721 (1)
L1-L2	163.721 (1)
L2-U1	132.242 (1)
L2-U1	134.610 (1)
L2-U2	-7.152 (1)
L2-U2	-5.97 (1)
U2-U3	-252.366 (1)
U2-U3	-251.771 (1)
L2-U3	-54.002 (1)
L2-U3	-50.932 (1)
L2-L3	**275.924 (1)**
L2-L3	275.924 (1)
L3-U3	49.447 (1)
L3-U3	51.182 (1)
U3-U4	**-294.195 (1)**
U3-U4	-294.195 (1)
L3-L4	275.924 (1)
L3-L4	275.924 (1)
L4-U3	33.331 (1)
L4-U3	35.333 (1)
L4-U4	-7.824 (1)
L4-U4	-6.489 (1)
U4-U5	-294.195 (1)
U4-U5	-294.195 (1)
L4-U5	35.105 (1)
L4-U5	37.107 (1)
L4-L5	274.980 (1)
L4-L5	274.980 (1)
L5-U5	49.447 (1)
L5-U5	51.182 (1)
U5-U6	-251.071 (1)
U5-U6	-250.476 (1)
L5-L6	274.980 (1)
L5-L6	274.980 (1)
L6-U5	-53.6 (1)
L6-U5	-52.575 (1)
L6-U6	-7.152 (1)
L6-U6	-5.97 (1)

Member	Fx (lc) K
U6-U7	-251.071 (1)
U6-U7	-250.476 (1)
L6-U7	131.362 (1)
L6-U7	133.730 (1)
L6-L7	163.002 (1)
L6-L7	163.002 (1)
L7-U7	47.557 (1)
L7-U7	48.895 (1)
U7-L8	-267.009 (1)
U7-L8	-260.111 (1)
L7-L8	163.002 (1)
L7-L8	163.002 (1)

LRFR Truss members: Frank J. Wood Bridge

Project: Bridge Rehabilitation
Date: January 25, 2018
Type: Span 3 Roadway and Sidewalk Trusses (Reference: Maine DOT Bridge Load Rating completed by Parson Brinckerhoff March 2013 - Starting at node point L0 based on original plans)

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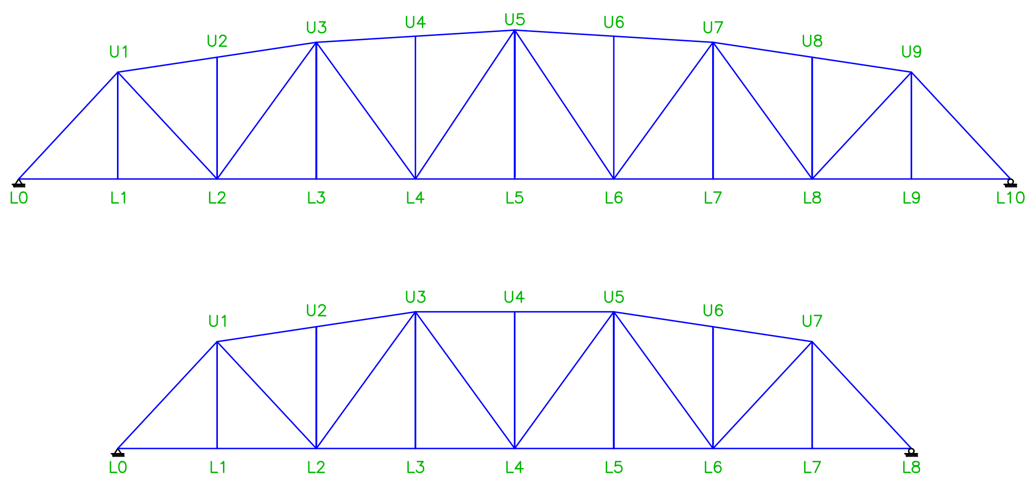

▪ INPUT DATA AND TRUSS RATING:

Strength I Load Factors

$\gamma_{DC} = 1.25$

```
1.25
```

$\gamma_{DW} = 1.50$

1.5

$\gamma_{LLInventory} = 1.75$

1.75

Resistance and strength of element:

Resistance of element (capacity) in force or stress (TRAP) - C_{xx};
Dead load of structural components or attachments effecting element (VA) - DC_{xx};
Dead load of structural components or attachments effecting element (TRAP) - $DCTRAP_{xx}$;
Dead load adjustment factor for structural components or attachments effecting DC_{xx} elements (TRAP) - FC_{xx};
Dead load of wearing surface or utilities effecting element (TRAP) - DW_{xx};
Live HL-93 vehicular truck load including dynamic load allowance effecting element (TRAP) - LL_{xx};

Roadway Truss Members (xxxx - subscript denotes member & xx - subscript denotes gusset plate):

Correction factor based on new rehabilitation repairs :

Sum of all TRAP dead loads - DL_T (kips);
Sum of TRAP dead loads from stringers and floorbeams - DL_E (kips);
Sum of NEW dead loads from stringers and floorbeams - DL_N (kips);
Correction factor - $CF_{RWtruss}$ (unitless);

$DL_T = 417.8$

417.8

$DL_E = 385.7$

385.7

$DL_N = 287$

287

$$CF_{RWtruss} = \frac{DL_T - (DL_E - DL_N)}{DL_T}$$

0.763763

Member L3U3 TENSION (Ref. Page 68-69/RF=0.89):

$C_{L3U3} = 228$

228

$DC_{L3U3} = 63$

63

$DCTRAP_{L3U3} = 65$

65

$FC_{L3U3} = 1.0$

1.

$DW_{L3U3} = 0$

0

$LL_{L3U3} = 94$

94

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L3U3} = \frac{C_{L3U3} - CF_{RWtruss}\,\gamma_{DC}\,(FC_{L3U3}\,DC_{L3U3}) - \gamma_{DW}\,(DW_{L3U3})}{\gamma_{LLInventory}\,(LL_{L3U3})}$$

1.02039

Gusset L3 - Member L3U3 (Ref. Page 1,394-1,395/RF=0.85):

$C_{L3} = 222$

222

$DC_{L3} = 63$

63

$DCTRAP_{L3} = 65$

65

$FC_{L3} = 1.0$

1.

$DW_{L3} = 0$

0

$LL_{L3} = 94$

94

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L3} = \frac{C_{L3} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{L3}\ \ DC_{L3}) - \gamma_{DW}\ (DW_{L3})}{\gamma_{LLInventory}\ (LL_{L3})}$$

0.983913

Gusset L1 - Member L1U1 (Ref. Page 1,344/RF=0.88):

$C_{L1} = 222$

222

$DC_{L1} = 59$

59

$DCTRAP_{L1} = 63$

63

$FC_{L1} = 1.0$

1.

$DW_{L1} = 0$

0

$LL_{L1} = 94$

94

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L1} = \frac{C_{L1} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{L1}\ \ DC_{L1}) - \gamma_{DW}\ (DW_{L1})}{\gamma_{LLInventory}\ (LL_{L1})}$$

1.00713

Gusset L0 - Member L0U1 (Ref. Page 1,283/RF=0.91):

$C_{L0} = 288$

288

$DC_{L0} = 125$

125

$DCTRAP_{L0} = 132$

132

$FC_{L0} = 1.00$

1.

$DW_{L0} = 0$

0

$LL_{L0} = 79$

79

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L0} = \frac{C_{L0} - CF_{RWtruss}\,\gamma_{DC}\,(FC_{L0}\ \ DC_{L0}) - \gamma_{DW}\,(DW_{L0})}{\gamma_{LLInventory}\,(LL_{L0})}$$

1.21998

Gusset L3 - Member L3U3 (Ref. Page 1,419/RF=0.98): Maine Legal Load Configuration 6

Strength I Load Factor - Maine Legal Load Factor

$\gamma_{MLLInventory} = 1.35$

1.35

$C_{L3} = 222$

222

$DC_{L3} = 63$

63

$DCTRAP_{L3} = 65$

65

$FC_{L3} = 1.0$

1.

$DW_{L3} = 0$

0

$LL_{L3} = 106$

106

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L3} = \frac{C_{L3} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{L3}\ \ DC_{L3}) - \gamma_{DW}\ (DW_{L3})}{\gamma_{MLLInventory}\ (LL_{L3})}$$

1.13105

Sidewalk Truss Members (xxxx - denotes member & xx - denotes gusset plate):

Correction factor based on new rehabilitation repairs :

Sum of all TRAP dead loads - DL_T (kips);
Sum of TRAP dead loads from stringers and floorbeams - DL_E (kips);
Sum of NEW dead loads from stringers and floorbeams - DL_N (kips);
Correction factor - $CF_{RWtruss}$ (unitless);

$DL_T = 481.8$

481.8

$DL_E = 377$

377

$DL_N = 287$

287

$$CF_{SWtruss} = \frac{DL_T - (DL_E - DL_N)}{DL_T}$$

0.8132

Member U1-U2 = U3-U4 & U5-U6 = U6-U8 COMPRESSION (Ref. Page 73-74/RF=0.95):

$C_{U1U2} = 776$

776

$DC_{U1U2} = N[\frac{399+341}{2}]$

370.

$DCTRAP_{U1U2} = 365$

365

$FC_{U1U2} = 1.0$

1.

$DW_{U1U2} = 0$

0

$LL_{U1U2} = 192$

192

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U1U2} = \frac{C_{U1U2} - CF_{SWtruss}\,\gamma_{DC}\,(FC_{U1U2}\,DC_{U1U2}) - \gamma_{DW}\,(DW_{U1U2})}{\gamma_{LLInventory}\,(LL_{U1U2})}$$

1.19016

Gusset L0 - Member L0U1 (Ref. Page 1,479/RF=0.72):

$C_{L0} = 288$

288

$DC_{L0} = 142$

142

$DCTRAP_{L0} = 150$

150

$FC_{L0} = 1.0$

1.

$DW_{L0} = 0$

0

$LL_{L0} = 79$

79

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L0} = \frac{C_{L0} - CF_{SWtruss}\,\gamma_{DC}\,(FC_{L0}\;DC_{L0}) - \gamma_{DW}\,(DW_{L0})}{\gamma_{LLInventory}\,(LL_{L0})}$$

1.03911

Gusset U1 - Member L2U1 (Ref. Page 1,662/RF=0.94):

$C_{U1} = 222$

222

$DC_{U1} = 92$

92

$DCTRAP_{U1} = 97$

97

$FC_{U1} = 1.0$

1.

$DW_{U1} = 0$

0

$LL_{U1} = 61$

61

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U1} = \frac{C_{U1} - CF_{SWtruss}\, \gamma_{DC}\, (FC_{U1}\ DC_{U1}) - \gamma_{DW}\, (DW_{U1})}{\gamma_{LLInventory}\, (LL_{U1})}$$

1.20358

Gusset U3 - Member L3U3 (Ref. Page 1,790/RF=0.99):

$C_{U3} = 130$

130

$DC_{U3} = 37$

37

$DCTRAP_{U3} = 38$

38

$FC_{U3} = 1.0$

1.

$DW_{U3} = 0$

0

$LL_{U3} = 47$

47

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U3} = \frac{C_{U3} - CF_{SWtruss}\ \gamma_{DC}\ (FC_{U3}\ \ DC_{U3}) - \gamma_{DW}\ (DW_{U3})}{\gamma_{LLInventory}\ (LL_{U3})}$$

```
1.12328
```

LRFR Truss members: Frank J. Wood Bridge

Project: Bridge Rehabilitation
Date: January 25, 2018
Type: Span 2 Roadway and Sidewalk Trusses (Reference: Maine DOT Bridge Load Rating completed by Parson Brinckerhoff March 2013 - Starting at node point L0 based on original plans)

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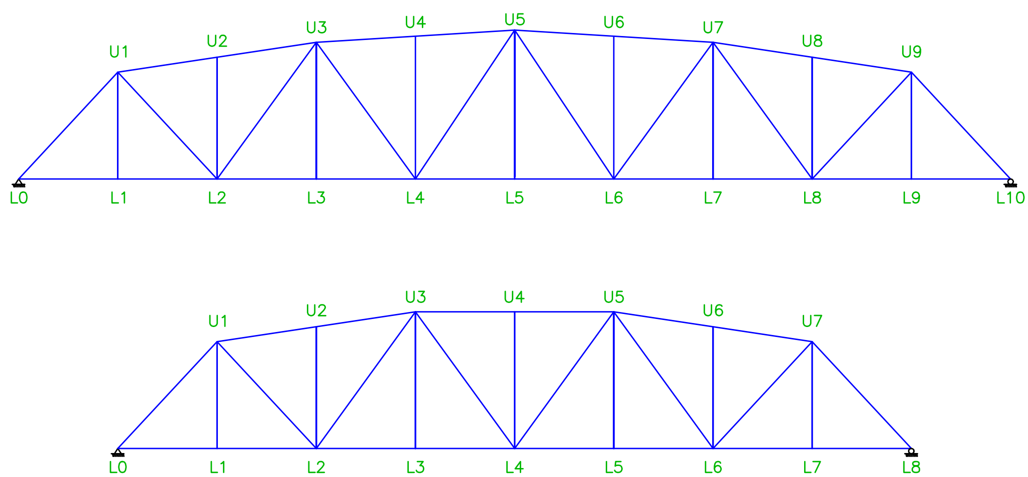

■ INPUT DATA AND TRUSS RATING:

Strength I Load Factors

$$\gamma_{DC} = 1.25$$

```
1.25
```

$\gamma_{DW} = 1.50$

1.5

$\gamma_{LLInventory} = 1.75$

1.75

Resistance and strength of element:

Resistance of element (capacity) in force or stress (TRAP) - C_{xx} ;
Dead load of structural components or attachments effecting element (VA) - DC_{xx} ;
Dead load of structural components or attachments effecting element (TRAP) - $DCTRAP_{xx}$;
Dead load adjustment factor for structural components or attachments effecting DC_{xx} elements (TRAP) - FC_{xx};
Dead load of wearing surface or utilities effecting element (TRAP) - DW_{xx} ;
Live HL-93 vehicular truck load including dynamic load allowance effecting element (TRAP) - LL_{xx} ;

Roadway Truss Members (xxxx - subscript denotes member & xx - subscript denotes gusset plate):

Correction factor based on new rehabilitation repairs :

Sum of all TRAP dead loads - DL_T (kips);
Sum of TRAP dead loads from stringers and floorbeams - DL_E (kips);
Sum of NEW dead loads from stringers and floorbeams - DL_N (kips);
Correction factor - $CF_{RWtruss}$ (unitless);

$DL_T = 827.1$

827.1

$DL_E = 729.1$

729.1

$DL_N = 480$

480

$$CF_{RWtruss} = \frac{DL_T - (DL_E - DL_N)}{DL_T}$$

0.698827

Member U1U2 COMPRESSION (Ref. Page 56-57/RF=0.92):

$C_{U1U2} = 1588$

1588

$DC_{U1U2} = 818$

818

$DCTRAP_{U1U2} = 840$

840

$FC_{U1U2} = 1.0$

1.

$DW_{U1U2} = 0$

0

$LL_{U1U2} = 336$

336

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U1U2} = \frac{C_{U1U2} - CF_{RWtruss}\, CF_{RWtruss}\, \gamma_{DC}\, (FC_{U1U2}\, DCTRAP_{U1U2}) - \gamma_{DW}\, (DW_{U1U2})}{\gamma_{LLInventory}\, (LL_{U1U2})}$$

1.82861

Member U2U3 COMPRESSION (Ref. Page 56-57/RF=0.94):

$C_{U2U3} = 1613$

1613

$DC_{U2U3} = 824$

824

$DCTRAP_{U2U3} = 846$

846

$FC_{U2U3} = 1.0$

1.

$DW_{U2U3} = 0$

0

$LL_{U2U3} = 338$

338

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U2U3} = \frac{C_{U2U3} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{U2U3}\ DCTRAP_{U2U3}) - \gamma_{DW}\ (DW_{U2U3})}{\gamma_{LLInventory}\ (LL_{U2U3})}$$

1.47758

Member U3U4 = U4U5 COMPRESSION (Ref. Page 56-57/RF=0.87):

$C_{U3U4} = 1737$

1737

$DC_{U3U4} = 911$

911

$DCTRAP_{U3U4} = 938$

938

$FC_{U3U4} = 1.0$

1.

$DW_{U3U4} = 0$

0

$LL_{U3U4} = 371$

371

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U3U4} = \frac{C_{U3U4} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{U3U4}\ DCTRAP_{U3U4}) - \gamma_{DW}\ (DW_{U3U4})}{\gamma_{LLInventory}\ (LL_{U3U4})}$$

1.41336

Member U5U6 = U6U7 COMPRESSION (Ref. Page 56-57/RF=0.87):

$C_{U5U6} = 1737$

1737

$DC_{U5U6} = 900$

900

$DCTRAP_{U5U6} = 928$

928

$FC_{U5U6} = 1.0$

1.

$DW_{U5U6} = 0$

0

$LL_{U5U6} = 367$

367

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U5U6} = \frac{C_{U5U6} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{U5U6}\ DCTRAP_{U5U6}) - \gamma_{DW}\ (DW_{U5U6})}{\gamma_{LLInventory}\ (LL_{U5U6})}$$

1.44237

Member U7U8 = U8U9 COMPRESSION (Ref. Page 56-57/RF=0.97):

$C_{U7U8} = 1554$

1554

$DC_{U7U8} = 778$

778

$DCTRAP_{U7U8} = 806$

806

$FC_{U7U8} = 1.0$

1.

$DW_{U7U8} = 0$

0

$LL_{U7U8} = 321$

321

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U7U8} = \frac{C_{U7U8} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{U7U8}\ DCTRAP_{U7U8}) - \gamma_{DW}\ (DW_{U7U8})}{\gamma_{LLInventory}\ (LL_{U7U8})}$$

1.51301

Gusset L1 - Member L1U1 (Ref. Page 227/RF=0.92):

$C_{L1} = 315$

315

$DC_{L1} = 99$

99

$DCTRAP_{L1} = 99$

99

$FC_{L1} = 1.0$

1.

$DW_{L1} = 0$

0

$LL_{L1} = 118.0$

118.

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L1} = \frac{C_{L1} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{L1}\ DCTRAP_{L1}) - \gamma_{DW}\ (DW_{L1})}{\gamma_{LLInventory}\ (LL_{L1})}$$

1.10664

Gusset U1 - Member L2U1 (Ref. Page 404/RF=0.86):

$C_{U1} = 352$

352

$DC_{U1} = 177$

177

$DCTRAP_{U1} = 181$

181

$FC_{U1} = 1.0$

1.

$DW_{U1} = 0$

0

$LL_{U1} = 84$

84

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U1} = \frac{C_{U1} - CF_{RWtruss}\,\gamma_{DC}\,(FC_{U1}\;\;DCTRAP_{U1}) - \gamma_{DW}\,(DW_{U1})}{\gamma_{LLInventory}\,(LL_{U1})}$$

1.31898

Gusset L10 - Member L10U9 (Ref. Page 331/RF=0.94):

$C_{L10} = 518$

518

$DC_{L10} = 266$

266

$DCTRAP_{L10} = 271$

271

$FC_{L10} = 1.0$

1.

$DW_{L10} = 0$

0

$LL_{L10} = 108$

108

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L10} = \frac{C_{L10} - CF_{RWtruss}\,\gamma_{DC}\,(FC_{L10}\;\;DCTRAP_{L10}) - \gamma_{DW}\,(DW_{L10})}{\gamma_{LLInventory}\,(LL_{L10})}$$

1.48821

Gusset L2 (Ref. Page 266):

Gusset L2 - Member L2U1 (Ref. Page 266/RF=0.99):

$C_{L2} = 370$

370

$DC_{L2} = 177$

177

$DCTRAP_{L2} = 181$

181

$FC_{L2} = 1.0$

1.

$DW_{L2} = 0$

0

$LL_{L2} = 84$

84

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L2} = \frac{C_{L2} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{L2}\ \ DCTRAP_{L2}) - \gamma_{DW}\ (DW_{L2})}{\gamma_{LLInventory}\ (LL_{L2})}$$

1.44143

Gusset U1 - Member L2U1 (Ref. Page 404/RF=0.86):

$C_{U1} = 352$

352

$DC_{U1} = 177$

177

$DCTRAP_{U1} = 181$

181

$FC_{U1} = 1.0$

1.

$DW_{U1} = 0$

0

$LL_{U1} = 84$

84

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U1} = \frac{C_{U1} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{U1}\ \ DCTRAP_{U1}) - \gamma_{DW}\ (DW_{U1})}{\gamma_{LLInventory}\ (LL_{U1})}$$

1.31898

Gusset L5 - Member L5U5 (Ref. Page 293/RF=0.95):

$C_{L5} = 315$

315

$DC_{L5} = 96$

96

$DCTRAP_{L5} = 101$

101

$FC_{L5} = 1.0$

1.

$DW_{L5} = 0$

0

$LL_{L5} = 114$

114

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L5} = \frac{C_{L5} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{L5}\ \ DCTRAP_{L5}) - \gamma_{DW}\ (DW_{L5})}{\gamma_{LLInventory}\ (LL_{L5})}$$

1.13671

Gusset L9 - Member L9U9 (Ref. Page 322/RF=0.99):

$C_{L9} = 315$

315

$DC_{L9} = 90$

90

$DCTRAP_{L9} = 94$

94

$FC_{L9} = 1.0$

1.

$DW_{L9} = 0$

0

$LL_{L9} = 113$

113

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L9} = \frac{C_{L9} - CF_{RWtruss}\,\gamma_{DC}\,(FC_{L9}\,DCTRAP_{L9}) - \gamma_{DW}\,(DW_{L9})}{\gamma_{LLInventory}\,(LL_{L9})}$$

1.17769

Sidewalk Truss Members (xxxx - denotes member & xx - denotes gusset plate):

Correction factor based on new rehabilitation repairs :

Sum of all TRAP dead loads - DL_T (kips);
Sum of TRAP dead loads from stringers and floorbeams - DL_E (kips);
Sum of NEW dead loads from stringers and floorbeams - DL_N (kips);
Correction factor - $CF_{RWtruss}$ (unitless);

$DL_T = 893.9$

893.9

$DL_E = 701.6$

701.6

$DL_N = 480$

480

$$CF_{RWtruss} = \frac{DL_T - (DL_E - DL_N)}{DL_T}$$

0.752098

Correction factor based on new rehabilitation repairs :

Sum of all TRAP dead loads - DL_T (kips);
Sum of NEW dead loads from stringers and floorbeams - DL_N (kips);
Correction factor - $CF_{RWtruss}$ (unitless);

$DL_T = 892.8$

892.8

$DL_N = 480$

480

$$CF_{SWtruss} = \frac{DL_T - (DL_T - DL_N)}{DL_T}$$

0.537634

Member L2U3 COMPRESSION (Ref. Page 62-63/RF=0.59):

$C_{L2U3} = 320$

320

$DC_{L2U3} = 165$

165

$DCTRAP_{L2U3} = 167$

167

$FC_{L2U3} = 1.0$

1.

$DW_{L2U3} = 0$

0

$LL_{L2U3} = 108$

108

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L2U3} = \frac{C_{L2U3} - CF_{RWtruss}\,\gamma_{DC}\,(FC_{L2U3}\,DC_{L2U3}) - \gamma_{DW}\,(DW_{L2U3})}{\gamma_{LLInventory}\,(LL_{L2U3})}$$

0.87238

Member L8U7 COMPRESSION (Ref. Page 62-63/RF=0.86):

$C_{L8U7} = 320$

320

$DC_{L8U7} = 139$

139

$DCTRAP_{L8U7} = 136$

136

$FC_{L8U7} = 1.0$

1.

$DW_{L8U7} = 0$

0

$LL_{L8U7} = 99$

99

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L8U7} = \frac{C_{L8U7} - CF_{RWtruss}\,\gamma_{DC}\,(FC_{L8U7}\,DC_{L8U7}) - \gamma_{DW}\,(DW_{L8U7})}{\gamma_{LLInventory}\,(LL_{L8U7})}$$

1.09277

Member L8U9 TENSION (Ref. Page 62-63/RF=0.92):

$C_{L8U9} = 681$

681

$DC_{L8U9} = 343$

343

$DCTRAP_{L8U9} = 357$

357

$FC_{L8U9} = 1.0$

1.

$DW_{L8U9} = 0$

0

$LL_{L8U9} = 146$

146

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L8U9} = \frac{C_{L8U9} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{L8U9}\ DC_{L8U9}) - \gamma_{DW}\ (DW_{L8U9})}{\gamma_{LLInventory}\ (LL_{L8U9})}$$

1.40328

Member L10U9 COMPRESSION (Ref. Page 62-63/RF=0.96):

$C_{L10U9} = 1606$

1606

$DC_{L10U9} = 815$

815

$DCTRAP_{L10U9} = 872$

872

$FC_{L10U9} = 1.0$

1.

$DW_{L10U9} = 0$

0

$LL_{L10U9} = 307$

307

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L10U9} = \frac{C_{L10U9} - CF_{RWtruss}\ \gamma_{DC}\ (FC_{L10U9}\ DC_{L10U9}) - \gamma_{DW}\ (DW_{L10U9})}{\gamma_{LLInventory}\ (LL_{L10U9})}$$

1.56315

LRFR Truss members: Frank J. Wood Bridge

Project: Bridge Rehabilitation - Exodermic Deck
Date: January 25, 2018
Type: Span 2 Roadway and Sidewalk Trusses (Reference: Maine DOT Bridge Load Rating completed by Parson Brinckerhoff March 2013 - Starting at node point L0 based on original plans)

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Show[ Import["TrussBridgeRating.pdf"][[1]], AspectRatio → Automatic, ImageSize → 6*90]
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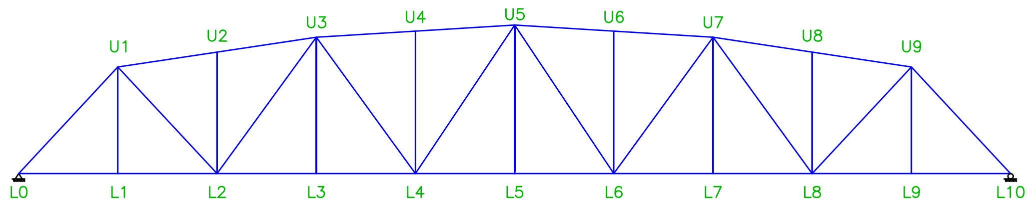

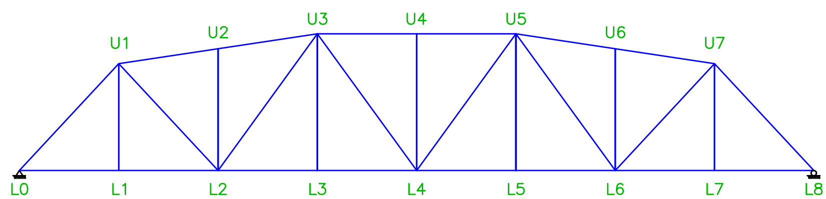

■ INPUT DATA AND TRUSS RATING:

Strength I Load Factors

$\gamma_{DC} = 1.25$

```
1.25
```

$\gamma_{DW} = 1.50$

1.5

$\gamma_{LLInventory} = 1.75$

1.75

Resistance and strength of element:

Resistance of element (capacity) in force or stress (TRAP) - C_{xx} ;
Dead load of structural components or attachments effecting element (VA) - DC_{xx} ;
Dead load of structural components or attachments effecting element (TRAP) - $DCTRAP_{xx}$;
Dead load of wearing surface or utilities effecting element (TRAP) - DW_{xx} ;
Live HL-93 vehicular truck load including dynamic load allowance effecting element (TRAP) - LL_{xx} ;
Exodermic deck with dead load of structural components or attachments effecting element (VA) - DCX_{xx} ;

Correction factor based on new rehabilitation repairs with respect to TRAP and VA analysis:

Sum of all TRAP dead loads - DL_T (kips);
Sum of TRAP dead loads from stringers and floorbeams - DL_E (kips);
Sum of NEW dead loads from stringers and floorbeams - DL_N (kips);
Correction factor - $CF_{RWtruss}$ (unitless);

$$FC_{xxxx} = \frac{DCTRAP_{xxxx}}{DC_{xxxx}}$$

$$\frac{DCTRAP_{xxxx}}{DC_{xxxx}}$$

Roadway Truss Members (xxxx - subscript denotes member & xx - subscript denotes gusset plate):

Member U1U2 COMPRESSION (Ref. Page 56-57/RF=0.92):

$C_{U1U2} = 1588$

1588

$DC_{U1U2} = 818$

818

$DCTRAP_{U1U2} = 840$

840

$DW_{U1U2} = 0$

0

$LL_{U1U2} = 336$

336

$FC_{U1U2} = N[\frac{DCTRAP_{U1U2}}{DC_{U1U2}}]$

1.02689

$DCX_{U1U2} = 254$

254

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U1U2} = \frac{C_{U1U2} - \gamma_{DC} (FC_{U1U2}\, DCX_{U1U2}) - \gamma_{DW} (DW_{U1U2})}{\gamma_{LLInventory} (LL_{U1U2})}$$

2.14619

Member U2U3 COMPRESSION (Ref. Page 56-57/RF=0.94):

$C_{U2U3} = 1613$

1613

$DC_{U2U3} = 824$

824

$DCTRAP_{U2U3} = 846$

846

$DW_{U2U3} = 0$

0

$LL_{U2U3} = 338$

338

$FC_{U2U3} = N[\frac{DCTRAP_{U2U3}}{DC_{U2U3}}]$

1.0267

$DCX_{U2U3} = 583$

583

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U2U3} = \frac{C_{U2U3} - \gamma_{DC}\,(FC_{U2U3}\ DCX_{U2U3}) - \gamma_{DW}\,(DW_{U2U3})}{\gamma_{LLInventory}\,(LL_{U2U3})}$$

1.46203

Member U3U4 = U4U5 COMPRESSION (Ref. Page 56-57/RF=0.87):

$C_{U3U4} = 1737$

1737

$DC_{U3U4} = 911$

911

$DCTRAP_{U3U4} = 938$

938

$DW_{U3U4} = 0$

0

$LL_{U3U4} = 371$

371

$$FC_{U3U4} = N\left[\frac{DCTRAP_{U3U4}}{DC_{U3U4}}\right]$$

1.02964

$DCX_{U3U4} = 653$

653

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U3U4} = \frac{C_{U3U4} - \gamma_{DC}\,(FC_{U3U4}\ DCX_{U3U4}) - \gamma_{DW}\,(DW_{U3U4})}{\gamma_{LLInventory}\,(LL_{U3U4})}$$

1.38091

Member U5U6 = U6U7 COMPRESSION (Ref. Page 56-57/RF=0.87):

$C_{U5U6} = 1737$

1737

$DC_{U5U6} = 900$

900

$DCTRAP_{U5U6} = 928$

928

$DW_{U5U6} = 0$

0

$LL_{U5U6} = 367$

367

$$FC_{U5U6} = N\left[\frac{DCTRAP_{U5U6}}{DC_{U5U6}}\right]$$

1.03111

$DCX_{U5U6} = 647$

647

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U5U6} = \frac{C_{U5U6} - \gamma_{DC}\,(FC_{U5U6}\; DCX_{U5U6}) - \gamma_{DW}\,(DW_{U5U6})}{\gamma_{LLInventory}\,(LL_{U5U6})}$$

1.40613

Member U7U8 = U8U9 COMPRESSION (Ref. Page 56-57/RF=0.97):

$C_{U7U8} = 1554$

1554

$DC_{U7U8} = 778$

778

$DCTRAP_{U7U8} = 806$

806

$DW_{U7U8} = 0$

0

$LL_{U7U8} = 321$

321

$FC_{U7U8} = N[\frac{DCTRAP_{U7U8}}{DC_{U7U8}}]$

1.03599

$DCX_{U7U8} = 559$

559

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U7U8} = \frac{C_{U7U8} - \gamma_{DC} (FC_{U7U8}\ DCX_{U7U8}) - \gamma_{DW} (DW_{U7U8})}{\gamma_{LLInventory}\ (LL_{U7U8})}$$

1.47771

Member L8U7 COMPRESSION (Ref. Page 62-63/RF=0.85):

$C_{L8U7} = 320$

320

$DC_{L8U7} = 135$

135

$DCTRAP_{L8U7} = 136$

136

$DW_{L8U7} = 0$

0

$LL_{L8U7} = 99$

99

$FC_{L8U7} = N[\frac{DCTRAP_{L8U7}}{DC_{L8U7}}]$

1.00741

$DCX_{L8U7} = 99$

99

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L8U7} = \frac{C_{L8U7} - \gamma_{DC}\,(FC_{L8U7}\ DCX_{L8U7}) - \gamma_{DW}\,(DW_{L8U7})}{\gamma_{LLInventory}\ (LL_{L8U7})}$$

1.12747

Gusset L1 - Member L1U1 (Ref. Page 227/RF=0.92):

$C_{L1} = 315$

315

$DC_{L1} = 99$

99

$DCTRAP_{L1} = 99$

99

$DW_{L1} = 0$

0

$LL_{L1} = 118.0$

118.

$FC_{L1} = N[\frac{DCTRAP_{L1}}{DC_{L1}}]$

1.

$DCX_{L1} = 59$

59

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L1} = \frac{C_{L1} - \gamma_{DC}\,(FC_{L1}\ DCX_{L1}) - \gamma_{DW}\,(DW_{L1})}{\gamma_{LLInventory}\ (LL_{L1})}$$

1.16828

Gusset U1 - Member L2U1 (Ref. Page 404/RF=0.86):

$C_{U1} = 352$

352

$DC_{U1} = 177$

177

$DCTRAP_{U1} = 181$

181

$DW_{U1} = 0$

0

$LL_{U1} = 84$

84

$$FC_{U1} = N\left[\frac{DCTRAP_{U1}}{DC_{U1}}\right]$$

1.0226

$DCX_{U1} = 127$

127

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U1} = \frac{C_{U1} - \gamma_{DC}\,(FC_{U1}\ DCX_{U1}) - \gamma_{DW}\,(DW_{U1})}{\gamma_{LLInventory}\ (LL_{U1})}$$

1.29022

Gusset L10 - Member L10U9 (Ref. Page 331/RF=0.94):

$C_{L10} = 518$

518

$DC_{L10} = 266$

266

$DCTRAP_{L10} = 271$

271

$DW_{L10} = 0$

0

$LL_{L10} = 108$

108

$$FC_{L10} = N\left[\frac{DCTRAP_{L10}}{DC_{L10}}\right]$$

1.0188

$DCX_{L10} = 191$

191

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L10} = \frac{C_{L10} - \gamma_{DC}\,(FC_{L10}\ \ DCX_{L10}) - \gamma_{DW}\,(DW_{L10})}{\gamma_{LLInventory}\ (LL_{L10})}$$

1.45377

Gusset L2 - Member L2U1 (Ref. Page 266/RF=0.99):

$C_{L2} = 370$

370

$DC_{L2} = 177$

177

$DCTRAP_{L2} = 181$

181

$DW_{L2} = 0$

0

$LL_{L2} = 84$

84

$$FC_{L2} = N[\frac{DCTRAP_{L2}}{DC_{L2}}]$$

1.0226

$DCX_{L2} = 127$

127

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L2} = \frac{C_{L2} - \gamma_{DC}\,(FC_{L2}\ \ DCX_{L2}) - \gamma_{DW}\,(DW_{L2})}{\gamma_{LLInventory}\ (LL_{L2})}$$

1.41267

Gusset L5 - Member L5U5 (Ref. Page 293/RF=0.95):

$C_{L5} = 315$

315

$DC_{L5} = 96$

96

$DCTRAP_{L5} = 101$

101

$DW_{L5} = 0$

0

$LL_{L5} = 114$

114

$FC_{L5} = N[\frac{DCTRAP_{L5}}{DC_{L5}}]$

1.05208

$DCX_{L5} = 64$

64

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L5} = \frac{C_{L5} - \gamma_{DC}\,(FC_{L5}\ \ DCX_{L5}) - \gamma_{DW}\,(DW_{L5})}{\gamma_{LLInventory}\,(LL_{L5})}$$

1.15706

Gusset L9 - Member L9U9 (Ref. Page 322/RF=0.99):

$C_{L9} = 315$

315

$DC_{L9} = 90$

90

$DCTRAP_{L9} = 94$

94

$DW_{L9} = 0$

0

$LL_{L9} = 113$

113

$FC_{L9} = N[\frac{DCTRAP_{L9}}{DC_{L9}}]$

1.04444

$DCX_{L9} = 58$

58

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$RFinv_{L9} = \frac{C_{L9} - \gamma_{DC} (FC_{L9} \, DCX_{L9}) - \gamma_{DW} (DW_{L9})}{\gamma_{LLInventory} (LL_{L9})}$

1.21

Sidewalk Truss Members (xxxx - denotes member & xx - denotes gusset plate):

Member L2U3 COMPRESSION (Ref. Page 62-63/RF=0.59 - Note: One new C15x33.9 top channel connected to each top flange):

$C_{L2U3} = N[320 (\frac{477 \text{ kips}}{370 \text{ kips}})]$

412.541

$DC_{L2U3} = 165$

165

$DCTRAP_{L2U3} = 167$

167

$DW_{L2U3} = 0$

0

$LL_{L2U3} = 108$

108

$FC_{L2U3} = N[\frac{DCTRAP_{L2U3}}{DC_{L2U3}}]$

1.01212

$DCX_{L2U3} = 130$

130

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L2U3} = \frac{C_{L2U3} - \gamma_{DC}\,(FC_{L2U3}\,DCX_{L2U3}) - \gamma_{DW}\,(DW_{L2U3})}{\gamma_{LLInventory}\,(LL_{L2U3})}$$

1.31254

Member L8U7 COMPRESSION (Ref. Page 62-63/RF=0.86):

$C_{L8U7} = 320$

320

$DC_{L8U7} = 139$

139

$DCTRAP_{L8U7} = 136$

136

$DW_{L8U7} = 0$

0

$LL_{L8U7} = 99$

99

$$FC_{L8U7} = N[\frac{DCTRAP_{L8U7}}{DC_{L8U7}}]$$

0.978417

$DCX_{L8U7} = 109$

109

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L8U7} = \frac{C_{L8U7} - \gamma_{DC}\,(FC_{L8U7}\,DCX_{L8U7}) - \gamma_{DW}\,(DW_{L8U7})}{\gamma_{LLInventory}\,(LL_{L8U7})}$$

1.07758

Member L8U9 TENSION (Ref. Page 62-63/RF=0.92):

$C_{L8U9} = 681$

681

$DC_{L8U9} = 343$

343

$DCTRAP_{L8U9} = 357$

357

$DW_{L8U9} = 0$

0

$LL_{L8U9} = 146$

146

$FC_{L8U9} = N[\frac{DCTRAP_{L8U9}}{DC_{L8U9}}]$

1.04082

$DCX_{L8U9} = 264$

264

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L8U9} = \frac{C_{L8U9} - \gamma_{DC}\,(FC_{L8U9}\,DCX_{L8U9}) - \gamma_{DW}\,(DW_{L8U9})}{\gamma_{LLInventory}\,(LL_{L8U9})}$$

1.32106

Member L10U9 COMPRESSION (Ref. Page 62-63/RF=0.96):

$C_{L10U9} = 1606$

1606

$DC_{L10U9} = 812$

812

$DCTRAP_{L10U9} = 872$

872

$DW_{L10U9} = 0$

0

$LL_{L10U9} = 307$

307

$FC_{L10U9} = N[\frac{DCTRAP_{L10U9}}{DC_{L10U9}}]$

1.07389

$DCX_{L10U9} = 626$

626

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L10U9} = \frac{C_{L10U9} - \gamma_{DC}\,(FC_{L10U9}\,DCX_{L10U9}) - \gamma_{DW}\,(DW_{L10U9})}{\gamma_{LLInventory}\,(LL_{L10U9})}$$

1.42518

Gusset L0 - Member Corner Connection L0U1 (Ref. Page 595-597/RF=0.67):

$C_{L0} = 518$

518

$DC_{L0} = 295$

295

$DCTRAP_{L0} = 313$

313

$DW_{L0} = 0$

0

$LL_{L0} = 108$

108

$FC_{L0} = N[\frac{DCTRAP_{L0}}{DC_{L0}}]$

1.06102

$DCX_{L0} = 226$

226

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L0} = \frac{C_{L0} - \gamma_{DC}\,(FC_{L0}\,DCX_{L0}) - \gamma_{DW}\,(DW_{L0})}{\gamma_{LLInventory}\,(LL_{L0})}$$

1.15483

Gusset L10 - Member L10U9 (Ref. Page 718-720/RF=0.71):

$C_{L10} = 518$

518

$DC_{L10} = 286$

286

$DCTRAP_{L10} = 307$

307

$DW_{L10} = 0$

0

$LL_{L10} = 109$

109

$$FC_{L10} = N[\frac{DCTRAP_{L10}}{DC_{L10}}]$$

1.07343

$DCX_{L10} = 220$

220

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L10} = \frac{C_{L10} - \gamma_{DC}\,(FC_{L10}\,DCX_{L10}) - \gamma_{DW}\,(DW_{L10})}{\gamma_{LLInventory}\,(LL_{L10})}$$

1.16806

Gusset U3 - Member L3U3 (Ref. Page 804/RF=0.94):

$C_{U3} = 167$

167

$DC_{U3} = 55$

55

$DCTRAP_{U3} = 59$

59

$DW_{U3} = 0$

0

$LL_{U3} = 57$

57

$FC_{U3} = N[\frac{DCTRAP_{U3}}{DC_{U3}}]$

1.07273

$DCX_{U3} = 40$

40

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U3} = \frac{C_{U3} - \gamma_{DC}\,(FC_{U3}\,DCX_{U3}) - \gamma_{DW}\,(DW_{U3})}{\gamma_{LLInventory}\,(LL_{U3})}$$

1.13648

Gusset U5 - Member L5U5 (Ref. Page 957-959/RF=0.93):

$C_{U5} = 167$

167

$DC_{U5} = 54$

54

$DCTRAP_{U5} = 59$

59

$DW_{U5} = 0$

0

$LL_{U5} = 57$

57

$FC_{U5} = N[\frac{DCTRAP_{U5}}{DC_{U5}}]$

1.09259

$DCX_{U5} = 42$

42

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U5} = \frac{C_{U5} - \gamma_{DC}\,(FC_{U5}\,DCX_{U5}) - \gamma_{DW}\,(DW_{U5})}{\gamma_{LLInventory}\,(LL_{U5})}$$

1.09914

Gusset U7 - Member L7U7 (Ref. Page 1114/RF=0.94):

$C_{U7} = 167$

167

$DC_{U7} = 54$

54

$DCTRAP_{U7} = 59$

59

$DW_{U7} = 0$

0

$LL_{U7} = 57$

57

$$FC_{U7} = N\left[\frac{DCTRAP_{U7}}{DC_{U7}}\right]$$

1.09259

$DCX_{U7} = 42$

42

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U7} = \frac{C_{U7} - \gamma_{DC}\,(FC_{U7}\,DCX_{U7}) - \gamma_{DW}\,(DW_{U7})}{\gamma_{LLInventory}\,(LL_{U7})}$$

1.09914

Gusset U9 - Member L9U9 (Ref. Page 1266/RF=0.98):

$C_{U9} = 167$

167

$DC_{U9} = 53$

53

$DCTRAP_{U9} = 55$

55

$DW_{U9} = 0$

0

$LL_{U9} = 57$

57

$FC_{U9} = N[\frac{DCTRAP_{U9}}{DC_{U9}}]$

1.03774

$DCX_{U9} = 40$

40

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U9} = \frac{C_{U9} - \gamma_{DC}\,(FC_{U9}\,DCX_{U9}) - \gamma_{DW}\,(DW_{U9})}{\gamma_{LLInventory}\,(LL_{U9})}$$

1.15402

LRFR Truss members: Frank J. Wood Bridge

Project: Bridge Rehabilitation - Exodermic Deck
Date: January 25, 2018
Type: Span 2 Roadway and Sidewalk Trusses (Reference: Maine DOT Bridge Load Rating completed by Parson Brinckerhoff March 2013 - Starting at node point L0 based on original plans)

```
Show[ Import["TrussBridgeRating.pdf"][[1]], AspectRatio → Automatic, ImageSize → 6*90]
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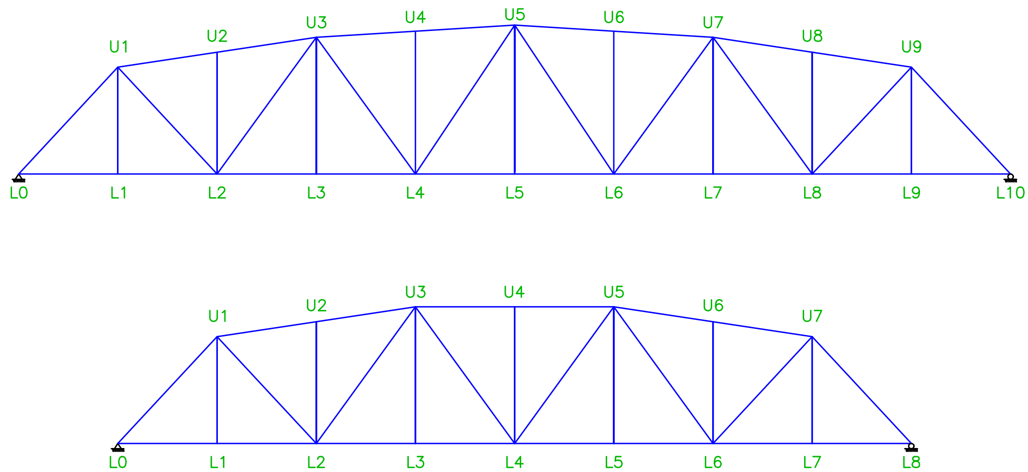

■ INPUT DATA AND TRUSS RATING:

Strength I Load Factors

$\gamma_{DC} = 1.25$

```
1.25
```

$\gamma_{DW} = 1.50$

1.5

$\gamma_{LLOperating} = 1.35$

1.35

Resistance and strength of element:

Resistance of element (capacity) in force or stress (TRAP) - C_{xx} ;
Dead load of structural components or attachments effecting element (VA) - DC_{xx} ;
Dead load of structural components or attachments effecting element (TRAP) - $DCTRAP_{xx}$;
Dead load of wearing surface or utilities effecting element (TRAP) - DW_{xx} ;
Live HL-93 vehicular truck load including dynamic load allowance effecting element (TRAP) - LL_{xx} ;
Exodermic deck with dead load of structural components or attachments effecting element (VA) - DCX_{xx} ;

Correction factor based on new rehabilitation repairs with respect to TRAP and VA analysis:

Sum of all TRAP dead loads - DL_T (kips);
Sum of TRAP dead loads from stringers and floorbeams - DL_E (kips);
Sum of NEW dead loads from stringers and floorbeams - DL_N (kips);
Correction factor - $CF_{RWtruss}$ (unitless);

$$FC_{xxxx} = \frac{DCTRAP_{xxxx}}{DC_{xxxx}}$$

$$\frac{DCTRAP_{xxxx}}{DC_{xxxx}}$$

Roadway Truss Members (xxxx - subscript denotes member & xx - subscript denotes gusset plate):

Member U1U2 COMPRESSION (Ref. Page 56-57/RF=0.92):

$C_{U1U2} = 1588$

1588

$DC_{U1U2} = 818$

818

$DCTRAP_{U1U2} = 840$

840

$DW_{U1U2} = 0$

0

$LL_{U1U2} = 336$

336

$FC_{U1U2} = N[\frac{DCTRAP_{U1U2}}{DC_{U1U2}}]$

1.02689

$DCX_{U1U2} = 254$

254

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U1U2} = \frac{C_{U1U2} - \gamma_{DC} (FC_{U1U2}\, DCX_{U1U2}) - \gamma_{DW} (DW_{U1U2})}{\gamma_{LLOperating} (LL_{U1U2})}$$

2.7821

Member U2U3 COMPRESSION (Ref. Page 56-57/RF=0.94):

$C_{U2U3} = 1613$

1613

$DC_{U2U3} = 824$

824

$DCTRAP_{U2U3} = 846$

846

$DW_{U2U3} = 0$

0

$LL_{U2U3} = 338$

338

$FC_{U2U3} = N[\frac{DCTRAP_{U2U3}}{DC_{U2U3}}]$

1.0267

$DCX_{U2U3} = 583$

583

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U2U3} = \frac{C_{U2U3} - \gamma_{DC}\,(FC_{U2U3}\ DCX_{U2U3}) - \gamma_{DW}\,(DW_{U2U3})}{\gamma_{LLOperating}\ (LL_{U2U3})}$$

1.89523

Member U3U4 = U4U5 COMPRESSION (Ref. Page 56-57/RF=0.87):

$C_{U3U4} = 1737$

1737

$DC_{U3U4} = 911$

911

$DCTRAP_{U3U4} = 938$

938

$DW_{U3U4} = 0$

0

$LL_{U3U4} = 371$

371

$$FC_{U3U4} = N\left[\frac{DCTRAP_{U3U4}}{DC_{U3U4}}\right]$$

1.02964

$DCX_{U3U4} = 653$

653

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U3U4} = \frac{C_{U3U4} - \gamma_{DC}\,(FC_{U3U4}\ DCX_{U3U4}) - \gamma_{DW}\,(DW_{U3U4})}{\gamma_{LLOperating}\ (LL_{U3U4})}$$

1.79007

Member U5U6 = U6U7 COMPRESSION (Ref. Page 56-57/RF=0.87):

$C_{U5U6} = 1737$

1737

$DC_{U5U6} = 900$

900

$DCTRAP_{U5U6} = 928$

928

$DW_{U5U6} = 0$

0

$LL_{U5U6} = 367$

367

$$FC_{U5U6} = N\left[\frac{DCTRAP_{U5U6}}{DC_{U5U6}}\right]$$

1.03111

$DCX_{U5U6} = 647$

647

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U5U6} = \frac{C_{U5U6} - \gamma_{DC}\,(FC_{U5U6}\ DCX_{U5U6}) - \gamma_{DW}\,(DW_{U5U6})}{\gamma_{LLOperating}\,(LL_{U5U6})}$$

1.82276

Member U7U8 = U8U9 COMPRESSION (Ref. Page 56-57/RF=0.97):

$C_{U7U8} = 1554$

1554

$DC_{U7U8} = 778$

778

$DCTRAP_{U7U8} = 806$

806

$DW_{U7U8} = 0$

0

$LL_{U7U8} = 321$

321

$FC_{U7U8} = N[\frac{DCTRAP_{U7U8}}{DC_{U7U8}}]$

1.03599

$DCX_{U7U8} = 559$

559

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U7U8} = \frac{C_{U7U8} - \gamma_{DC}\,(FC_{U7U8}\ DCX_{U7U8}) - \gamma_{DW}\,(DW_{U7U8})}{\gamma_{LLOperating}\ (LL_{U7U8})}$$

1.91555

Member L8U7 COMPRESSION (Ref. Page 62-63/RF=0.85):

$C_{L8U7} = 320$

320

$DC_{L8U7} = 135$

135

$DCTRAP_{L8U7} = 136$

136

$DW_{L8U7} = 0$

0

$LL_{L8U7} = 99$

99

$FC_{L8U7} = N[\frac{DCTRAP_{L8U7}}{DC_{L8U7}}]$

1.00741

$DCX_{L8U7} = 99$

99

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L8U7} = \frac{C_{L8U7} - \gamma_{DC}\,(FC_{L8U7}\;DCX_{L8U7}) - \gamma_{DW}\,(DW_{L8U7})}{\gamma_{LLOperating}\;(LL_{L8U7})}$$

1.46153

Gusset L1 - Member L1U1 (Ref. Page 227/RF=0.92):

$C_{L1} = 315$

315

$DC_{L1} = 99$

99

$DCTRAP_{L1} = 99$

99

$DW_{L1} = 0$

0

$LL_{L1} = 118.0$

118.

$$FC_{L1} = N[\frac{DCTRAP_{L1}}{DC_{L1}}]$$

1.

$DCX_{L1} = 59$

59

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L1} = \frac{C_{L1} - \gamma_{DC}\,(FC_{L1}\;DCX_{L1}) - \gamma_{DW}\,(DW_{L1})}{\gamma_{LLOperating}\;(LL_{L1})}$$

1.51444

Gusset U1 - Member L2U1 (Ref. Page 404/RF=0.86):

$C_{U1} = 352$

352

$DC_{U1} = 177$

177

$DCTRAP_{U1} = 181$

181

$DW_{U1} = 0$

0

$LL_{U1} = 84$

84

$FC_{U1} = N[\frac{DCTRAP_{U1}}{DC_{U1}}]$

1.0226

$DCX_{U1} = 127$

127

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U1} = \frac{C_{U1} - \gamma_{DC} (FC_{U1}\ DCX_{U1}) - \gamma_{DW} (DW_{U1})}{\gamma_{LLOperating} (LL_{U1})}$$

1.67251

Gusset L10 - Member L10U9 (Ref. Page 331/RF=0.94):

$C_{L10} = 518$

518

$DC_{L10} = 266$

266

$DCTRAP_{L10} = 271$

271

$DW_{L10} = 0$

0

$LL_{L10} = 108$

108

$FC_{L10} = N[\frac{DCTRAP_{L10}}{DC_{L10}}]$

1.0188

$DCX_{L10} = 191$

191

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L10} = \frac{C_{L10} - \gamma_{DC}\,(FC_{L10}\ \ DCX_{L10}) - \gamma_{DW}\,(DW_{L10})}{\gamma_{LLOperating}\ (LL_{L10})}$$

1.88451

Gusset L2 - Member L2U1 (Ref. Page 266/RF=0.99):

$C_{L2} = 370$

370

$DC_{L2} = 177$

177

$DCTRAP_{L2} = 181$

181

$DW_{L2} = 0$

0

$LL_{L2} = 84$

84

$$FC_{L2} = N[\frac{DCTRAP_{L2}}{DC_{L2}}]$$

1.0226

$DCX_{L2} = 127$

127

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L2} = \frac{C_{L2} - \gamma_{DC}\,(FC_{L2}\ \ DCX_{L2}) - \gamma_{DW}\,(DW_{L2})}{\gamma_{LLOperating}\ (LL_{L2})}$$

1.83124

Gusset L5 - Member L5U5 (Ref. Page 293/RF=0.95):

$C_{L5} = 315$

315

$DC_{L5} = 96$

96

$DCTRAP_{L5} = 101$

101

$DW_{L5} = 0$

0

$LL_{L5} = 114$

114

$FC_{L5} = N[\frac{DCTRAP_{L5}}{DC_{L5}}]$

1.05208

$DCX_{L5} = 64$

64

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L5} = \frac{C_{L5} - \gamma_{DC}\,(FC_{L5}\;\; DCX_{L5}) - \gamma_{DW}\,(DW_{L5})}{\gamma_{LLOperating}\;(LL_{L5})}$$

1.49989

Gusset L9 - Member L9U9 (Ref. Page 322/RF=0.99):

$C_{L9} = 315$

315

$DC_{L9} = 90$

90

$DCTRAP_{L9} = 94$

94

$DW_{L9} = 0$

0

$LL_{L9} = 113$

113

$$FC_{L9} = N[\frac{DCTRAP_{L9}}{DC_{L9}}]$$

1.04444

$DCX_{L9} = 58$

58

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L9} = \frac{C_{L9} - \gamma_{DC} (FC_{L9}\, DCX_{L9}) - \gamma_{DW} (DW_{L9})}{\gamma_{LLOperating} (LL_{L9})}$$

1.56852

Sidewalk Truss Members (xxxx - denotes member & xx - denotes gusset plate):

Member L2U3 COMPRESSION (Ref. Page 62-63/RF=0.59 - Note: One new C15x33.9 top channel connected to each top flange):

$$C_{L2U3} = N[320 (\frac{477\ kips}{370\ kips})]$$

412.541

$DC_{L2U3} = 165$

165

$DCTRAP_{L2U3} = 167$

167

$DW_{L2U3} = 0$

0

$LL_{L2U3} = 108$

108

$$FC_{L2U3} = N[\frac{DCTRAP_{L2U3}}{DC_{L2U3}}]$$

1.01212

$DCX_{L2U3} = 130$

130

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L2U3} = \frac{C_{L2U3} - \gamma_{DC}\,(FC_{L2U3}\, DCX_{L2U3}) - \gamma_{DW}\,(DW_{L2U3})}{\gamma_{LLOperating}\,(LL_{L2U3})}$$

1.70145

Member L8U7 COMPRESSION (Ref. Page 62-63/RF=0.86):

$C_{L8U7} = 320$

320

$DC_{L8U7} = 139$

139

$DCTRAP_{L8U7} = 136$

136

$DW_{L8U7} = 0$

0

$LL_{L8U7} = 99$

99

$$FC_{L8U7} = N[\frac{DCTRAP_{L8U7}}{DC_{L8U7}}]$$

0.978417

$DCX_{L8U7} = 109$

109

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L8U7} = \frac{C_{L8U7} - \gamma_{DC}\,(FC_{L8U7}\, DCX_{L8U7}) - \gamma_{DW}\,(DW_{L8U7})}{\gamma_{LLOperating}\,(LL_{L8U7})}$$

1.39686

Member L8U9 TENSION (Ref. Page 62-63/RF=0.92):

$C_{L8U9} = 681$

681

$DC_{L8U9} = 343$

343

$DCTRAP_{L8U9} = 357$

357

$DW_{L8U9} = 0$

0

$LL_{L8U9} = 146$

146

$FC_{L8U9} = N[\frac{DCTRAP_{L8U9}}{DC_{L8U9}}]$

1.04082

$DCX_{L8U9} = 264$

264

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L8U9} = \frac{C_{L8U9} - \gamma_{DC}\,(FC_{L8U9}\,DCX_{L8U9}) - \gamma_{DW}\,(DW_{L8U9})}{\gamma_{LLOperating}\,(LL_{L8U9})}$$

1.71248

Member L10U9 COMPRESSION (Ref. Page 62-63/RF=0.96):

$C_{L10U9} = 1606$

1606

$DC_{L10U9} = 812$

812

$DCTRAP_{L10U9} = 872$

872

$DW_{L10U9} = 0$

0

$LL_{L10U9} = 307$

307

$FC_{L10U9} = N[\frac{DCTRAP_{L10U9}}{DC_{L10U9}}]$

1.07389

$DCX_{L10U9} = 626$

626

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L10U9} = \frac{C_{L10U9} - \gamma_{DC}\,(FC_{L10U9}\,DCX_{L10U9}) - \gamma_{DW}\,(DW_{L10U9})}{\gamma_{LLOperating}\,(LL_{L10U9})}$$

1.84746

Gusset L0 - Member Corner Connection L0U1 (Ref. Page 595-597/RF=0.67):

$C_{L0} = 518$

518

$DC_{L0} = 295$

295

$DCTRAP_{L0} = 313$

313

$DW_{L0} = 0$

0

$LL_{L0} = 108$

108

$FC_{L0} = N[\frac{DCTRAP_{L0}}{DC_{L0}}]$

1.06102

$DCX_{L0} = 226$

226

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L0} = \frac{C_{L0} - \gamma_{DC} (FC_{L0}\, DCX_{L0}) - \gamma_{DW} (DW_{L0})}{\gamma_{LLOperating} (LL_{L0})}$$

1.497

Gusset L10 - Member L10U9 (Ref. Page 718-720/RF=0.71):

$C_{L10} = 518$

518

$DC_{L10} = 286$

286

$DCTRAP_{L10} = 307$

307

$DW_{L10} = 0$

0

$LL_{L10} = 109$

109

$$FC_{L10} = N[\frac{DCTRAP_{L10}}{DC_{L10}}]$$

1.07343

$DCX_{L10} = 220$

220

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L10} = \frac{C_{L10} - \gamma_{DC} (FC_{L10}\, DCX_{L10}) - \gamma_{DW} (DW_{L10})}{\gamma_{LLOperating} (LL_{L10})}$$

1.51415

Gusset U3 - Member L3U3 (Ref. Page 804/RF=0.94):

$C_{U3} = 167$

167

$DC_{U3} = 55$

55

$DCTRAP_{U3} = 59$

59

$DW_{U3} = 0$

0

$LL_{U3} = 57$

57

$FC_{U3} = N[\frac{DCTRAP_{U3}}{DC_{U3}}]$

1.07273

$DCX_{U3} = 40$

40

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U3} = \frac{C_{U3} - \gamma_{DC}\,(FC_{U3}\,DCX_{U3}) - \gamma_{DW}\,(DW_{U3})}{\gamma_{LLOperating}\,(LL_{U3})}$$

1.47321

Gusset U5 - Member L5U5 (Ref. Page 957-959/RF=0.93):

$C_{U5} = 167$

167

$DC_{U5} = 54$

54

$DCTRAP_{U5} = 59$

59

$DW_{U5} = 0$

0

$LL_{U5} = 57$

57

$FC_{U5} = N[\frac{DCTRAP_{U5}}{DC_{U5}}]$

1.09259

$DCX_{U5} = 42$

42

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U5} = \frac{C_{U5} - \gamma_{DC}\,(FC_{U5}\,DCX_{U5}) - \gamma_{DW}\,(DW_{U5})}{\gamma_{LLOperating}\,(LL_{U5})}$$

1.42481

Gusset U7 - Member L7U7 (Ref. Page 1114/RF=0.94):

$C_{U7} = 167$

167

$DC_{U7} = 54$

54

$DCTRAP_{U7} = 59$

59

$DW_{U7} = 0$

0

$LL_{U7} = 57$

57

$$FC_{U7} = N\left[\frac{DCTRAP_{U7}}{DC_{U7}}\right]$$

1.09259

$DCX_{U7} = 42$

42

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U7} = \frac{C_{U7} - \gamma_{DC}\,(FC_{U7}\,DCX_{U7}) - \gamma_{DW}\,(DW_{U7})}{\gamma_{LLOperating}\,(LL_{U7})}$$

1.42481

Gusset U9 - Member L9U9 (Ref. Page 1266/RF=0.98):

$C_{U9} = 167$

167

$DC_{U9} = 53$

53

$DCTRAP_{U9} = 55$

55

$DW_{U9} = 0$

0

$LL_{U9} = 57$

57

$FC_{U9} = N[\frac{DCTRAP_{U9}}{DC_{U9}}]$

1.03774

$DCX_{U9} = 40$

40

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U9} = \frac{C_{U9} - \gamma_{DC} (FC_{U9}\, DCX_{U9}) - \gamma_{DW} (DW_{U9})}{\gamma_{LLOperating} (LL_{U9})}$$

1.49595

LRFR Truss members: Frank J. Wood Bridge

Project: Bridge Rehabilitation - Exodermic Deck
Date: January 25, 2018
Type: Span 3 Roadway and Sidewalk Trusses (Reference: Maine DOT Bridge Load Rating completed by Parson Brinckerhoff March 2013 - Starting at node point L0 based on original plans)

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Show[ Import["TrussBridgeRating.pdf"][[1]], AspectRatio → Automatic, ImageSize → 6 * 90]
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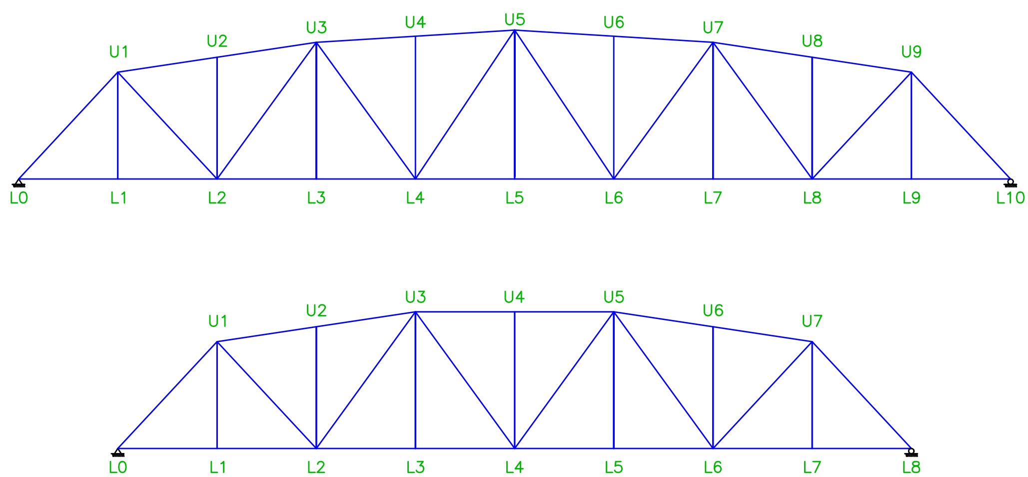


▪ INPUT DATA AND TRUSS RATING:

Strength I Load Factors

$\gamma_{DC} = 1.25$

```
1.25
```

$\gamma_{DW} = 1.50$

1.5

$\gamma_{LLInventory} = 1.75$

1.75

Resistance and strength of element:

Resistance of element (capacity) in force or stress (TRAP) - C_{xx};
Dead load of structural components or attachments effecting element (VA) - DC_{xx};
Dead load of structural components or attachments effecting element (TRAP) - $DCTRAP_{xx}$;
Dead load of wearing surface or utilities effecting element (TRAP) - DW_{xx};
Live HL-93 vehicular truck load including dynamic load allowance effecting element (TRAP) - LL_{xx};
Exodermic deck with dead load of structural components or attachments effecting element (VA) - DCX_{xx};

Correction factor based on new rehabilitation repairs with respect to TRAP and VA analysis:

Sum of all TRAP dead loads - DL_T (kips);
Sum of TRAP dead loads from stringers and floorbeams - DL_E (kips);
Sum of NEW dead loads from stringers and floorbeams - DL_N (kips);
Correction factor - $CF_{RWtruss}$ (unitless);

$$FC_{xxxx} = \frac{DCTRAP_{xxxx}}{DC_{xxxx}}$$

$$\frac{DCTRAP_{xxxx}}{DC_{xxxx}}$$

Roadway Truss Members (xxxx - subscript denotes member & xx - subscript denotes gusset plate):

Member L3U3 TENSION (Ref. Page 68-69/RF=0.89):

$C_{L3U3} = 228$

228

$DC_{L3U3} = 62$

62

$DCTRAP_{L3U3} = 65$

65

$DW_{L3U3} = 0$

0

$LL_{L3U3} = 94$

94

$FC_{L3U3} = N[\frac{DCTRAP_{L3U3}}{DC_{L3U3}}]$

1.04839

$DCX_{L3U3} = 40$

40

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L3U3} = \frac{C_{L3U3} - \gamma_{DC}\,(FC_{L3U3}\,DCX_{L3U3}) - \gamma_{DW}\,(DW_{L3U3})}{\gamma_{LLInventory}\,(LL_{L3U3})}$$

1.06736

Gusset L3 - Member L3U3 (Ref. Page 1,394-1,395/RF=0.85):

$C_{L3} = 222$

222

$DC_{L3} = 63$

63

$DCTRAP_{L3} = 65$

65

$DW_{L3} = 0$

0

$LL_{L3} = 94$

94

$FC_{L3} = N[\frac{DCTRAP_{L3}}{DC_{L3}}]$

1.03175

$DCX_{L3} = 40$

40

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L3} = \frac{C_{L3} - \gamma_{DC}\,(FC_{L3}\ \ DCX_{L3}) - \gamma_{DW}\,(DW_{L3})}{\gamma_{LLInventory}\ (LL_{L3})}$$

1.03594

Gusset L1 - Member L1U1 (Ref. Page 1,344/RF=0.88):

$C_{L1} = 222$

222

$DC_{L1} = 59$

59

$DCTRAP_{L1} = 63$

63

$DW_{L1} = 0$

0

$LL_{L1} = 94$

94

$$FC_{L1} = N[\frac{DCTRAP_{L1}}{DC_{L1}}]$$

1.0678

$DCX_{L1} = 37$

37

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L1} = \frac{C_{L1} - \gamma_{DC}\,(FC_{L1}\ \ DCX_{L1}) - \gamma_{DW}\,(DW_{L1})}{\gamma_{LLInventory}\ (LL_{L1})}$$

1.04933

Gusset L0 - Member L0U1 (Ref. Page 1,283/RF=0.91):

$C_{L0} = 288$

288

$DC_{L0} = 125$

125

$DCTRAP_{L0} = 132$

132

$DW_{L0} = 0$

0

$LL_{L0} = 79$

79

$FC_{L0} = N[\frac{DCTRAP_{L0}}{DC_{L0}}]$

1.056

$DCX_{L0} = 88$

88

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$RFinv_{L0} = \frac{C_{L0} - \gamma_{DC}\,(FC_{L0}\ \ DCX_{L0}) - \gamma_{DW}\,(DW_{L0})}{\gamma_{LLInventory}\,(LL_{L0})}$

1.24297

Gusset L3 - Member L3U3 (Ref. Page 1,419/RF=0.98): Maine Legal Load Configuration 6

Strength I Load Factor - Maine Legal Load Factor

$\gamma_{MLLInventory} = 1.35$

1.35

$C_{L3} = 222$

222

$DC_{L3} = 62$

62

$DCTRAP_{L3} = 65$

65

$DW_{L3} = 0$

0

$LL_{L3} = 106$

106

$FC_{L3} = N[\frac{DCTRAP_{L3}}{DC_{L3}}]$

1.04839

$DCX_{L3} = 40$

40

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L3} = \frac{C_{L3} - \gamma_{DC}\,(FC_{L3}\ DCX_{L3}) - \gamma_{DW}\,(DW_{L3})}{\gamma_{MLLInventory}\ (LL_{L3})}$$

1.18505

Sidewalk Truss Members (xxxx - denotes member & xx - denotes gusset plate):

Member U1-U2 = U3-U4 & U5-U6 = U6-U7 COMPRESSION (Ref. Page 73-74/RF=0.95):

$C_{U1U2} = 776$

776

$DC_{U1U2} = N[\frac{393 + 336}{2}]$

364.5

$DCTRAP_{U1U2} = 365$

365

$DW_{U1U2} = 0$

0

$LL_{U1U2} = 192$

192

$$FC_{U1U2} = N[\frac{DCTRAP_{U1U2}}{DC_{U1U2}}]$$

1.00137

$$DCX_{U1U2} = N[\frac{294 + 251}{2}]$$

272.5

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U1U2} = \frac{C_{U1U2} - \gamma_{DC} (FC_{U1U2} DCX_{U1U2}) - \gamma_{DW} (DW_{U1U2})}{\gamma_{LLInventory} (LL_{U1U2})}$$

1.29437

Gusset L0 - Member L0U1 (Ref. Page 1,479/RF=0.72):

$C_{L0} = 288$

288

$DC_{L0} = 142$

142

$DCTRAP_{L0} = 150$

150

$DW_{L0} = 0$

0

$LL_{L0} = 79$

79

$$FC_{L0} = N[\frac{DCTRAP_{L0}}{DC_{L0}}]$$

1.05634

$DCX_{L0} = 107$

107

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{L0} = \frac{C_{L0} - \gamma_{DC}\,(FC_{L0}\ \ DCX_{L0}) - \gamma_{DW}\,(DW_{L0})}{\gamma_{LLInventory}\ (LL_{L0})}$$

1.06123

Gusset U1 - Member L2U1 (Ref. Page 1,662/RF=0.94):

$C_{U1} = 222$

222

$DC_{U1} = 92$

92

$DCTRAP_{U1} = 97$

97

$DW_{U1} = 0$

0

$LL_{U1} = 61$

61

$$FC_{U1} = N[\frac{DCTRAP_{U1}}{DC_{U1}}]$$

1.05435

$DCX_{U1} = 69$

69

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

$$RFinv_{U1} = \frac{C_{U1} - \gamma_{DC}\,(FC_{U1}\ \ DCX_{U1}) - \gamma_{DW}\,(DW_{U1})}{\gamma_{LLInventory}\ (LL_{U1})}$$

1.22775

Gusset U3 - Member L3U3 (Ref. Page 1,790/RF=0.99):

$C_{U3} = 130$

130

$DC_{U3} = 37$

37

$DCTRAP_{U3} = 38$

38

$DW_{U3} = 0$

0

$LL_{U3} = 47$

47

$FC_{U3} = N[\frac{DCTRAP_{U3}}{DC_{U3}}]$

1.02703

$DCX_{U3} = 26$

26

Inventory HL-93 Truck Load Rating Factor for member or gusset plate - RFinv:

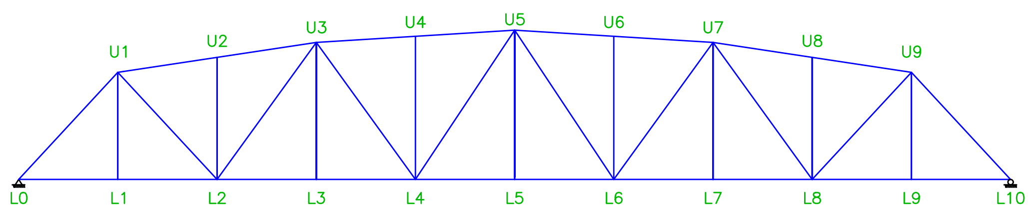
$$RFinv_{U3} = \frac{C_{U3} - \gamma_{DC} (FC_{U3}\ DCX_{U3}) - \gamma_{DW} (DW_{U3})}{\gamma_{LLInventory} (LL_{U3})}$$

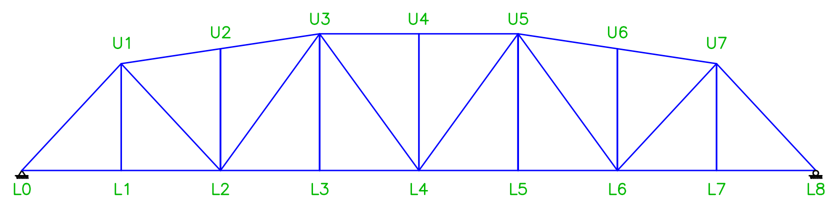
1.17473

LRFR Truss members: Frank J. Wood Bridge

Project: Bridge Rehabilitation - Exodermic Deck
Date: January 25, 2018
Type: Span 3 Roadway and Sidewalk Trusses (Reference: Maine DOT Bridge Load Rating completed by Parson Brinckerhoff March 2013 - Starting at node point L0 based on original plans)

```
Show[ Import["TrussBridgeRating.pdf"][[1]], AspectRatio → Automatic, ImageSize → 6*90]
```





▪ INPUT DATA AND TRUSS RATING:

Strength I Load Factors

$\gamma_{DC} = 1.25$

```
1.25
```

$\gamma_{DW} = 1.50$

1.5

$\gamma_{LLOperating} = 1.35$

1.35

Resistance and strength of element:

Resistance of element (capacity) in force or stress (TRAP) - C_{xx};
Dead load of structural components or attachments effecting element (VA) - DC_{xx};
Dead load of structural components or attachments effecting element (TRAP) - $DCTRAP_{xx}$;
Dead load of wearing surface or utilities effecting element (TRAP) - DW_{xx};
Live HL-93 vehicular truck load including dynamic load allowance effecting element (TRAP) - LL_{xx};
Exodermic deck with dead load of structural components or attachments effecting element (VA) - DCX_{xx};

Correction factor based on new rehabilitation repairs with respect to TRAP and VA analysis:

Sum of all TRAP dead loads - DL_T (kips);
Sum of TRAP dead loads from stringers and floorbeams - DL_E (kips);
Sum of NEW dead loads from stringers and floorbeams - DL_N (kips);
Correction factor - $CF_{RWtruss}$ (unitless);

$$FC_{xxxx} = \frac{DCTRAP_{xxxx}}{DC_{xxxx}}$$

$$\frac{DCTRAP_{xxxx}}{DC_{xxxx}}$$

Roadway Truss Members (xxxx - subscript denotes member & xx - subscript denotes gusset plate):

Member L3U3 TENSION (Ref. Page 68-69/RF=0.89):

$C_{L3U3} = 228$

228

$DC_{L3U3} = 62$

62

$DCTRAP_{L3U3} = 65$

65

$DW_{L3U3} = 0$

0

$LL_{L3U3} = 94$

94

$FC_{L3U3} = N[\frac{DCTRAP_{L3U3}}{DC_{L3U3}}]$

1.04839

$DCX_{L3U3} = 40$

40

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L3U3} = \frac{C_{L3U3} - \gamma_{DC}\,(FC_{L3U3}\,DCX_{L3U3}) - \gamma_{DW}\,(DW_{L3U3})}{\gamma_{LLOperating}\,(LL_{L3U3})}$$

1.38361

Gusset L3 - Member L3U3 (Ref. Page 1,394-1,395/RF=0.85):

$C_{L3} = 222$

222

$DC_{L3} = 63$

63

$DCTRAP_{L3} = 65$

65

$DW_{L3} = 0$

0

$LL_{L3} = 94$

94

$FC_{L3} = N[\frac{DCTRAP_{L3}}{DC_{L3}}]$

1.03175

$DCX_{L3} = 40$

40

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L3} = \frac{C_{L3} - \gamma_{DC}\,(FC_{L3}\;\; DCX_{L3}) - \gamma_{DW}\,(DW_{L3})}{\gamma_{LLOperating}\;(LL_{L3})}$$

1.34289

Gusset L1 - Member L1U1 (Ref. Page 1,344/RF=0.88):

$C_{L1} = 222$

222

$DC_{L1} = 59$

59

$DCTRAP_{L1} = 63$

63

$DW_{L1} = 0$

0

$LL_{L1} = 94$

94

$$FC_{L1} = N[\frac{DCTRAP_{L1}}{DC_{L1}}]$$

1.0678

$DCX_{L1} = 37$

37

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L1} = \frac{C_{L1} - \gamma_{DC}\,(FC_{L1}\;\; DCX_{L1}) - \gamma_{DW}\,(DW_{L1})}{\gamma_{LLOperating}\;(LL_{L1})}$$

1.36024

Gusset L0 - Member L0U1 (Ref. Page 1,283/RF=0.91):

$C_{L0} = 288$

288

$DC_{L0} = 125$

125

$DCTRAP_{L0} = 132$

132

$DW_{L0} = 0$

0

$LL_{L0} = 79$

79

$FC_{L0} = N[\frac{DCTRAP_{L0}}{DC_{L0}}]$

1.056

$DCX_{L0} = 88$

88

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L0} = \frac{C_{L0} - \gamma_{DC}\,(FC_{L0}\ DCX_{L0}) - \gamma_{DW}\,(DW_{L0})}{\gamma_{LLOperating}\,(LL_{L0})}$$

1.61125

Gusset L3 - Member L3U3 (Ref. Page 1,419/RF=0.98): Maine Legal Load Configuration 6

Strength I Load Factor - Maine Legal Load Factor

$\gamma_{MLLInventory} = 1.35$

1.35

$C_{L3} = 222$

222

$DC_{L3} = 62$

62

$DCTRAP_{L3} = 65$

65

$DW_{L3} = 0$

0

$LL_{L3} = 106$

106

$FC_{L3} = N[\frac{DCTRAP_{L3}}{DC_{L3}}]$

1.04839

$DCX_{L3} = 40$

40

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L3} = \frac{C_{L3} - \gamma_{DC} (FC_{L3}\ DCX_{L3}) - \gamma_{DW} (DW_{L3})}{\gamma_{MLLInventory}\ (LL_{L3})}$$

1.18505

Sidewalk Truss Members (xxxx - denotes member & xx - denotes gusset plate):

Member U1-U2 = U3-U4 & U5-U6 = U6-U7 COMPRESSION (Ref. Page 73-74/RF=0.95):

$C_{U1U2} = 776$

776

$DC_{U1U2} = N[\frac{393 + 336}{2}]$

364.5

$DCTRAP_{U1U2} = 365$

365

$DW_{U1U2} = 0$

0

$LL_{U1U2} = 192$

192

$FC_{U1U2} = N[\frac{DCTRAP_{U1U2}}{DC_{U1U2}}]$

1.00137

$DCX_{U1U2} = N[\frac{294 + 251}{2}]$

272.5

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$RFoper_{U1U2} = \frac{C_{U1U2} - \gamma_{DC} (FC_{U1U2}\, DCX_{U1U2}) - \gamma_{DW} (DW_{U1U2})}{\gamma_{LLOperating} (LL_{U1U2})}$

1.67788

Gusset L0 - Member L0U1 (Ref. Page 1,479/RF=0.72):

$C_{L0} = 288$

288

$DC_{L0} = 142$

142

$DCTRAP_{L0} = 150$

150

$DW_{L0} = 0$

0

$LL_{L0} = 79$

79

$FC_{L0} = N[\frac{DCTRAP_{L0}}{DC_{L0}}]$

1.05634

$DCX_{L0} = 107$

107

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{L0} = \frac{C_{L0} - \gamma_{DC}\,(FC_{L0}\ \ DCX_{L0}) - \gamma_{DW}\,(DW_{L0})}{\gamma_{LLOperating}\ (LL_{L0})}$$

1.37567

Gusset U1 - Member L2U1 (Ref. Page 1,662/RF=0.94):

$C_{U1} = 222$

222

$DC_{U1} = 92$

92

$DCTRAP_{U1} = 97$

97

$DW_{U1} = 0$

0

$LL_{U1} = 61$

61

$$FC_{U1} = N\left[\frac{DCTRAP_{U1}}{DC_{U1}}\right]$$

1.05435

$DCX_{U1} = 69$

69

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U1} = \frac{C_{U1} - \gamma_{DC}\,(FC_{U1}\ \ DCX_{U1}) - \gamma_{DW}\,(DW_{U1})}{\gamma_{LLOperating}\ (LL_{U1})}$$

1.59153

Gusset U3 - Member L3U3 (Ref. Page 1,790/RF=0.99):

$C_{U3} = 130$

130

$DC_{U3} = 37$

37

$DCTRAP_{U3} = 38$

38

$DW_{U3} = 0$

0

$LL_{U3} = 47$

47

$FC_{U3} = N[\frac{DCTRAP_{U3}}{DC_{U3}}]$

1.02703

$DCX_{U3} = 26$

26

Operating HL-93 Truck Load Rating Factor for member or gusset plate - RFoper:

$$RFoper_{U3} = \frac{C_{U3} - \gamma_{DC}\,(FC_{U3}\ DCX_{U3}) - \gamma_{DW}\,(DW_{U3})}{\gamma_{LLOperating}\,(LL_{U3})}$$

1.5228

E2 Axial compression: Span 2 Sidewalk Truss Member L2-U3

Design of axially loaded compression member.

Project: Frank J. Wood Bridge Rehabilitation
Date: January 29, 2018
Member designation: L2-U3

INPUT DATA-EXISTING MEMBER:

Unbraced column length - L_u (ft.);
Effective length factor - K (unitless);
Steel yield stress - F_y (ksi);
Modulus of elasticity - E_m (ksi);

$$L_u = \frac{55.6}{2}$$

27.8

$K = 1$

1

$F_y = 30$

30

$E_m = 29\,000$

29 000

Beam properties (inches):

Section: CB 12x65 + 2-12"x 9/16 in. Top Pls.

$A = 32.6$

32.6

$d = 13.125$

13.125

$t_w = 0.4$

0.4

$b_f = 12.0$

12.

$t_f = 1.17$

$r_y = 3.21$

```
3.21
```

SOLUTION:

Computed beam properties:

$h = d - 2\,t_f$

```
10.785
```

Allowable stresses:

Compression:

$$C_c = N\left[\sqrt{\frac{2\,\pi^2\,E_m}{F_y}}\right]$$

```
138.135
```

$$k = \frac{K\,L_u\,12}{r_y}$$

```
103.925
```

$$F_{a1} = \frac{\left(1 - \frac{k^2}{2\,C_c^2}\right)F_y}{-\frac{k^3}{8\,C_c^3} + \frac{3\,k}{8\,C_c} + \frac{5}{3}}$$

```
11.3473
```

$$F_{a2} = \frac{12\,\pi^2\,E_m}{23\,k^2}$$

```
13.8264
```

$F_a = \text{If}[C_c < k,\ F_{a2},\ F_{a1}]$

```
11.3473
```

SUMMARY:

Limiting noncompact width to thickness ratios criteria: do not use section if h/t_w or d/t_f is greater than $253\Big/\sqrt{F_y}$.

$$N\left[\frac{h}{t_w}\right]$$

```
26.9625
```

$N[d]$

$N\left[\frac{253}{\sqrt{F_y}}\right]$

46.1913

Limiting slenderness ratio criteria: do not use section if k is greater than 200.

k

103.925

Capacity of section in weak axis:

Compression (kips):

$F_{cap} = N[F_a\ A]$

369.923

INPUT DATA-EXISTING MEMBER WITH ADDITIONAL BOLTED CHANNEL EACH FLANGE:

Unbraced column length - L_u (ft.);
Effective length factor - K (unitless);
Steel yield stress - F_y (ksi);
Modulus of elasticity - E_m (ksi);

$L_u = \frac{55.6}{2}$

27.8

$K = 1$

1

$F_y = 30$

30

$E_m = 29\,000$

29 000

Beam properties (inches):

Section: CB 12x65 + 2-12”x 9/16 in. Top Pls. + 2-C15X33.9 Channels

$A = 52.6$

52.6

$d = 13.925$

13.925

$b_f = 15.0$

15.

$t_f = 1.57$

1.57

$r_y = 4.17$

4.17

SOLUTION:

Computed beam properties:

$h = d - 2\,t_f$

10.785

Allowable stresses:

Compression:

$$C_c = N\left[\sqrt{\frac{2\,\pi^2\,E_m}{F_y}}\right]$$

138.135

$$k = \frac{K\,L_u\,12}{r_y}$$

80.

$$F_{a1} = \frac{\left(1 - \frac{k^2}{2\,C_c^2}\right)F_y}{-\frac{k^3}{8\,C_c^3} + \frac{3\,k}{8\,C_c} + \frac{5}{3}}$$

13.4273

$$F_{a2} = \frac{12\,\pi^2\,E_m}{23\,k^2}$$

23.333

$F_a = \mathrm{If}[C_c < k,\ F_{a2},\ F_{a1}]$

13.4273

SUMMARY:

Limiting noncompact width to thickness ratios criteria: do not use section if h/t_w or d/t_f is greater than $253 / \sqrt{F_y}$.

$N\left[\frac{h}{t_w}\right]$

26.9625

$N\left[\frac{d}{t_f}\right]$

8.86943

$N\left[\frac{253}{\sqrt{F_y}}\right]$

46.1913

Limiting slenderness ratio criteria: do not use section if k is greater than 200.

k

80.

Capacity of section in weak axis:

Compression (kips):

$F_{cap} = N\left[F_a \quad A\right]$

706.275

APPENDIX C Construction Cost Estimate for Rehabilitation Option 1

Frank J. Wood Bridge Construction Estimate

Project No.: :01705-061-02 Frank J. Wood Bridge
Location : Brunswick-Topsham, ME
Description : OPTION 1: BETTERMENT REPAIRS EXODERMIC DECK REPLACEMENT WITH POLYMER WEARING SURFACE
Date : February 8, 2018

TOWN: BRUNSWICK- TOPSHAM
STATION: --------- ROAD: US ROUTE 201 & ROUTE 57
OVER: ANDROSCOGGIN RIVER
TYPE: Warren Truss ROADWAY WIDTH: 30 Ft.
WALKS: 1
SPANS: 3 ROADWAY LENGTH:
CLEARANCE:

MEDIAN:

ESTIMATE OF QUANTITIES AND COST - BRIDGE BETTERMENTS, BRUNSWICK - TOPSHAM

Bridge #2016

- 114.1 DEMOLITION SUPERSTRUCTURE (SF) - Quantity x Unit Price = Total Item Cost

In[1]:= $TC_{114.1} = N[(850\ ft) \times (35\ ft) \times 40.00\ \frac{Dollars}{ft^2}]$

Out[1]= 1.19×10^6 Dollars

In[2]:= $Q_{114.1} = N[\frac{TC_{114.1}}{40.00\ \frac{Dollars}{ft^2}}]$

Out[2]= $29750.\ ft^2$

- 107.95 NEW EXODERMIC BRIDGE DECK WITH POLYMER WEARING SURFACE - (SF) - Quantity x Unit Price = Total Item Cost

In[3]:= $TC_{107.95} = N[((810\ ft) \times (35\ ft)) \times ((40 + 35 + 16)\ \frac{Dollars}{ft^2})]$

Out[3]= 2.57985×10^6 Dollars

In[4]:= $Q_{107.95} = N[\frac{TC_{107.95}}{(40+35+16)\ \frac{Dollars}{ft^2}}]$

Out[4]= $28350.\ ft^2$

- 472 HOT MIX ASPHALT FOR MISCELLANEOUS BRIDGE WORK (TON) - Quantity x Unit Price = Total Item Cost

In[5]:= $TC_{472} = N[(30\ ft)\times(100\ ft)\times(4\ in)\times\frac{ft}{12\ in}\times\frac{144\ lbs}{ft^3}\times\frac{ton}{2000\ lbs}/approach\ \times 2\ approach\times 250.00\ \frac{Dollars}{ton}]$

Out[5]= 36000. Dollars

In[6]:= $Q_{472} = N[\frac{TC_{472}}{250.00\ \frac{Dollars}{ton}}]$

Out[6]= 144. ton

- 851 SAFETY CONTROLS FOR CONSTRUCTION OPERATIONS (UD) - Quantity x Unit Price = Total Item Cost

In[7]:= $TC_{851} = N[(820\ UD)\times 80.00\ \frac{Dollars}{UD}]$

Out[7]= 65600. Dollars

In[8]:= $Q_{851} = N[\frac{TC_{851}}{80.00\ \frac{Dollars}{UD}}]$

Out[8]= 820. UD

- 852 SAFETY SIGNING FOR CONSTRUCTION OPERATIONS (SF) - Quantity x Unit Price = Total Item Cost

In[9]:= $TC_{852} = N[(4\ ft\ \times 4\ ft)\times 100\ \times (25.00\ \frac{Dollars}{ft^2})]$

Out[9]= 40000. Dollars

In[10]:= $Q_{852} = N[\frac{TC_{852}}{25.00\ \frac{Dollars}{ft^2}}]$

Out[10]= $1600.\ ft^2$

▪ 853.21 TEMPORARY CONCRETE BARRIER REMOVED & RESET (LF) - Quantity x Unit Price = Total Item Cost

In[11]:= $TC_{853.21} = N[(810\ ft) \times 20.00\ \frac{Dollars}{ft}]$

Out[11]= 16 200. Dollars

In[12]:= $Q_{853.21} = N[\frac{TC_{853.21}}{20.00\ \frac{Dollars}{ft}}]$

Out[12]= 810. ft

▪ 859 REFLECTORIZED DRUM (UD) - Quantity x Unit Price = Total Item Cost

In[13]:= $TC_{859} = N[(850 \times 40\ UD) \times 0.60\ \frac{Dollars}{UD}]$

Out[13]= 20 400. Dollars

In[14]:= $Q_{859} = N[\frac{TC_{859}}{0.60\ \frac{Dollars}{UD}}]$

Out[14]= 34 000. UD

▪ 904.0 4000 PSI CEMENT CONCRETE - ABUTMENT REPAIRS (CY) - Quantity x Unit Price = Total Item Cost

In[15]:= $TC_{904.0} = N[((100\ (2\ ft) \times (1.5\ ft)\ (\frac{12\ in}{12\ \frac{in}{ft}}))) \times (\frac{cy^3}{27\ ft^3}) \times (1000.00\ \frac{Dollars}{cy^3})]$

Out[15]= 11 111.1 Dollars

In[16]:= $Q_{904.0} = N[\frac{TC_{904.0}}{1000.00\ \frac{Dollars}{cy^3}}]$

Out[16]= $11.1111\ cy^3$

▪ 960.12 STRUCTURAL STEEL NEW STRINGERS - COATED STEEL: M270 GRADE 50 (LB) - Quantity x Unit Price = Total Item Cost

In[17]:= $TC_{960.12} = N[((820\ ft \times 34\ ft) \times (\frac{18\ lbs}{ft^2})) \times (6.00\ \frac{Dollars}{lbs})]$

Out[17]= 3.01104×10^6 Dollars

In[18]:= $Q_{960.12} = N[\frac{TC_{960.12}}{8.00\ \frac{Dollars}{lbs}}]$

Out[18]= 376 380. lbs

- 960.122 STRUCTURAL STEEL FLOORBEAM - COATED STEEL: M270 GRADE 50 (LB) - Quantity x Unit Price = Total Item Cost

In[19]:= $TC_{960.122} = N[((820\ ft \times 34\ ft) \times (\frac{9\ lbs}{ft^2})) \times (7.00\ \frac{Dollars}{lbs})]$

Out[19]= 1.75644×10^6 Dollars

In[20]:= $Q_{960.122} = N[\frac{TC_{960.122}}{10.00\ \frac{Dollars}{lbs}}]$

Out[20]= 175 644. lbs

- 960.123 STRUCTURAL STEEL NEW SPLICE CONNECTION PLATES AND GUSSET PLATES INCLUDING POST TENSIONING IF NEEDED : M270 GRADE 50 (LB) - Quantity x Unit Price = Total Item Cost

In[21]:= $TC_{960.123} = N[(50\ (650\ lbs)) \times (16.00\ \frac{Dollars}{lbs})]$

Out[21]= 520 000. Dollars

In[22]:= $Q_{960.123} = N[\frac{TC_{960.123}}{60\ \frac{Dollars}{lbs}}]$

Out[22]= 8666.67 lbs

- *992.311 TEMPORARY SUPPORTS FOR ALL UTILITY PIPES (LS) - Quantity x Unit Price = Total Item Cost

In[23]:= $TC_{992.311} = N[(1\ ls)\ 200\,000.00\ \frac{Dollars}{ls}]$

Out[23]= 200 000. Dollars

In[24]:= $Q_{992.311} = N[\frac{TC_{992.311}}{200\,000.00\ \frac{Dollars}{ls}}]$

Out[24]= 1. ls

■ *961.210 PAINTING EXISTING STEEL TRUSSES (SF) - Quantity x Unit Price = Total Item Cost

In[25]:= $TC_{961.210} = N[(8000\ sf)\ 10.00\ \frac{Dollars}{sf}]$

Out[25]= 80 000. Dollars

In[26]:= $Q_{992.311} = N[\frac{TC_{961.210}}{10.00\ \frac{Dollars}{ls}}]$

Out[26]= 8000. ls

TOTAL CONSTRUCTION COST ESTIMATE FOR - OPTION 1

In[27]:= $TotalCost = AccountingForm[(TC_{114.1} + TC_{107.95} + TC_{472} + TC_{851} + TC_{852} + TC_{853.21} + TC_{859} + TC_{904.0} + TC_{960.12} + TC_{960.122} + TC_{960.123} + TC_{992.311} + TC_{961.210})\ 1.15, 12]$

Out[27]//AccountingForm=
10955637.2778 Dollars