

# REQUEST FOR PROPOSAL

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## ENGINEERING SERVICES FOR BRIDGE DESIGN (109/068) & (110/068) TOWN OF HUDSON, NH

MAY 2020



Prepared by

**Town of Hudson  
Engineering & Public Works Departments  
12 School Street  
Hudson, NH 03051**



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## REQUEST FOR PROPOSAL

The Town of Hudson, New Hampshire wishes to engage the services of a qualified engineering company to provide design and permitting services for:

### **ENGINEERING SERVICES FOR BRIDGE DESIGN (109/068) & (110/068)**

The ENGINEER must be lawfully engaged in the service of bridge design and permitting in the State of New Hampshire.

An overview and detailed specifications are provided later in the Request for Proposal (RFP).

Proposals must be received no later than **10:00 AM on SEPTEMBER 25, 2020** from interested firms, to be eligible for consideration by the Town. Proposal shall follow the format listed below and be on the forms provided as required. Each statement shall be submitted in a sealed envelope, which is clearly marked,

### **“ENGINEERING SERVICES FOR BRIDGE STREET DESIGN (109/068) & (110/068)”**

Requests may be issued only by the Town Engineer, or his designee, to authorized firms, and are not transferable unless authorized by the Town Engineer or his designee.

Complete copies of RFP are available from:

Mr. Elvis Dhima, P.E.  
Town Engineer  
Town Hall  
12 School Street  
Hudson, NH 03051  
[edhima@Hudsonnh.gov](mailto:edhima@Hudsonnh.gov)

**All proposals received will be considered confidential and not available for public review until after a vendor has been selected.**

The Town reserves the right to reject any or all proposals or any part thereof, to waive any formality, informality, information or errors in the proposal, to accept the proposal considered to be in the best interest of the Town, or to purchase on the open market if it is considered in the best interest of the Town to do so. Failure to submit all information called for and/or submission of an unbalanced proposal are sufficient reasons to declare a proposal as non-responsive and subject to disqualification.

Proposals which do not incorporate our requested format for providing **ENGINEERING SERVICES FOR BRIDGE STREET DESIGN (109/068) & (110/068)** will not be considered.

All proposals are advertised, at the Town’s discretion, in various publications and are posted publicly as detailed below:

Name	Advertising Medium	Address	Phone/Fax	Email and Web Address
Town Hall Hudson, NH	Post at Town Hall	12 School Street, Hudson NH 03051	603.886.6008 603.594.1142(fax)	<a href="mailto:edhima@hudsonnh.gov">edhima@hudsonnh.gov</a>

TOWN OF HUDSON, NEW HAMPSHIRE

\_\_\_\_\_  
Mr. Elvis Dhima, PE, Town Engineer

Date: \_\_\_\_\_

**PROPOSAL DUE DATE/TIME: SEPTEMBER 25, 2020 NOT LATER THAN 10:00 AM AT THE TOWN HALL OFFICES, 12 SCHOOL STREET, HUDSON, NH.**

**A MANDATORY PRE-PROPOSAL MEETING WILL BE HELD AT TOWN HALL ON AUGUST 28, 2020 AT 11:30 AM.**

**ALL QUESTIONS DUE BY SEPTEMBER 11, 2020 AT 10:00 AM.**

PREPARATION OF PROPOSALS:

Proposals shall be submitted on the forms provided and must be signed by the Proposer or the Proposer’s authorized representative. The person signing the proposal shall initial any corrections to entries made on the proposal forms.

Proposers must quote on all items appearing on the proposal forms. Failure to quote on all items may disqualify the proposal.

Unless otherwise stated in the Request for Proposal (RFP), the Proposer agrees that the proposal shall be deemed open for acceptance for sixty (60) calendar days subsequent to submittal to the Town of Hudson or as modified by addendum.

Any questions or inquiries must be submitted in writing, and must be received by the Town Engineer, Elvis Dhima ([edhima@hudsonnh.gov](mailto:edhima@hudsonnh.gov)) no later than seven (7) calendar days before the Request for Proposals due date to be considered. Any responses to questions, clarifications, or changes to the Request for Proposals will be provided to all Proposers of record that attended the mandatory pre-proposal meeting.

The Proposer shall not divulge, discuss or compare this proposal with other Proposers and shall not collude with any other Proposers or parties to a proposal whatever.

### MANDATORY PRE-PROPOSAL MEETING:

All Proposers are required to attend the pre-proposal meeting at **Town Hall at 11:30 AM on August 28 , 2020.**

### SUBMISSION OF PROPOSALS:

Proposals must be submitted at the Clerk's Office, Town Hall Offices, 12 School Street, Hudson NH by **10:00 AM SEPTEMBER 25, 2020** as directed in the Request for Proposals, and on the forms provided unless otherwise specified. Proposals must be typewritten or printed in ink. Proposals must be mailed or delivered in person. Proposals that are faxed or e-mailed will not be accepted.

### AMENDMENTS TO PROPOSALS

If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

Proposers shall acknowledge receipt of any amendment to this solicitation (1) by identifying the amendment number and date on the Proposal form, or by letter. Proposals which fail to acknowledge the Proposer's receipt of any amendment will result in the rejection of the Proposal if the amendment(s) contained information which substantively changed the municipality's requirements.

Amendments will be on file in the offices of the municipality and the Engineer at least 1 day before Proposal opening.

### WITHDRAWAL OF PROPOSALS:

Proposals may be withdrawn by written notice, telegram (including mailgram) or facsimile machine transmission received at any time before the exact time set for opening of proposals; provided that written confirmation of telegraphic or facsimile withdrawals over the signature of the proposer is mailed and postmarked prior to the specified proposal opening time. A proposal may be withdrawn in person by a proposer or its authorized representative if, before the exact time set for opening of proposals, the identity of the person requesting withdrawal is established and the person signs a receipt for the proposal. Negligence on the part of the Proposer in preparing this proposal shall not constitute a right to withdraw a proposal subsequent to the proposal opening. Proposals may not be withdrawn for the period as indicated in this Request for Proposals or as modified by addenda.

### RECEIPT AND OPENING OF PROPOSALS:

Proposals shall be submitted prior to the time fixed in the Request for Proposals. Proposals received after the time so indicated shall be returned unopened.

All qualified Bidders will receive consideration without regard to race, color, religion, creed, age, sex, or national origin.

PROPOSAL RESULTS:

**All proposals received shall be considered confidential and not available for public review until after a contractor has been selected. All proposals may be subject to negotiations prior to the award of a contract.**

**NO TELEPHONE REQUESTS FOR RESULTS WILL BE ACCEPTED OR GIVEN.**

TIE PROPOSALS:

When identical Proposals are received, with respect to price, delivery, financial resources, experience, ability to perform and quality, award may be made by a toss of a coin.

LIMITATIONS:

This Request for Proposal (RFP) does not commit the Town to award a contract, to pay any costs incurred in the preparation of a response to this request, or to procure or contract for services, supplies or equipment. The Town reserves the right to accept or reject any or all proposals received as a result of this request, or to cancel in part or in its entirety this RFP, if it is in the best interest of the Town to do so.

The OWNER reserves the right to waive any informalities, to negotiate with any Bidder and to reject any or all Bids. No Bidder may withdraw his Bid within ninety (90) days after the actual date of the opening thereof.

PROPOSAL EVALUATION:

In an attempt to determine if a Proposer is responsible, the Town, at its discretion, may obtain technical support from outside sources. Each Proposer will agree to fully cooperate with the personnel of such organizations.

PROJECT BACKGROUND

Town of Hudson and City of Nashua share ownership of the two bridges in question and are looking for engineering services at this time. The two bridges we constructed in 1970 (109/068) (Hudson to Nashua) and 1973 (110/068) (Nashua to Hudson) and are inspected bi-annually by NHDOT. The most recent inspection report (2019) and the evaluation of both bridges completed in 2018 by McFarland Johnson Engineering are attached. Each bridge is approximately 600 feet long and 28 feet wide, excluding the sidewalk.

Town of Hudson will execute this contract and will be the point of contact through this task. City of Nashua staff will be involved with the decision making and selecting the Engineering firm winning this contract. In case a municipality agreement is not reached between Hudson



and Nashua, Town of Hudson reserves the right to execute this work for bridge (109/068) (Hudson to Nashua).

This project will be 100% (50/50) funded by the Town of Hudson and City of Nashua.

### SCOPE OF SERVICES

The Town of Hudson Engineering Department is soliciting Engineering services for **BRIDGE DESIGN (109/068) & (110/068)**

The work will involve the following:

- Revise existing plans, inspections and evaluation report related to the bridges and provide/conduct additional inspections if necessary using National Bridge Inspection guidelines.
- Provide full Structural Design for both bridges rehabilitation
- Permitting and approval with NHDOT and NHDES
- Providing Plans and Specification, which Town of Hudson and City of Nashua can utilize to bid the construction phase for both bridges

Proposers shall demonstrate experience in the completion of similar design work.

#### 1. Description of Services Requested

The Engineering Firm will need to provide the Town with a detailed written description of the proposed work for review and approval.

Work will include:

- Complete schedule of the work and fees for the proposed tasks

#### 2. Time Frame for Performance of Services

A contract will be signed as soon as possible after the Proposal due date and completion of the Proposal evaluations, but no later than July 1, 2020 and the project will proceed immediately. **The Engineer will be able to start work as of July 1, 2020 and must be substantially complete no later than October 30, 2020.**

### APPROXIMATE BUDGET FOR ENGINEERING SERVICES

The budget is \$200,000 for both bridges and \$100,000 for one bridge.

### TRAFFIC CONTROL/MAINTENANCE

The Town reserves the right to hire Hudson Police Department or Highway Department staff directly to reduce the cost of the traffic control/maintenance, if necessary.

## PROPOSAL STATEMENT PREPARATION

In order to facilitate the evaluation of the Proposals, the Proposer is instructed to follow the outline below in responding. Proposals that do not follow the outline, or do not contain the required information may be considered as unresponsive Proposals. Additional or more detailed information may be annexed to the main body of the Proposal. Proposals shall be submitted in electronic and two (2) identical hard copy formats.

### 1. Company or Contractor Team Background Material

The Proposer shall provide information concerning the background of the firm including a brief description of the firm's experience providing similar services. This shall include any proposed subcontractor or consultants that the Proposer plans to engage on this project.

### 2. Experience/References

The Proposer shall provide a Client reference list, with names, addresses, and telephone numbers, especially for clients whom the Proposer has provided similar services in the past. The Proposer should be able to provide a list showing that they have worked on at least one similar project in the last ten (10) years that are of similar size and scope. References shall include a brief description of the project and the services provided. Contractor shall be familiar with the New Hampshire Department Environmental Services.

### 3. Project Approach

The Proposer shall provide a work schedule and cost estimate of their design, including permitting. The Proposer shall also describe recent similar work and any other information that the Proposer deems relevant to the project, and which the Proposer believes will further the competitiveness of the Proposal, including work samples, pictures, etc. from similar completed projects.

### 4. Schedule

The Proposer shall provide a brief description of their ability to meet the schedule set forth in this Request for Proposal.

### 5. Cost Proposal

Proposers shall submit an hourly rate breakdown for each task and a Cost Proposal in a total in Lump Sum not to exceed format.

AWARD OF CONTRACT:

Any contract entered into by the Town shall be in response to the proposal and subsequent discussions. It is the policy of the Town that contracts be awarded, among other considerations, only to responsive and responsible Proposers. In order to qualify as responsive and responsible, a prospective Engineering Firm must meet the following standards as they relate to this request:

- Have the necessary experience, organization, technical and professional qualifications, skills and facilities;
- Be able to comply with the proposed or required time of completion or performance schedule;
- Have a demonstrated satisfactory record of performance.
- Adhere to the specifications of this proposal and provide all documentation required of this proposal

The contract will be awarded to a responsive and responsible Proposer based on the evaluation criteria (design approach, experience of the engineering firm and sub consultants, cost and schedule), not necessarily the lowest price.

The Town reserves the right to reject any or all proposals or any part thereof, to waive any formality, informality, information and/or errors in the proposal, to accept any proposal in part or in whole as may be in the best interest of the Town, or any other option if it is considered in the best interest of the Town to do so.

This solicitation requires proposing on all items, failure to do so will disqualify the proposal.

CONTRACT AWARD PROTEST POLICY AND PROCEDURE:

- a. Definitions. As used in this provision:

“Interested party” means an actual or prospective bidder whose direct economic interest would be affected by the award of the contract.

“Protest” means a written objection by an interested party to this solicitation or to a proposed or actual award of a contract pursuant to this solicitation.

- b. Protests shall be served on the Contracting Officer by obtaining written and dated acknowledgement from:

Steve Malizia, Town Administrator  
Town of Hudson  
12 School Street  
Hudson, NH 03051

- c. All protests shall be resolved in accordance with the municipality’s protest policy and procedures, copies of which are maintained at the municipality.

#### MODIFICATIONS AFTER AWARD:

The Contract shall constitute the entire understanding between the parties, and it shall not be considered modified, altered, changed, or amended in any respect unless in writing and signed by the parties hereto. Such modification shall be in the form of a contract amendment executed by both parties.

#### CANCELLATION OF AWARD:

The Town reserves the right to cancel the award without liability to the Proposer at any time before a contract has been fully executed by all parties and is approved by the Town.

#### CONTRACT:

Any Contract between the Town and the Contractor shall consist of (1) the Request for Proposal (RFP) and any amendments thereto and (2) the Contractor's proposal in response to the RFP, (3) Form of Agreement. In the event of a conflict in language between documents (1), (2), and (3) referenced above, the provisions and requirements set forth and referenced in the RFP shall govern. However, the Town reserves the right to clarify any contractual relationship in writing and such written clarification shall govern in case of conflict. In all other matters, not affected by written clarification, if any, the RFP shall govern. The Proposer is cautioned that this proposal shall be subject to acceptance without further clarification.

#### EXECUTION OF CONTRACT:

The successful Proposer shall sign (execute) the contract documents and shall satisfy all conditions set forth in the contract to enter into the contract and return such signed documents to the Town, within ten (10) calendar days from the date mailed or otherwise delivered to the successful Proposer.

#### APPROVAL OF CONTRACT:

Upon receipt of the contract that has been fully executed by the successful Proposer (Contractor), the Town shall complete the execution of the contract in accordance with local laws or ordinances and return the fully executed contract to the Contractor. Delivery of the fully executed contract, along with a Notice to Proceed and a Town purchase order, to the Contractor shall constitute the Town's approval of the contract with the Contractor.

#### FAILURE TO EXECUTE CONTRACT:

Failure of the successful Proposer to execute the contract within ten (10) calendar days from the date mailed or otherwise delivered to the successful Proposer shall be just cause for cancellation of the award.

#### DISQUALIFICATION:

Awards will not be made to any person, firm and/or corporation that has defaulted upon a contract with the Town, the State of New Hampshire or the Federal Government within the past 5 years. Awards will not be made to any principal owner or officers that have a 10% or greater interest in a firm or corporation that has defaulted upon a contract with the Town, the State of New Hampshire or the Federal Government within the past 5 years. Corporations must currently be in good standing with the Secretary of State's Office in the state of incorporation.

INSURANCE:

The successful Proposer shall procure and maintain insurance, in the amounts and coverage as set forth in this Request for Proposals, or otherwise required by the Town, at the Proposer's sole expense, with Town approved insurance companies, insuring against any and all public liability, including injuries or death to persons and damage to property, arising out of or related to the goods or Proposer's performance hereunder and shall furnish to the Town certificates of such insurance and renewals thereof signed by the issuing company or agent upon the Town's request. Such certificates shall name the Town of Hudson and City of Nashua as an additional insured. Such policies shall provide for cancellation only subsequent to 30 days prior written notice to the Town and proof of subsequent insurance upon cancellation of prior policy.

The Town's examination of, or failure to request or demand, any evidence of insurance hereunder, shall not constitute a waiver of any requirement and the existence of any insurance shall not limit the Proposer's obligation under any provision hereof.

Except to the extent of comparable insurance acceptable to, or express waiver by the Town, the Proposer shall, or shall cause any carrier engaged by the Proposer, to insure all shipments of goods for full value.

If the contract with the Proposer involves the performance of work by the Proposer's employees at property owned or leased by the Town, the Proposer shall furnish such additional insurance as the Town may request in respect thereof, but in any event and without such request, workers' compensation insurance and unemployment compensation insurance as required by laws of the State of New Hampshire and public and automotive liability and property damage insurance. In no event shall such employees of the Proposer be deemed to be the employees of, or under the direction or control of the Town for any purpose whatsoever.

WORKER'S COMPENSATION:

All Proposers and subcontractors at every tier under the Proposer will conform with the requirements of RSA 281 Title XXIII, Section 281-A:2 with close attention to sections VI(a), VI(c) and VII(a) as well as Section 281-A:4.

DISAGREEMENTS AND DISPUTES:

All disagreements and disputes, if any, arising under the terms of any contract, either by law, in equity, or by arbitration, shall be resolved pursuant to the laws and procedures of the State

of New Hampshire, in which state any contract shall be deemed to have been executed. No action at law, or equity, or by arbitration shall be commenced to resolve any disagreements or disputes under the terms of any contract, in any jurisdiction whatsoever other than the State of New Hampshire and Hillsborough County.

TERMINATION OF CONTACT FOR CAUSE:

If the Contractor shall violate any provision of the Contract, the Town shall have the right to terminate the Contract. To terminate the Contract, the Town shall provide written notice to the Contractor of such termination. Such written notice shall state the Contract violation(s) and be delivered to the Contractor's address as identified in the Contract Documents. This notice shall provide the Contractor with fifteen (15) calendar days from the date of delivery, to correct the violation(s) to the Town's satisfaction. Should the Contractor fail to satisfactorily correct all violations within (15) fifteen calendar days, the Town may terminate the contract immediately upon delivery of a Notice of Termination to the Contractor. Such termination shall become effective immediately or as otherwise determined by the Town. Upon termination, all finished or unfinished work, services, plans, data programs and reports prepared by the Contractor under the Contract shall become the Town's property. The Town may also terminate this Contract in accordance with any other applicable Contract provision.

Notwithstanding the above, the Contractor shall not be relieved of liability to the Town for damages sustained by the Town by virtue of any breach of any contract, and the Town may withhold any payments until such time as the exact amount of damages due the Town is determined.

TERMINATION FOR THE CONVENIENCE OF THE TOWN:

The Town may terminate any contract at any time by giving written notice to the Vendor of such termination and specifying the effective date thereof, at least fifteen (15) days before the effective date of such termination.

In that event, all finished or unfinished work, services, documents and materials shall become the Town's property. If any Contract is terminated by the Town as provided herein, the Vendor will be paid an amount which bears the same ratio to the total compensation as the services covered by any contract, less payments of compensation previously made.

PATENT PROTECTION:

The successful Proposer agrees to indemnify and defend the Town of Hudson from all claims and losses resulting from alleged and actual patent infringements and further agrees to hold the Town of Hudson and City of Nashua harmless from any liability arising under RSA 382-A, 2-312 (3). (Uniform Commercial Code).

OWNERSHIP OF REPORTS:

All data, materials, plans, reports and documentation prepared pursuant to any contract between the Town of Hudson and the successful Proposer shall belong exclusively to the Town of Hudson and City of Nashua.

ASSIGNMENT PROVISION:

The successful Proposer hereby agrees that it will assign to the Town of Hudson all cause of action that it may acquire under the anti-trust laws of New Hampshire and the United States as the result of conspiracies, combination of contracts in restraint of trade which affect the price of goods or services obtained by the Town under this contract if so requested by the Town of Hudson.

PAYMENT:

Payment will be made within thirty (30) days of the completion of the work based upon the payment schedule listed in the Form of Agreement after receipt of invoice by the Town.

TAX:

The Town is exempt from all sales and Federal excise taxes. The Town's tax exemption certificate will be provided to the successful Contractor upon request. Please bill less these taxes.

FUNDING OUT:

The Town of Hudson's obligations to pay any amount due under a contract are contingent upon availability and continuation of funds for the purpose. The Town may terminate the contract at any time, due to the non-appropriation of funds, and all payment obligations of the Town cease on the date of termination.

ASSIGNMENT OR SUB-CONTRACTING:

None of the work or services covered by the contract shall be assigned in full or in part, or sub-contracted without the prior approval of the Town.

PRICING:

Unless otherwise specified all prices listed are firm for the term of the contract. All prices should include all labor, material and transportation costs, and any discounts offered. No fuel surcharges shall be allowed at any time.

AUDIT:

For a period of at least three (3) years after completion of any contract, it is the responsibility of the Contractor to make available at the Contractor's place of business, upon demand, all

price lists, documents, financial records and other records pertaining to purchases made and /or work performed under contract for the purposes of audit by the Town of Hudson.

#### FUGITIVE NOISE ORDINANCES

All work shall be conducted in conformance with the Town's Code Part II General Legislation

#### 1. Chapter 249-4, Prohibited Noise Emissions and Conditions

The Town Code can be viewed on-line at <http://ecode360.com/HU1110>

#### GUARANTEES & WARRANTY:

All parts and labor related to contracts must be guaranteed and include a 12 month warranty from the date of acceptance by the Town. If any work is unable to be guaranteed, the contractor must inform the Town, in writing, prior to the delivery of an item or any work being performed. Non-guaranteed work must be offered at a discount rate from the proposal prices. **Inspection, testing and final determination of non-warranty work shall be performed at no cost to the Town.**

#### FORCE MAJEURE:

Neither party shall be liable for any inability to perform its' obligations under any subsequent contract due to war, riot, insurrection, civil commotion, fire, flood, earthquake, storm or other act of God.

#### SEVERABILITY:

If any of this Request for Proposals or subsequent contract are held to be invalid or unenforceable, it will be construed to have the broadest interpretation which would make it valid and enforceable under such holding. Invalidity or the inability to enforce a term or condition will not affect any of the other this Request for Proposals or subsequent contract.

#### PROVISION REQUIRED BY LAW DEEM INSERTED

Each and every provision and clause required by law to be inserted in this Request for Proposals and any subsequent Contract shall be deemed to be inserted herein and this Request for Proposals and Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Request for Proposals and/or Contract shall forthwith be physically amended to make such insertion or correction.



## DISADVANTAGED BUSINESS ENTERPRISES

The Town hereby notifies all Contractors that it will affirmatively insure that in any contract entered into pursuant to this Request for Proposals, disadvantaged business enterprises will be afforded full opportunity to submit proposals in response to this request and will not be discriminated against on the grounds of race, color, national origin, religion, sex, age or disability in consideration for an award.

## NON-DISCRIMINATION

Contracts for work resulting from this Request for Proposals shall obligate the Contractor and the Contractor's subcontractors not to discriminate in employment practices on the grounds of race, color, national origin, religion, sex, age or disability. Statements as to non-discriminatory practices may be requested from the successful Vendor(s).

## DEFINITIONS:

Proposal shall also mean quotation, bid, offer and qualification/experience statement.

Vendors shall also mean Proposers, offerors, bidders, contractors or any person or firm responding to a Request for Proposals.

Contract shall also mean agreement.

## GOVERNING LAW:

The Laws of the State of New Hampshire shall govern all contracts entered into by the Town of Hudson. Any disputes shall be resolved within the venue of the State of New Hampshire and Hillsborough County.

*FAILURE TO ACKNOWLEDGE THIS REQUEST FOR PROPOSALS MAY RESULT IN WITHDRAWAL FROM THE PROPOSAL LIST FOR THIS COMMODITY OR SERVICE.*

*FAILURE TO COMPLY WITH THESE REQUIREMENTS COULD RESULT IN THE CANCELLATION OF AN ORDER OR CONTRACT.*

## **PROPOSAL SUBMISSION CHECKLIST**

In order to be considered responsive, each prospective vendor must submit the following documents, in **electronic and two (2) identical hard copy formats** as part of its proposal:

1. Proposal Document as outlined above
2. Specifications Exception Form
3. Alternate Form W-9
4. Town of Hudson and City of Nashua Indemnification Agreement

**The successful contractor must submit, prior to contract signing, its insurance certificate (naming the Town of Hudson and City of Nashua) that meets the minimum required types and levels of coverage.**

**PROPOSAL FORM**

**ENGINEERING SERVICES FOR BRIDGE DESIGN (109/068) & (110/068)  
TOWN OF HUDSON, NEW HAMPSHIRE**

THE UNDERSIGNED HEREBY OFFERS TO PROVIDE ENGINEERING SERVICES FOR THE ABOVE.

**1. Engineering Services :**

Engineering services for the project listed above.

\$ \_\_\_\_\_

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Length of the warranty for labor shall be one year from the date of Project acceptance

Length of the warranty for materials shall be one year from the date of Project acceptance

The warranty shall include parts, labor, and travel to and from the site to remedy any warranty repairs.

The undersigned acknowledges:

1. That he/she is an authorized agent of the vendor submitting this proposal
2. The receipt of the following addenda:  
\_\_\_\_\_
3. The firm submitting this bid has never defaulted on any municipal, state, federal or private contract
4. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.
5. The undersigned hereby certifies that he (has) (has not) (CIRCLE ONE) performed work subject to the President's Executive Order No. 11246 entitled "Equal Employment Opportunity."
6. The undersigned hereby acknowledges that he has read this proposal in its entirety and understands and agrees to all provisions contained herein.

**Company:** \_\_\_\_\_

**Signed by:** \_\_\_\_\_

**Printed or typed name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Telephone number:** \_\_\_\_\_ **fax number:** \_\_\_\_\_

**Toll free number:** \_\_\_\_\_ **e-mail:** \_\_\_\_\_

**Cell phone number:** \_\_\_\_\_

**Primary point of contact:** \_\_\_\_\_

**Payment terms and conditions:** \_\_\_\_\_

**Please fill out, sign and return to:**

Town of Hudson  
Town Engineer  
Mr. Elvis Dhima, P.E.,  
12 School Street, Hudson, NH 03051  
603-886-6008; 603-594-1142 (Fax)  
[edhima@hudsonnh.gov](mailto:edhima@hudsonnh.gov)

**Due Date/Time: September 25, 2020, Not Later Than 10:00 AM**

**SPECIFICATIONS EXCEPTION FORM**

**ENGINEERING SERVICES FOR BRIDGE DESIGN (109/068) & (110/068)  
TOWN OF HUDSON, NEW HAMPSHIRE**

In the interest of fairness and sound business practice, it is mandatory that you state any exceptions taken by you to our specifications.

It should not be the responsibility of the Town of Hudson & City of Nashua to ferret out information concerning the materials, which you intend to furnish.

If your bid/quotation does not meet all of our specifications, you **must** so state in the space provided below:

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Proposals on equipment, vehicles, supplies, service and materials not meeting specifications may be considered by the Town, however, all deviations must be listed above.

If your proposal does not meet our specifications, and your exceptions are not listed above, the Town of Hudson may claim forfeiture on your proposal bond, if submitted.

Signed: \_\_\_\_\_  
**I DO** meet specifications

Signed: \_\_\_\_\_  
**I DO NOT** meet specifications as listed in this bid; exceptions are in the space provided.

Failure to submit this form with your RFP response may result in your Proposal being rejected as unresponsive.



Name (as shown on your income tax return)		
Business name/disregard entity name, if different from above		
Check appropriate box for federal tax classification (required): <input type="checkbox"/> Individual/ Sole proprietor	<input type="checkbox"/> C Corporation	<input type="checkbox"/> S Corporation
<input type="checkbox"/> Partnership	<input type="checkbox"/> Trust/estate	
<input type="checkbox"/> Limited Liability Company – Enter the tax classification (C= Corporation, S-S Corporation, P= Partnership)_____		<input type="checkbox"/> Exempt payee
<input type="checkbox"/> Other (see instructions)		
Address (number, street, and apt. or suite no.)	Requester's name and address (optional)	
City, state, and ZIP code	City of Concord 41 Green Street Concord NH 03301	
List account number(s) here (optional)		

<b>Part I</b>	<b>Taxpayer Identification Number (TIN)</b>
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Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3. **Note.** If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social Security number –	Employer identification number –
--------------------------	----------------------------------

<b>Part II</b>	<b>Certification</b>
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Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions: You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 4.

<b>Sign Here</b>	<b>Signature of U.S. Person</b>	<b>Date:</b>
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**General Instructions**

Section references are to the Internal Revenue Code unless otherwise noted.

**Purpose of Form**

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA. Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to: 1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued), 2. Certify that you are not subject to backup withholding, or 3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income. **Note.** If a requester give you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9. Pursuant to IRS Regulations, you must furnish your Taxpayer IRS Identification Number (TIN) to the City whether or not you are required to file tax returns. If this number is not provided, you may be subject to required withholding on each payment made to you. To avoid this withholding & to ensure that accurate tax information is reported to the IRS, **A RESPONSE IS REQUIRED.**





**ENGINEERING SERVICES FOR BRIDGE DESIGN  
(109/068) & (110/068)  
TOWN OF HUDSON, NEW HAMPSHIRE**

**THE FOLLOWING INDEMNIFICATION AGREEMENT SHALL BE, AND IS  
HEREBY A PROVISION OF ANY CONTRACT**

The successful contractor agrees to indemnify, defend and save harmless the Town of Hudson and City of Nashua, its officials, officers, agents and employees from any and all claims and losses accruing or resulting to any and all contractors, subcontractors, suppliers, laborers and any other person, firm, or corporation furnishing or supplying work, services, materials or supplies in connection with the performance of this contract, and from any and all claims and losses accruing or resulting to any person, firm or corporation which may be injured or damaged by the contractor in the performance of this contract. In any case, the foregoing provisions concerning indemnification shall not be construed to indemnify the Town of Hudson and City of Nashua for damage arising out of bodily injury to persons or damage to property caused by or resulting from the sole negligence of the Town or its employees. This indemnification shall survive the expiration or early termination of this contract.

**Company**\_\_\_\_\_

**Taxpayer identification number**\_\_\_\_\_

**Authorized signature**\_\_\_\_\_

**Date**\_\_\_\_\_

**Address**\_\_\_\_\_

**Telephone**\_\_\_\_\_

**Toll-free number**\_\_\_\_\_

**Fax number**\_\_\_\_\_

**E-mail address**\_\_\_\_\_



**ENGINEERING SERVICES FOR BRIDGE DESIGN  
(109/068) & (110/068)  
Town of Hudson  
Insurance Requirements for All Contractors**

*Additional Coverage is Required if Checked* \_\_\_\_\_ *Minimum Limits Required*

**Commercial General Liability**

General Aggregate	\$2,000,000
Products-Completed Operations Agg.	\$2,000,000
Personal and Advertising	\$1,000,000
Each Occurrence Injury	\$1,000,000
Fire Damage (Any One Fire)	\$ 50,000
Medical Expense (Any One Person)	\$ 5,000

- Occurrence  
 Claims Made

**Additional Coverage to Include**

<input type="checkbox"/> Owners & Contractors' Protective – Limit	NA
<input type="checkbox"/> Underground/Explosion and Collapse	NA

**Commercial Automobile Liability**

Combined Single Limit	\$1,000,000
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- Any Auto, Symbol 1  
 Include Employees as Insured

**Additional Coverage to include:**

<input type="checkbox"/> Garage Liability	NA
<input type="checkbox"/> Garage Keepers Legal Liability	NA

**Workers Compensation**

NH Statutory including Employers Liability - Each Accident/Disease-Policy Limit/Disease-Each Employee	\$100,000/\$500,000/\$100,000
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**Commercial Umbrella**

May be substituted for higher limits required above	\$1,000,000 _____
<input checked="" type="checkbox"/> Follow Form Umbrella on ALL requested Coverage	

**Other**

<input type="checkbox"/> 1. Professional/Errors & Omissions	NA
<input type="checkbox"/> 2. Builders Risk – Renovation Form	
All Risk completed value form including Collapse	NA
Sublimit for Soft Cost Coverage	NA
<input type="checkbox"/> 3. Installation Floater (Equipment)	NA
<input type="checkbox"/> 4. Riggers Liability	NA
<input type="checkbox"/> 5. Environmental – Pollution Liability	NA
<input type="checkbox"/> 6. Aviation Liability	NA
<input type="checkbox"/> 7. Watercraft – Protection & Indemnity	NA

**(X) The Town of Hudson & City of Nashua must be named as Additional Insured with respect to general, automobile and umbrella liability.**



**NOTICE OF AWARD**

Dated \_\_\_\_\_, 2020

TO: \_\_\_\_\_  
(BIDDER)

ADDRESS: \_\_\_\_\_

OWNER'S PROJECT NO: \_\_\_\_\_

PROJECT: Contract for **ENGINEERING SERVICES FOR BRIDGE DESIGN (109/068) & (110/068)**

OWNER'S CONTRACT NO: \_\_\_\_\_

CONTRACT FOR: Contract for **ENGINEERING SERVICES FOR BRIDGE DESIGN (109/068) & (110/068)**

\_\_\_\_\_  
(Insert name of contract as it appears in the Bid Documents)

You are notified that your Bid dated \_\_\_\_\_ for the above Contract has been considered. You are the apparent successful bidder and have been awarded a contract for:

Hudson – RFP 013-20  
Contract for **ENGINEERING SERVICES FOR BRIDGE DESIGN (109/068) & (110/068)**

\_\_\_\_\_  
(Indicate total Work, alternates or sections of Work awarded)

The Contract Price of your contract is \_\_\_\_\_ Dollars (\$ \_\_\_\_\_).

4 (four) copies of each of the proposed Form of Agreement, and Performance and Payment Bond forms accompany this Notice of Award.

You must comply with the following conditions precedent within **five** days of receiving this Notice of Award.

1. You must deliver to the OWNER all of the fully executed counterparts of the Agreement.
2. You must deliver with the executed Agreement the Contract Security (Bonds) as specified in the Information for Bidders and General Provisions.
3. (List other conditions precedent).

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List of subcontractors

Insurance Certificates (1 copy) - **Please note that BOTH Municipalities must be named as additional insureds.**

Failure to comply with these conditions within the time specified will entitle **OWNER** to consider your bid abandoned, to annul this Notice of Award and to declare your Bid Security forfeited.

Within ten days after receipt of acceptable performance BOND, payment BOND and agreement signed by the party to whom the Agreement was awarded, the **OWNER** will return to you one fully signed counterpart of the Agreement with the Contract Documents attached.

Town of Hudson  
(OWNER)

**By** \_\_\_\_\_  
(Authorized Signature)

\_\_\_\_\_  
(TITLE)

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

By \_\_\_\_\_

The \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_

By \_\_\_\_\_

Title \_\_\_\_\_

Copy to ENGINEER  
 (Use Certified Mail, Return Receipt Requested)

**FORM OF AGREEMENT  
BETWEEN OWNER AND CONTRACTOR  
ON THE BASIS OF A LUMP SUM PRICE**

**THIS AGREEMENT** is dated as of the \_\_\_\_\_ day of \_\_\_\_\_ in the year 2020 by and between the Town of Hudson, 12 School Street, Hudson, NH (hereinafter called OWNER) and \_\_\_\_\_ (hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

**ARTICLE 1 - WORK**

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

**ENGINEERING SERVICES FOR  
BRIDGE DESIGN (109/068) & (110/068)  
HUDSON, NEW HAMPSHIRE**

**ARTICLE 2 - ENGINEER**

The Project is being managed by the Town Engineer with assistance from \_\_\_\_\_, who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

**ARTICLE 3 - CONTRACT PRICE**

OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount equal to the sum of the Lump Sum Cost as shown on the Proposal Form (attached).

3.1 Liquidated Damages: OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that if the Work is not completed within the times specified, plus any extensions thereof allowed in accordance with the General Conditions, the OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) the OWNER shall deduct from payments due the CONTRACTOR **Two Hundred and Fifty dollars (\$250.00)** for each calendar day that expires past the date for each calendar day that expires after the Substantial Completion date specified, until said portions of the work have been completed. If payments due the CONTRACTOR are less than the amount of such liquidated damages, said damages shall be deducted from any other monies due or to become due the CONTRACTOR, and then the CONTRACTOR or his Surety shall pay the balance to the OWNER.

- 3.2 In addition to the above, if the Contract is not completed within the time specified and no extension of time is authorized by the OWNER, the CONTRACTOR shall indemnify the OWNER for costs to the OWNER of additional engineering work required during any such extension period.

#### **ARTICLE 4 - PAYMENT PROCEDURES**

CONTRACTOR shall submit Applications for Payment in accordance with the General Conditions and Supplemental Conditions. Applications for Payment will be processed by ENGINEER as follows:

- Payment will be made within thirty (30) days of the completion of each phase

The Town waives any retainage requirement for this project. All payments to the Contractor will be based on the payment schedule noted above.

#### **ARTICLE 5 - INTEREST**

All monies not paid when due as provided in the General Conditions shall bear interest at the maximum rate allowed by law at the place of the Project.

#### **ARTICLE 6 - CONTRACTOR'S REPRESENTATIONS**

In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

- 7.1 CONTRACTOR has examined and carefully studied the Contract Documents including the Addenda and the other related data identified in the Bidding Documents including "technical data".
- 7.2 CONTRACTOR has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance or furnishing of the Work.
- 7.3 CONTRACTOR is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.
- 7.4 CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto. CONTRACTOR does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.



- 7.5 CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.
- 7.6 CONTRACTOR has given OWNER written notice of all conflicts, errors, ambiguities or discrepancies that CONTRACTOR has discovered in the Contract Documents and the written resolution thereof by OWNER is acceptable to CONTRACTOR, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

## **ARTICLE 7 - CONTRACT DOCUMENTS**

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

- 7.1 Request for Proposal RFB 01-20.
- 7.2 Town of Hudson required contract forms:
- a.) Proposal Document
  - b.) Specifications Exception Form
  - d.) Alternate Form W-9
  - d.) Indemnification Agreement
- 7.3 Notice of Award.
- 7.4 This Agreement.
- 7.5 CONTRACTOR's Proposal.
- 7.6 Documentation submitted by CONTRACTOR prior to Notice of Award (pages \_\_ to \_\_\_\_, inclusive).
- 7.7 The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: All Written Amendments and other documents amending, modifying or supplementing the Contract Documents pursuant to the General Conditions.

## **ARTICLE 8 - MISCELLANEOUS**

- 8.1 Terms used in this Agreement which are defined in the General Conditions will have the meanings indicated in the General Conditions, for construction use only.

- 8.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without written consent of the party sought to be bound; and, specifically but without limitation, monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.
- 8.3 OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.
- 8.4 Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed, initialed or identified by OWNER and CONTRACTOR or identified by ENGINEER on their behalf.

This Agreement will be effective on \_\_\_\_\_, 20\_\_ (which is the Effective Date of the Agreement).

OWNER Town of Hudson

CONTRACTOR \_\_\_\_\_

By: \_\_\_\_\_

By: \_\_\_\_\_

Print Name \_\_\_\_\_

Print Name \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

STATE OF NEW HAMPSHIRE  
COUNTY OF \_\_\_\_\_

STATE OF \_\_\_\_\_  
COUNTY OF \_\_\_\_\_

The foregoing instrument was acknowledged before me this \_\_\_\_ day of \_\_\_\_\_, 2020, by \_\_\_\_\_, duly authorized \_\_\_\_\_ of \_\_\_\_\_, a New Hampshire corporation, on behalf of same.

The foregoing instrument was acknowledged before me this \_\_\_\_ day of \_\_\_\_\_ 2020, by \_\_\_\_\_, duly authorized \_\_\_\_\_ of \_\_\_\_\_, a \_\_\_\_\_ corporation, on behalf of same.

\_\_\_\_\_  
Justice of the Peace/Notary Public

\_\_\_\_\_  
Justice of the Peace/Notary Public

Address for giving notices:

Address for giving notices:

Town of Hudson, 12 School Street,

\_\_\_\_\_

Hudson, New Hampshire

\_\_\_\_\_

(If OWNER is a public body, attach evidence of authority to sign and resolution of other documents authorizing execution of Agreement.

NH License No.: \_\_\_\_\_

Agent for service of process: \_\_\_\_\_

\_\_\_\_\_

(If CONTRACTOR is a corporation, attach evidence of authority to sign).





# McFarland Johnson

*Innovative Solutions / Sustainable Results*

53 Regional Drive • Concord, NH 03301  
Phone: 603-225-2978 • Fax: 603-225-0095  
www.mjinc.com

October 3, 2018  
Job No. 18385.00

Mr. Elvis Dhima, P.E.  
Town Engineer  
Town of Hudson  
12 School Street  
Hudson, NH 03051

Re: Hudson –Bridge Nos. 109/068 and 110/068  
NH Route 111 Westbound (Bridge Street) and Eastbound (Ferry Street) over the  
Merrimack River

## **BRIDGE EVALUATION SUMMARY**

Dear Elvis,

We have completed our scope of services associated with bridge evaluation of the NH Route 111 bridges over the Merrimack River. This letter summarizes the results of the work completed for this evaluation.

### **Site Visit and Visual Deck Inspection:**

Two MJ staff members performed a visual inspection of the bridge deck and paint condition for each bridge. The inspection concurred with the current inspection condition ratings noted by the NHDOT in the September 2017 inspection reports. The NHDOT inspection report noted the Eastbound Bridge (Bridge No. 110/068) has a deck condition rating of '7' (Good). The NHDOT inspection report noted the Westbound Bridge (Bridge No. 109/068) has a deck condition rating of '6' (Satisfactory) (See Appendix 1). The overall paint condition of each bridge is in Good to Satisfactory condition with localized areas of deterioration, primarily located at the girder ends.

Specific notes and inspection photos documented by MJ staff during the bridge deck inspections are included as an attachment (See Appendix 1).

### **Bridge Deck Testing:**

MJ subcontracted with John Turner Consulting, Inc. (JTC) to perform concrete deck cores and test for strength, chloride ion content, and presence of asbestos. JTC also performed Ground Penetrating Radar (GPR) of the deck surfaces to identify potential areas of deck delamination and deterioration below the asphalt overlay. JTC provided a bridge deck map of potential delamination locations based on GPR results.

The results of the testing performed by JTC are as follows:

- Chloride Ion Content: Sixteen concrete cores were taken (eight from each bridge) and each core was tested for chloride ion content at three locations, typically at depth of roughly 1", 3", and 5". The results of the chloride ion tests are included as an attachment (See Appendix 2). The chloride ion content thresholds for initiation of any corrosion was calculated to be 0.02% by weight. The results of the tests indicate most locations are below this threshold, particularly at the 2"-3" depth where the steel reinforcement is located. Based on the results of the chloride ion content tests, the concrete bridge decks are a candidate for rehabilitation.
- Concrete Strength Tests: Four concrete cores (two from each bridge) were tested for concrete strength. All four cores tested had compression strengths greater than 6,000 psi and are sufficient based on design strengths. The concrete test report is included as an attachment (See Appendix 3).
- Asbestos: A total of fifteen bridge samples from both bridges were tested for the presence of asbestos. The asbestos test report is included as an attachment (See Appendix 4). Asbestos was NOT detected in any of the samples.
- Ground Penetrating Radar: GPR was performed on the travel way for the entire length of both bridges. The GPR evaluation indicated roughly 5% of the deck area of the Eastbound Bridge and roughly 7% of the deck area of the Westbound Bridge exhibited deterioration of the concrete. The location of these areas was primarily located at the deck ends and along the curblines. The GPR test results and deck mapping are included as an attachment (See Appendix 5). For the purposes of the estimating rehabilitation costs, the percent of deck deterioration was conservatively rounded up.

#### **Deck Rehabilitation Costs:**

MJ completed an estimate of deck rehabilitation costs for each bridge. The deck rehabilitation includes new membrane and pavement overlay, partial and full-depth concrete repairs, and construction specific costs including traffic control and mobilization. A 20% contingency is included in the estimate to account for minor items and potential changes to quantities based on actual conditions during construction. The estimated construction cost for each bridge are as follows (See Appendix 6):

- NH Route 111 Westbound (Bridge No. 109/068): \$485,000
- NH Route 111 Eastbound (Bridge No. 110/068): \$515,000

#### **Deck Replacement Costs:**

MJ completed an estimate of deck replacement costs for each bridge. The deck replacement includes deck removal, new concrete deck and sidewalk, new bridge rail, new modular deck joints, new membrane and pavement, and partial painting of structural steel. Deck replacement costs include construction specific costs including traffic control and mobilization. A 20% contingency is included in the estimate to account for minor items and potential changes to quantities based on actual conditions during construction. The estimated construction cost for each bridge are as follows (See Appendix 7):

- NH Route 111 Westbound (Bridge No. 109/068): \$3,300,000
- NH Route 111 Eastbound (Bridge No. 110/068): \$3,500,000

**Life-Cycle Cost Analysis:**

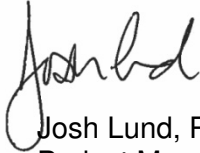
MJ completed a life-cycle cost analysis for the NH Route 111 Westbound Bridge (Bridge No. 109/068) to determine the best use of present worth dollars based on the options of deck rehabilitation versus deck replacement. The NH Route 111 Eastbound Bridge will have nearly identical results. The analysis is based on a 60-year design life cycle considering a full deck rehabilitation every 20 years after a deck replacement. The life-cycle cost analysis indicates the best use of present day funds is to proceed with a deck rehabilitation for each bridge. The life-cycle cost though does not take into account roadway user costs, future traffic control restrictions, or future funding opportunities/limitations. The life-cycle cost analysis is included as an attachment (See Appendix 8).

Based on the condition of the bridge decks and the results of the testing, we recommend both bridges have bridge rehabilitation construction completed within the next 10 years. The bridge rehabilitation will extend the serviceable life the of the bridges 20 years at which point a bridge deck rehabilitation/replacement evaluation can be completed. The satisfactory condition of the bridge decks combined with the acceptable results of the bridge deck testing and life-cycle cost analysis indicate that a bridge deck rehabilitation is the best value for the Town of Hudson.

If you have any questions regarding the enclosed information, please do not hesitate to contact me at (603) 225-2978.

Sincerely,

**McFARLAND JOHNSON, INC.**



Josh Lund, P.E.  
Project Manager

# APPENDIX 1

NHDOT INSPECTION REPORTS  
MJ VISUAL DECK INSPECTIONS



# Bridge Inspection Report

NBI Structure Number: 013101090006800

Hudson 109/068

**Date of Inspection:** 09/21/2017

**NH111 WB**

**Date Report Sent:** 12/13/2017

over

Owner: Municipality

**MERRIMACK RIVER**

Bridge Inspection Group: D-Team

**Taylor Falls Bridge**

Bridge Maintenance Crew: OTHER

**Bridge also in:** Nashua, New Hampshire

### Recommended Postings:

Weight: **E-2**

Weight Sign OK

SIGNS IN PLACE. 9/21/2017

Width: **Not Required**

Width Sign OK

Primary Height Sign Recommendation: *None*

**Clearances:** Over: 99.99

Height Sign OK

Optional Centerline Height Sign Rec: *None*

(Feet) Under: 0.00

Route: 99.99

### Condition:

Red List Status: Not on the Redlist

Deck: 6 Satisfactory

Superstructure: 7 Good

Substructure: 7 Good

Culvert: N N/A (NBI)

Sufficiency Rating: 63 %

NBI Status: Functionally Obsolete

Bridge Rail: Substandard

Rail Transition: Substandard

Bridge Approach Rail: Substandard

Approach Rail Ends: Substandard

### Structure Type and Materials:

Number of Main Spans: 4

Number of Approach Spans: 0

#### **Main Span Material and Design Type**

Steel Continuous Multiple Beam

NH Bridge Type: IB-C (I Beams w/ Concrete Deck)

Deck Type: Concrete, Cast in Place

Wearing Surface: Bituminous

Membrane: Other

Deck Protection: None

Curb Reveal: 8 in

Plan Location: 3-14-2-1

Total Bridge Length: 602.0 ft

Right Curb/Sidewalk Width: 0.7 ft

Total Bridge Width: 36.4 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 1970

Detour Length: 10.0 mi

### Bridge Dimensions:

Length Maximum Span: 173.0 ft

Left Curb/Sidewalk Width: 5.0 ft

Width Curb to Curb: 28.0 ft

Approach Roadway Width: 28.0 ft  
(W/Shoulders)

# Bridge Inspection Report

NBI Structure Number: 013101090006800

Hudson 109/068

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## Bridge Service:

Type of Service on Bridge: Highway and Pedestrian

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 16,119

Percent Trucks: 5%

Year of AADT: 2014

Future AADT: 23,856

Year of Future AADT: 2038

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: NHS Roadway on Bridge

Roadway Functional Class: Urban Principal Arterial

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Possibly eligible

Traffic Direction: One-way traffic

## Bridge Inspection Report

NBI Structure Number: 013101090006800

Hudson 109/068

## Element Details (see disclaimer below)

No.	Description	Material Notes and Condition Notes:
12	Reinforced Concrete Deck	CURB- ON SOUTH, FEW CRACKS WITH MINOR SPALLS. SIDEWALK- ON NORTH, CRACKED, SPALLED WITH LARGE DELAMINATED AREAS; SOME REPAIRED. UNDERSIDE OF DECK- MINOR CRACKS, EFFLORESCENCE, RUST STAINS, SMALL TO MEDIUM DELAMINATIONS AND LIGHT SPALL WITH REBAR EXPOSED. UNDERSIDE OF CURBS, SEVERAL LARGE DELAMINATIONS, FEW SPALLS WITH REBAR EXPOSED.
L 510	Wearing Surfaces	ASPHALT- FEW CRACKS, A COUPLE OF MEMBRANE BLISTERS ON EAST; SEVERAL ON WEST.
L 1080	Delamination/Spall/Patched Area	SEVERAL DELAMINATIONS UNDER BOTH CURBS, FEW AREAS UNDER DECK.
L 1090	Exposed Rebar	SEVERAL SMALL AREAS OF EXPOSED REBAR UNDER CURBS ON BOTH SIDES, ONE UNDER DECK.
107	Steel Open Girder/Beam	EXTERIORS FADED, AREAS OF EXPOSED METAL ON BOTTOM FLANGES, DIAPHRAGMS AND WEBS. LATERAL BRACING CONNECTION PLATE BENT AT EAST.
L 515	Steel Protective Coating	
L 1000	Corrosion	AREAS OF EXPOSED METAL WITH FRECKLED RUST.
210	Reinforced Concrete Pier Wall	TREE DEBRIS ON PIER NOSES, UPSTREAM.
L 6000	Scour	FOOTINGS AND SHEET PILE EXPOSED. SCOUR CRITICAL, CHA STUDY. WILL FURTHER INVESTIGATE PILE STABILITY DURING FLOOD EVENTS.
215	Reinforced Concrete Abutment	
L 1080	Delamination/Spall/Patched Area	TOP OF BACKWALL, NINE FOOT SPALL ON SOUTHWEST; THREE FOOT SPALL ON NORTHEAST. FOUR FOOT DELAMINATION ON INTERIOR OF SOUTHWEST CHEEKWALL; TWO FOOT DELAMINATION ON NORTHWEST INTERIOR CHEEKWALL.
234	Reinforced Concrete Pier Cap	MINOR CRACKS.
300	Strip Seal Expansion Joint	JOINTS- DEBRIS FILLED.
311	Movable Bearing	ANCHORE BOLT LIFTED ON #1 AND #3 ROCKER ON EAST ABUTMENT; ROCKERS SLIGHTLY TIPPED ON BOTH ENDS.
L 515	Steel Protective Coating	
313	Fixed Bearing	BOLT LIFTED ON BEARING #3, PIER #2 ON WEST.
L 515	Steel Protective Coating	
330	Metal Bridge Railing	RAIL- ONE BRIDGE POST DAMAGED ON SOUTHEAST, SEVERAL SCRAPES ON RAIL. FEW SECTIONS OF BALUSTERS DAMAGED AND MISSING ON NORTH.

# Bridge Inspection Report

NBI Structure Number: 013101090006800

Hudson 109/068

**Element States (see disclaimer below)**

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
12	Reinforced Concrete Deck	21,915	sq.ft	89%	11%	0%	0%
L 510	Wearing Surfaces	---	---	63%	37%	0%	0%
L 1080	Delamination/Spall/Patched Area	2,000	sq.ft	0%	100%	0%	0%
L 1090	Exposed Rebar	100	sq.ft	0%	100%	0%	0%
107	Steel Open Girder/Beam	2,408	ft	90%	10%	0%	0%
L 515	Steel Protective Coating	---	---	100%	0%	0%	0%
L 1000	Corrosion	240	each	0%	100%	0%	0%
210	Reinforced Concrete Pier Wall	75	ft	99%	1%	0%	0%
L 6000	Scour	1	ft	0%	100%	0%	0%
215	Reinforced Concrete Abutment	151	ft	88%	12%	0%	0%
L 1080	Delamination/Spall/Patched Area	18	ft	0%	100%	0%	0%
234	Reinforced Concrete Pier Cap	108	ft	100%	0%	0%	0%
300	Strip Seal Expansion Joint	72	ft	100%	0%	0%	0%
311	Movable Bearing	16	each	100%	0%	0%	0%
L 515	Steel Protective Coating	---	---	100%	0%	0%	0%
313	Fixed Bearing	4	each	100%	0%	0%	0%
L 515	Steel Protective Coating	---	---	100%	0%	0%	0%
330	Metal Bridge Railing	1,309	ft	100%	0%	0%	0%

Element Disclaimer: NHDOT is transitioning from CoRe elements to AASHTO elements. The AASHTO element data shown above is the product of the automated element migration routine from the AASHTOWare BrM software. This migrated data has undergone limited field verification. Adequate quality control of this element data is not expected to be achieved until the conclusion of the 2020 inspection season. Please utilize element data with caution.

**Bridge Notes:**

SERVI-LIFT USED 6/15/05, 8/19/09 10/7/13, 9/21/17

UNDERWATER INSPECTION 6/23/2010. DMB UNDERWATER INSPECTION COMMENTS- PIERS ONLY INSPECTED.

CONCRETE IN GOOD CONDITION WITH ONLY MINOR DEFECTS. PIERS ARE SUBJECT TO SCOUR WITH HOLES UP TO 12' MEASURED ALONG STEEL SHEET PILE. NO UNDERMINING OBSERVED. A COMPARISON WITH PRIOR REPORTS INDICATES NO SIGNIFICANT CHANGE FROM 5 YEARS AGO. PIER #1 HAS SOME EXPOSED CONCRETE FOOTING ON THE EAST SIDE. P#2 HAS EXPOSED CONCRETE FOOTING ALL AROUND AS WELL AS SHEET PILE EXPOSURE AT THE SOUTH END AND SE CORNER. P#3 HAS EXPOSED CONCRETE FOOTING ALL AROUND AS WELL AS EXPOSED SHEET PILE ALONG THE WEST SIDE AND THE SOUTH END. ONE AREA HAS PULLED AWAY FROM CONCRETE ABOUT 12". WATER DEPTHS AROUND P#1 RANGE FROM 5' TO 7.9'. DEPTHS AROUND P#2 RANGE FROM 13.9' TO 18'. DEPTHS AROUND P#3 RANGE FROM 4.0' TO 15'. REFERENCE ELEVATION 6.6' FROM TOP OF EXPOSED FOOTING AT THE SW CORNER OF P#2 TO WATERLINE.

FLOOD EVENT 8/28-29/2011. SCOUR CRITICAL POST FLOOD EVENT INSPECTION, 9/1/11.

**Inspection Notes:** 09/21/2017

BTB inspection comments-

DECK: ASPHALT- FEW CRACKS, A COUPLE OF MEMBRANE BLISTERS ON EAST; SEVERAL ON WEST. CURB- ON SOUTH, FEW CRACKS WITH MINOR SPALLS. SIDEWALK- ON NORTH, CRACKED, SPALLED WITH LARGE DELAMINATED AREAS; SOME REPAIRED.

UNDERSIDE OF DECK- MINOR CRACKS, EFFLORESCENCE, RUST STAINS, SMALL TO MEDIUM DELAMINATIONS AND MINOR TO LIGHT SPALLS WITH REBAR EXPOSED. UNDERSIDE OF CURBS, SEVERAL LARGE DELAMINATIONS, FEW SPALLS WITH REBAR EXPOSED.

JOINTS- DEBRIS FILLED. RAIL- ONE BRIDGE POST DAMAGED ON SOUTHEAST, SEVERAL SCRAPES ON RAIL. FEW SECTIONS OF BALUSTERS DAMAGED AND MISSING ON NORTH.

SUPERSTRUCTURE: GIRDERS- EXTERIORS FADED, AREAS OF EXPOSED METAL ON BOTTOM FLANGES, DIAPHRAGMS AND WEBS. LATERAL BRACING CONNECTION PLATE BENT AT EAST.

SUBSTRUCTURE: ABUTMENTS- TOP OF BACKWALL SPALLED ALONG JOINT BOTH SIDES. CHEEKWALL SPALLED AT BASE WITH SMALL AREA OF REBAR EXPOSED ON SOUTHWEST. LARGE DELAMINATION ON INTERIOR OF SOUTHWEST CHEEKWALL; SMALL DELAMINATION ON NORTHWEST INTERIOR CHEEKWALL.

PICTURES: D208-

09. TOP OF BACKWALL SPALLED ALONG EAST JOINT.

10. UNDERSIDE OF CURB SPALLED AT NORTH, TYPICAL OF SOUTH.

11. AREAS OF EXPOSED METAL ON BOTTOM FLANGES, DIAPHRAGMS AND WEBS.

12. BOLT LIFTED ON BEARING #3, PIER #2 ON WEST.

13. DELAMINATIONS UNDER NORTH CURB, TYPICAL OF SOUTH.

14. DELAMINATION IN BAY #2, SPAN #2.

15. TWO DELAMINATIONS IN BAY #3, SPAN #1.

16. TOP OF BACKWALL SPALLED ALONG WEST JOINT.

# Bridge Inspection Report

Hudson 109/068

NBI Structure Number: 013101090006800

**Previous Inspection Notes:** 09/23/2015

NJL inspection comments-

DECK: ASPHALT- FEW CRACKS, A COUPLE OF MEMBRANE BLISTERS ON EAST; SEVERAL ON WEST. CURB- ON SOUTH, FEW CRACKS WITH MINOR SPALLS. SIDEWALK- ON NORTH, CRACKED, SPALLED WITH LARGE DELAMINATED AREAS; SOME REPAIRED. RAIL- ONE BRIDGE POST DAMAGED ON SOUTHEAST, SEVERAL SCRAPES ON RAIL. FEW SECTIONS OF BALUSTERS DAMAGED AND MISSING ON NORTH. JOINTS- MINOR SPALLS IN CONCRETE ARMOR PROTECTION ON EAST ; LARGE SPALLS ON WEST. DEBRIS FILLED. SOFFIT- MINOR CRACKS, EFFLORESCENCE, RUST STAINS, SMALL TO MEDIUM DELAMINATIONS AND MINOR TO LIGHT SPALLS WITH REBAR EXPOSED. UNDERSIDE OF NORTH CURB SPALLED WITH REBAR EXPOSED.

SUPERSTRUCTURE: GIRDERS- PAINT PEELING IN AREAS. LATERAL BRACING CONNECTION PLATE BENT AT EAST. MINOR SCALE AT EXTERIORS.

SUBSTRUCTURE: ABUTMENTS- CHEEKWALL SPALLED AT BASE WITH SMALL AREA OF REBAR EXPOSED ON SOUTHWEST. LARGE DELAMINATION ON INTERIOR OF SOUTHWEST CHEEKWALL; SMALL DELAMINATION ON NORTHWEST INTERIOR CHEEKWALL.

PICTURES: D169-

85. SEVERAL MEMBRANE BLISTERS AT WEST.

86. LARGE SPALLS IN CONCRETE ARMOR PROTECTION ON WEST DEPARTURE.

87. LARGE DELAMINATION ON INTERIOR OF SOUTHWEST CHEEKWALL.

**Approach and Roadway Notes:**

APPROACH ASPHALT- CRACKED, SETTLED ON BOTH ENDS EXPOSING EDGE OF JOINT ARMOR; POTHOLED ON WEST. RAIL POSTS LOOSE AT NORTHEAST DUE TO IMPACT. NORTHEAST AND SOUTHWEST TERMINAL ENDS WITH CRACKED WELDS.

**Unusual or experimental features:**

**Inspection History**

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
09/21/2017	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
09/23/2015	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
06/29/2015	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
10/07/2013	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
08/08/2013	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
09/01/2011	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
08/17/2011	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
06/23/2010	DMB	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
08/19/2009	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
08/10/2007	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
06/15/2005	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
10/02/2003	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
07/12/2001	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
11/05/1999	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
07/01/1997		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
10/01/1995		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
11/01/1993		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
09/01/1991		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	8	8	N	<input type="checkbox"/>	E-2

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	60

# Bridge Inspection Report

NBI Structure Number: 013101100006800

Hudson 110/068

Date of Inspection: 09/21/2017

NH111 EB

Date Report Sent: 12/13/2017

over

Owner: Municipality

MERRIMACK RIVER

Bridge Inspection Group: D-Team

Taylor Falls Bridge

Bridge Maintenance Crew: OTHER

Bridge also in: Nashua, New Hampshire

### Recommended Postings:

Weight: **E-2**

Weight Sign OK

SIGNS IN PLACE. 9/21/2017

Width: **Not Required**

Width Sign OK

Primary Height Sign Recommendation: *None*

Clearances: Over: 99.99

Height Sign OK

Optional Centerline Height Sign Rec: *None*

(Feet) Under: 0.00

Route: 99.99

### Condition:

Red List Status: Not on the Redlist

Deck: 7 Good

Superstructure: 7 Good

Substructure: 7 Good

Culvert: N N/A (NBI)

Sufficiency Rating: 63 %

NBI Status: Functionally Obsolete

Bridge Rail: Substandard

Rail Transition: Substandard

Bridge Approach Rail: Substandard

Approach Rail Ends: Substandard

### Structure Type and Materials:

Number of Main Spans: 4

Number of Approach Spans: 0

#### Main Span Material and Design Type

Steel Continuous Multiple Beam

NH Bridge Type: IB-C (I Beams w/ Concrete Deck)

Deck Type: Concrete, Cast in Place

Wearing Surface: Bituminous

Membrane: Other

Deck Protection: None

Curb Reveal: 8 in

Plan Location: 4-2-1-1

Total Bridge Length: 602.0 ft

Right Curb/Sidewalk Width: 0.8 ft

Total Bridge Width: 36.4 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 1973

Detour Length: 10.0 mi

### Bridge Dimensions:

Length Maximum Span: 173.0 ft

Left Curb/Sidewalk Width: 5.0 ft

Width Curb to Curb: 28.0 ft

Approach Roadway Width: 28.0 ft

(W/Shoulders)

# Bridge Inspection Report

NBI Structure Number: 013101100006800

Hudson 110/068

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## Bridge Service:

Type of Service on Bridge: Highway and Pedestrian

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 16,119

Percent Trucks: 5%

Year of AADT: 2014

Future AADT: 23,856

Year of Future AADT: 2038

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: NHS Roadway on Bridge

Roadway Functional Class: Urban Principal Arterial

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Possibly eligible

Traffic Direction: One-way traffic

## Bridge Inspection Report

NBI Structure Number: 013101100006800

Hudson 110/068

## Element Details (see disclaimer below)

No.	Description	Material Notes and Condition Notes:
12	Reinforced Concrete Deck	SIDEWALK- SMALL SPALLS ALONG GRANITE CURB. CURB- LIGHT CRACKS. UNDERSIDE OF DECK- SEVERAL FINE TRANSVERSE CRACKS WITH EFFLORESCENCE, MINOR SPALLS. FULL DEPTH PATCH IN SPAN #1, BAY #2; NO LEAKAGE. FINE CRACKS, RUST STAINED AND LIGHT EFFLORESCENCE UNDER CURBS.
L 510	Wearing Surfaces	ASPHALT- FEW CRACKS, SEVERAL AREAS OF HOLLOW SOUNDING CIRCULAR MEMBRANE FAILURES.
L 1120	Efflorescence/Rust Staining	FINE CRACKS WITH EFFLORESCENCE UNDER DECK AND CURB FASCIA.
107	Steel Open Girder/Beam	EXTERIORS FADED, LIGHT PAINT PEELING WITH MINOR RUST. PACK RUST DEVELOPING ON ALL EXTERIOR CONNECTION PLATES, PACK RUST APPROXIMATELY 3/8"+. MINOR CRACK IN HORIZONTAL STIFFENER WELD IN SPAN TWO, STRINGER THREE; EAST OF X FRAME #4. TOP OF BOTTOM FLANGE, GUANO COVERED IN AREAS
L 515	Steel Protective Coating	
L 1000	Corrosion	FRECKLED RUST IN AREAS.
L 1020	Connection	CREVICE CORROSION DEVELOPING AT BASE OF ALL EXTERIOR CONNECTION PLATES WITH APPROXIMATELY 3/8"+ OF PACK RUST.
152	Steel Floor Beam	FLOOR BEAMS- LOCATED IN SPAN #4, BAY #4.
L 515	Steel Protective Coating	
210	Reinforced Concrete Pier Wall	CONCRETE IN GOOD CONDITION WITH ONLY MINOR DEFECTS. PIERS ARE SUBJECT TO SCOUR WITH HOLES UP TO 10' MEASURED ALONG STEEL SHEET PILE. NO UNDERMINING OBSERVED.
215	Reinforced Concrete Abutment	MINOR CRACKS.
L 6000	Scour	FOOTING AND SHEET PILE EXPOSURE AT PIER #2. FOOTING EXPOSED PIER #3.
234	Reinforced Concrete Pier Cap	<i>Element record added 2013-10-08.</i> FINE CRACKS.
300	Strip Seal Expansion Joint	DEBRIS FILLED. LIGHT TO MODERATE GOUGES IN JOINT ARMOR ON WEST.
311	Movable Bearing	ROCKER #5 RUSTED UNDER WEEPER LEAKAGE ON NORTHWEST.
L 515	Steel Protective Coating	
313	Fixed Bearing	PAINT PEELING.
L 515	Steel Protective Coating	
330	Metal Bridge Railing	<b>** 2-Bar Aluminum **</b> RAIL- FEW SCRAPES AND MINOR GOUGES. SEVERAL AREAS OF MISSING OR LOOSE BALUSTERS. MODERATE DAMAGE ON POST AND RAIL, NORTHWEST. TOP RAIL CRACKED OVER JOINT, SOUTHEAST.



**Bridge Inspection Report**

NBI Structure Number: 013101100006800

Hudson 110/068

**Element States (see disclaimer below)**

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
12	Reinforced Concrete Deck	21,915	sq.ft	90%	10%	0%	0%
L 510	Wearing Surfaces	---	---	83%	17%	0%	0%
L 1120	Efflorescence/Rust Staining	2,191	sq.ft	0%	100%	0%	0%
107	Steel Open Girder/Beam	3,061	ft	97%	3%	0%	0%
L 515	Steel Protective Coating	---	---	100%	0%	0%	0%
L 1000	Corrosion	60	each	0%	100%	0%	0%
L 1020	Connection	24	ft	0%	100%	0%	0%
152	Steel Floor Beam	49	ft	100%	0%	0%	0%
L 515	Steel Protective Coating	---	---	100%	0%	0%	0%
210	Reinforced Concrete Pier Wall	112	ft	100%	0%	0%	0%
215	Reinforced Concrete Abutment	174	ft	100%	0%	0%	0%
L 6000	Scour	1	ft	100%	0%	0%	0%
234	Reinforced Concrete Pier Cap	106	ft	100%	0%	0%	0%
300	Strip Seal Expansion Joint	73	ft	90%	10%	0%	0%
311	Movable Bearing	20	each	95%	5%	0%	0%
L 515	Steel Protective Coating	---	---	100%	0%	0%	0%
313	Fixed Bearing	5	each	100%	0%	0%	0%
L 515	Steel Protective Coating	---	---	100%	0%	0%	0%
330	Metal Bridge Railing	1,302	ft	100%	0%	0%	0%

Element Disclaimer: NHDOT is transitioning from CoRe elements to AASHTO elements. The AASHTO element data shown above is the product of the automated element migration routine from the AASHTOWare BrM software. This migrated data has undergone limited field verification. Adequate quality control of this element data is not expected to be achieved until the conclusion of the 2020 inspection season. Please utilize element data with caution.

**Bridge Notes:**

LIFT USED 7/12/01, 6/15/05, 8/19/09, 10/8/13, 9/21/17

UNDERWATER INSPECTION 6/23/2010. DMB UNDERWATER INSPECTION COMMENTS- PIERS ONLY INSPECTED.

CONCRETE IN GOOD CONDITION WITH ONLY MINOR DEFECTS. PIERS ARE SUBJECT TO SCOUR WITH HOLES UP TO 10' MEASURED ALONG STEEL SHEET PILE. NO UNDERMINING OBSERVED. PIER #1 NOW HAS NO EXPOSED CONCRETE FOOTING. P#2 HAS EXPOSED CONCRETE FOOTING ALL AROUND AS WELL AS SHEET PILE EXPOSURE EXCEPT AT THE SE CORNER. P#3 HAS EXPOSED CONCRETE FOOTING ALL AROUND. WATER DEPTHS AROUND P#1 RANGE FROM 5' TO 10.0'. DEPTHS AROUND P#2 RANGE FROM 9.0' TO 19'. DEPTHS AROUND P#3 RANGE FROM 3.5' TO 6.0'. 18.0' TO 19' DEPTH AT NORTH PIER NOSE #2 AND ALONG WEST SIDE OF P#2. REFERENCE ELEVATION 6.7' FROM TOP OF EXPOSED FOOTING AT THE SW CORNER OF P#2 TO WATERLINE.

**Inspection Notes: 09/21/2017**

NJL inspection comments -

DECK: ASPHALT- FEW CRACKS, SEVERAL AREAS OF HOLLOW SOUNDING CIRCULAR MEMBRANE FAILURES. SIDEWALK-SMALL SPALLS ALONG GRANITE CURB. CURB- LIGHT CRACKS. UNDERSIDE OF DECK- SEVERAL FINE TRANSVERSE CRACKS WITH EFFLORESCENCE, MINOR SPALLS. FULL DEPTH PATCH IN SPAN #1, BAY #2; NO LEAKAGE. FINE CRACKS, RUST STAINED AND LIGHT EFFLORESCENCE UNDER CURBS. JOINTS- DEBRIS FILLED. LIGHT TO MODERATE GOUGES ON WEST. RAIL- FEW SCRAPES AND MINOR GOUGES. SEVERAL AREAS OF MISSING OR LOOSE BALUSTERS. MODERATE DAMAGE ON POST AND RAIL, NORTHWEST. TOP RAIL CRACKED OVER JOINT, SOUTHEAST.

SUPERSTRUCTURE: GIRDERS- EXTERIORS FADED, LIGHT PAINT PEELING WITH MINOR RUST. PACK RUST DEVELOPING ON ALL EXTERIOR CONNECTION PLATES, PACK RUST APPROXIMATELY 3/8"+. MINOR CRACK IN HORIZONTAL STIFFENER WELD IN SPAN TWO, STRINGER THREE; EAST OF X FRAME #4. TOP OF BOTTOM FLANGE, GUANO COVERED IN AREAS

SUBSTRUCTURE: ABUTMENTS- MINOR CRACKS. PIERS- SEE UNDERWATER INSPECTION.

PICTURES: D208-

04. WEEPER BROKEN OFF NEAR NORTHWEST ABUTMENT WITH LEAKAGE ONTO #5 MOVEABLE BEARING CREATING LIGHT SCALE.

05. PACK RUST DEVELOPING ON EXTERIOR CONNECTION PLATE IN SPAN #1, TYPICAL OF ALL EXTERIORS; PACK RUST APPROXIMATELY 3/8"+.

06. VIEW OF UNDERSIDE OF DECK IN SPAN #1, FINE TRANSVERSE CRACKS WITH EFFLORESCENCE; FULL DEPTH PATCH SOUND.

07. BOLT BROKEN OFF FIXED BEARING #3, PIER #2 ON EAST.

08. VIEW OF UNDERSIDE OF DECK IN SPAN #3, FINE TRANSVERSE CRACKS WITH EFFLORESCENCE.

# Bridge Inspection Report

Hudson 110/068

NBI Structure Number: 013101100006800

**Previous Inspection Notes:** 09/23/2015

KLM inspection comments -

DECK: ASPHALT- SEVERAL AREAS OF HOLLOW SOUNDING CIRCULAR MEMBRANE FAILURES. SIDEWALK- MINOR TO LIGHT SPALLS AND DELAMINATIONS. RAIL- TOP RAIL- SCRAPES. CRACKED OVER JOINT, SOUTHEAST. BOTTOM RAIL SCRAPED AND MINOR GOUGES. SEVERAL AREAS OF MISSING OR LOOSE BALUSTERS. MODERATE DAMAGE ON POST AND RAIL, NORTHWEST. SOFFIT- CRACKS, EFFLORESCENCE AND MINOR SPALLS. FULL DEPTH PATCH IN SPAN #1, BAY #2. FEW CRACKS, RUST STAINED AND LIGHT LEAKING AT EXTERIORS. JOINTS- DEBRIS FILLED. LIGHT TO MODERATE GOUGES ON WEST.  
SUPERSTRUCTURE: GIRDERS- PAINT PEELING, LIGHT RUST AND GUANO COVERED. CRACK IN HORIZONTAL STIFFENER WELD IN SPAN TWO, STRINGER THREE, EAST OF X FRAME #4.  
SUBSTRUCTURE: ABUTMENTS- MINOR CRACKS. PIERS- SEE UNDERWATER INSPECTION.

PICTURES: D169-

- 88. POST AND RAIL DAMAGED ON NORTHWEST.
- 89. SIDEWALK PLATE HOLED NEAR POLE #4.

**Approach and Roadway Notes:**

APPROACH ASPHALT- CRACKED, PATCHED AND SETTLED ON WEST EXPOSING EDGE OF JOINT ARMOR. MINOR CRACKS ON EAST.  
APPROACH RAIL- MODERATE DAMAGE ON NORTHWEST.

**Inspection History**

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
09/21/2017	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
09/23/2015	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
06/29/2015	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
10/08/2013	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
08/08/2013	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
08/17/2011	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
06/23/2010	DMB	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
08/19/2009	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
08/10/2007	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
06/15/2005	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
10/02/2003	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
07/12/2001	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
07/01/1997		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
10/01/1995		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
11/01/1993		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	8	8	N	<input type="checkbox"/>	E-2
09/01/1991		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	8	8	N	<input type="checkbox"/>	E-2

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	60

# NH Route 111 Westbound (Bridge No. 109/068)

## Bridge Inspection Summary

Inspection Date: 8/7/2018

Weather: Sunny, 100deg

Inspected By: DRW & SFD

### **INSPECTION NOTES:**

#### **Wearing Surface:**

- Wearing surface is in overall satisfactory condition with minor rutting in travel lanes and minor longitudinal cracking full bridge length
- Wearing surface around west bridge expansion joint is in poor condition with large deteriorated and patched areas, creating an uneven surface

#### **Bridge Rail:**

- Bridge rail on sidewalk has minor scraping/plow damage full length.

#### **Bridge Joints:**

- Expansion joints at each end are in satisfactory condition with minor accumulation of dirt and debris.
- SW corner of west expansion joint has moderate spalling of concrete around joint armor that has been patched with asphalt.
- Neither expansion joint shows signs of leaking

#### **Deck:**

- Topsides of both curb and sidewalk are in overall satisfactory/fair condition with scattered locations of minor spalling (no exposed rebar).
- There is minor spalling along the backside of granite curbing full length of both curblines.
- Deck fascias are in satisfactory condition with uniformly spaced popoffs with exposed rebar.
- Deck undersides are in overall good condition with minor transverse hairline cracking.

#### **Superstructure:**

- Steel girders and paint system are in overall satisfactory condition with minor paint freckling on 40% of bottom flanges and exposed webs of exterior girders.
- Girder ends are in overall good condition with only minor surface rust forming on bottom flanges and end diaphragms.



Photo 1 – Elevation view looking south



Photo 2 – Elevation view looking north



Photo 3 – Approach roadway looking east



Photo 4 – Approach roadway looking west



Photo 5 – Typical condition of sidewalk. Note areas of deteriorated concrete and cracking in concrete.



Photo 6 – 3'x4'x1" spall on sidewalk. There are several other similar locations.



Photo 7 – View of east expansion joint. Note minor cracking in wearing surface on approach and minor spalling of concrete around joint armor.



Photo 8 – Close-up view of east expansion joint. Note accumulation of dirt and debris.



Photo 9 – View of west expansion joint. Note poor condition of wearing surface on approach roadway. Also note the spalled and patched section of concrete on the south end of the joint.



Photo 10 – View of SW corner of bridge at west expansion joint. Wearing surface has popped off, exposing the waterproofing membrane. Also note the accumulation of dirt and debris.





Photo 11 – Typical view of bridge wearing surface. Wearing surface exhibits minor rutting and cracking, with a longitudinal crack full bridge length at center of roadway.



Photo 12 – Typical deck underside in good condition. Note paint freckling of 50% of bottom flange surface along full length of girder.



Photo 13 – View of typical girder end condition at west abutment. Note minor surface rust and freckling of paint on bottom flange.



Photo 14 – View showing uniformly spaced popoffs with exposed rebar along length of deck overhang.



Photo 15 – View showing all bays of superstructure. Note steel girder paint system in satisfactory condition with only minor paint freckling along bottom of girder flanges and lower chord members.



Photo 16 – View showing typical deck underside in good condition in the eastern span.



Photo 17 – View showing typical girder end conditions at the east abutment

# NH Route 111 Eastbound (Bridge No. 110/068)

## Bridge Inspection Summary

Inspection Date: 8/8/2018

Weather: Sunny, 85deg

Inspected By: DRW

### INSPECTION NOTES:

#### Wearing Surface:

- Wearing surface is rutted in travel lanes with minor longitudinal cracking full bridge length
- There are scattered areas of wearing surface popoffs, and areas that have been patched
- Wearing surface around west bridge expansion joint is in poor condition with full width, full depth transverse cracking and popoffs and exposed backwall concrete. Similar but less significant at east expansion joint.

#### Bridge Rail:

- Bridge rail on sidewalk has minor scraping/plow damage full length. There are several locations where the balusters are bent or missing.
- Bridge rail at NW corner of bridge has been impacted by a vehicle. The bolts on the first bridge post have been damaged.

#### Bridge Joints:

- Expansion joints at each end are in satisfactory condition with minor accumulation of dirt and debris.
- Joint armor at each end has minor plow damage.
- NW corner of west expansion joint shows signs of leaking onto bridge seat below.
- East expansion joint shows no signs of leaking

#### Deck:

- Topsides of both curb and sidewalk are in overall satisfactory condition with minor spalling (no exposed rebar).
- There is minor spalling along the backside of granite curbing full length of both curblines.
- Scuppers are clogged and require cleanout.
- Deck fascias are in good condition with no spalling
- Deck undersides are in overall good condition with minor transverse hairline cracking and efflorescence staining.

#### Superstructure:

- Steel girders and paint system are in overall good condition with minor scattered areas of paint freckling.
- North exterior girder end at west abutment has surface rusting due to joint leakage.



Photo 1 – Typical elevation view looking south



Photo 2 – Elevation view looking north



Photo 3 – Approach roadway looking east



Photo 4 – Approach roadway looking west



Photo 5 – Typical condition of southern bridge rail on sidewalk. Note scrape damage from plows on rail. There are several locations of bent or missing balusters.



Photo 6 – Damaged bridge rail from vehicular impact on northern curb near northwest corner.





**Photo 7 – Damaged bridge rail from vehicular impact on northern curb near northwest corner. Note that all bolts connecting post to curb have been popped. Also note poor condition of concrete curb.**



**Photo 8 – Typical sidewalk condition. There are several similar locations of spalling. Note spalling along backside of granite curbing; this is typical each side full length of bridge.**



Photo 9 – View of west expansion joint in southern lane. Note full width, full depth transverse crack over backwall width popoffs and exposed concrete backwall.



Photo 10 – View of west expansion joint in northern lane. Note full width, full depth transverse crack over backwall with popoffs and exposed concrete backwall. Note accumulation of dirt at NW bridge corner



Photo 11 – View of east expansion joint. Note minor transverse cracking in wearing surface over backwall. Note minor wearing surface popoffs along joint armor. Note minor accumulation of dirt and debris in joint.



Photo 12 – View showing typical wearing surface condition. Note rutting and longitudinal cracking in travel ways. Also note scattered areas of wearing surface popoffs and patching.



**Photo 13 – Typical deck underside condition in western end span. Note minor hairline transverse cracks with efflorescence staining. Also note scattered locations of steel paint freckling.**



**Photo 14 – View showing condition of northwest exterior girder end bearing. Note paint failure and rusting of girder end due to the leaking expansion joint above. This is not typical, other girder ends are in better condition.**



Photo 15 – View showing typical condition girder end condition besides north exterior girder at west abutment. Note only minor scattered paint freckling on girders and end diaphragms.



Photo 16 – View of typical deck fascia in good condition. This is typical both sides, full length.



Photo 17 – View showing typical condition of deck underside in east span. Note only minor hairline cracking with efflorescence staining. Also note steel paint system in good condition.



Photo 18 – Elevation view of east abutment. Note girder ends are in good condition with no signs of leakage from expansion joint above. Also note center girder is blackened from a fire under the bridge.

# APPENDIX 2

CHLORIDE ION CONTENT



## Summary of Chloride Ion Content ASTM C1218

**CLIENT:** McFarland Johnson

**PROJECT:** Bridge Deck Evaluations  
Hudson, NH

**DATE:** August 31, 2018

**REPORT #:** 18-20-034-001D

**Date Cored:** 8-7-18 and 8-8-18

**Date Received:** 8/10/2018

**Lab Technician:** Ted Moody

**Reviewed By:** Jeff Young

Specimen #	Depth from Surface (in.)	Temperature (C°)	Chloride Ion Content (% by weight of Concrete)
C-1	1	33.0	0.024
C-1	3	31.0	0.009
C-1	4	31.1	0.002
C-3	1	33.7	0.003
C-3	2.5	31.4	0.006
C-3	3.75	31.7	0.007
C-4	1	31.7	0.005
C-4	2.75	31.7	0.002
C-4	4	31.7	0.003
C-5	1	31.6	0.003
C-5	2	31.7	0.005
C-5	4	31.7	0.003
C-6	1	30.3	0.073
C-6	3	29.7	0.044
C-6	4.75	29.7	0.025
C-7	1	24.9	0.013
C-7	3	24.8	0.025
C-7	4.75	25.0	0.016

**REMARKS:** ACI 318-83 has established well known criteria relative to the allowable soluble chloride content for reinforced concrete exposed to chloride ions in service. The corrosion threshold is the amount of chloride ion that must be present in concrete, along with ample moisture and oxygen, for corrosion to begin. The threshold limit for corrosion to be possible for this application of reinforced concrete is 0.15 percent by weight of the portland cement within the concrete. Assuming the concrete had 600 pounds of portland cement and a unit weight of 150 lb/ft<sup>3</sup> gives a threshold chloride content of 0.02 percent by weight of the concrete.





**Summary of Chloride Ion Content  
ASTM C1218**

**CLIENT:** McFarland Johnson

**PROJECT:** Bridge Deck Evaluations  
Hudson, NH

**DATE:** August 31, 2018

**REPORT #:** 18-20-034-001D

**Date Cored:** 8-7-18 and 8-8-18

**Date Received:** 8/10/2018

**Lab Technician:** Ted Moody

**Reviewed By:** Jeff Young

Specimen #	Depth from Surface (in.)	Temperature (C°)	Chloride Ion Content (% by weight of Concrete)
C-8	1	25.6	0.027
C-8	3	29.2	0.029
C-8	5	34.1	0.026
C-9	1	34.8	0.107
C-9	3	33.8	0.055
C-9	5	34.7	0.024
C-12	1	34.6	0.016
C-12	3	33.2	0.007
C-12	5	34.3	0.005
C-13	1	34.9	0.075
C-13	3	34.1	0.029
C-13	4.5	33.3	0.019
C-14	1	33.6	0.018
C-14	3	33.6	0.009
C-14	5	33.8	0.008
C-15	1	33.3	0.009
C-15	3	34.1	0.008
C-15	4.5	33.7	0.010

**REMARKS:** ACI 318-83 has established well known criteria relative to the allowable soluble chloride content for reinforced concrete exposed to chloride ions in service. The corrosion threshold is the amount of chloride ion that must be present in concrete, along with ample moisture and oxygen, for corrosion to begin. The threshold limit for corrosion to be possible for this application of reinforced concrete is 0.15 percent by weight of the portland cement within the concrete. Assuming the concrete had 600 pounds of portland cement and a unit weight of 150 lb/ft<sup>3</sup> gives a threshold chloride content of 0.02 percent by weight of the concrete.



**Summary of Chloride Ion Content  
ASTM C1218**

**CLIENT:** McFarland Johnson

**PROJECT:** Bridge Deck Evaluations  
Hudson, NH

**DATE:** August 31, 2018

**REPORT #:** 18-20-034-001D

**Date Cored:** 8-7-18 and 8-8-18

**Date Received:** 8/10/2018

**Lab Technician:** Ted Moody

**Reviewed By:** Jeff Young

Specimen #	Depth from Surface (in.)	Temperature (C°)	Chloride Ion Content (% by weight of Concrete)
C-16	1	33.7	0.015
C-16	3	33.9	0.010
C-16	4.75	33.0	0.011
C-17	1	34.1	0.047
C-17	3	34.6	0.009
C-17	5	34.7	0.007
C-19	1	30.6	0.023
C-19	3	32.3	0.021
C-19	5	31.2	0.018
C-20	1	30.8	0.067
C-20	3	31.4	0.048
C-20	5	30.0	0.018

**REMARKS:** ACI 318-83 has established well known criteria relative to the allowable soluble chloride content for reinforced concrete exposed to chloride ions in service. The corrosion threshold is the amount of chloride ion that must be present in concrete, along with ample moisture and oxygen, for corrosion to begin. The threshold limit for corrosion to be possible for this application of reinforced concrete is 0.15 percent by weight of the portland cement within the concrete. Assuming the concrete had 600 pounds of portland cement and a unit weight of 150 lb/ft<sup>3</sup> gives a threshold chloride content of 0.02 percent by weight of the concrete.

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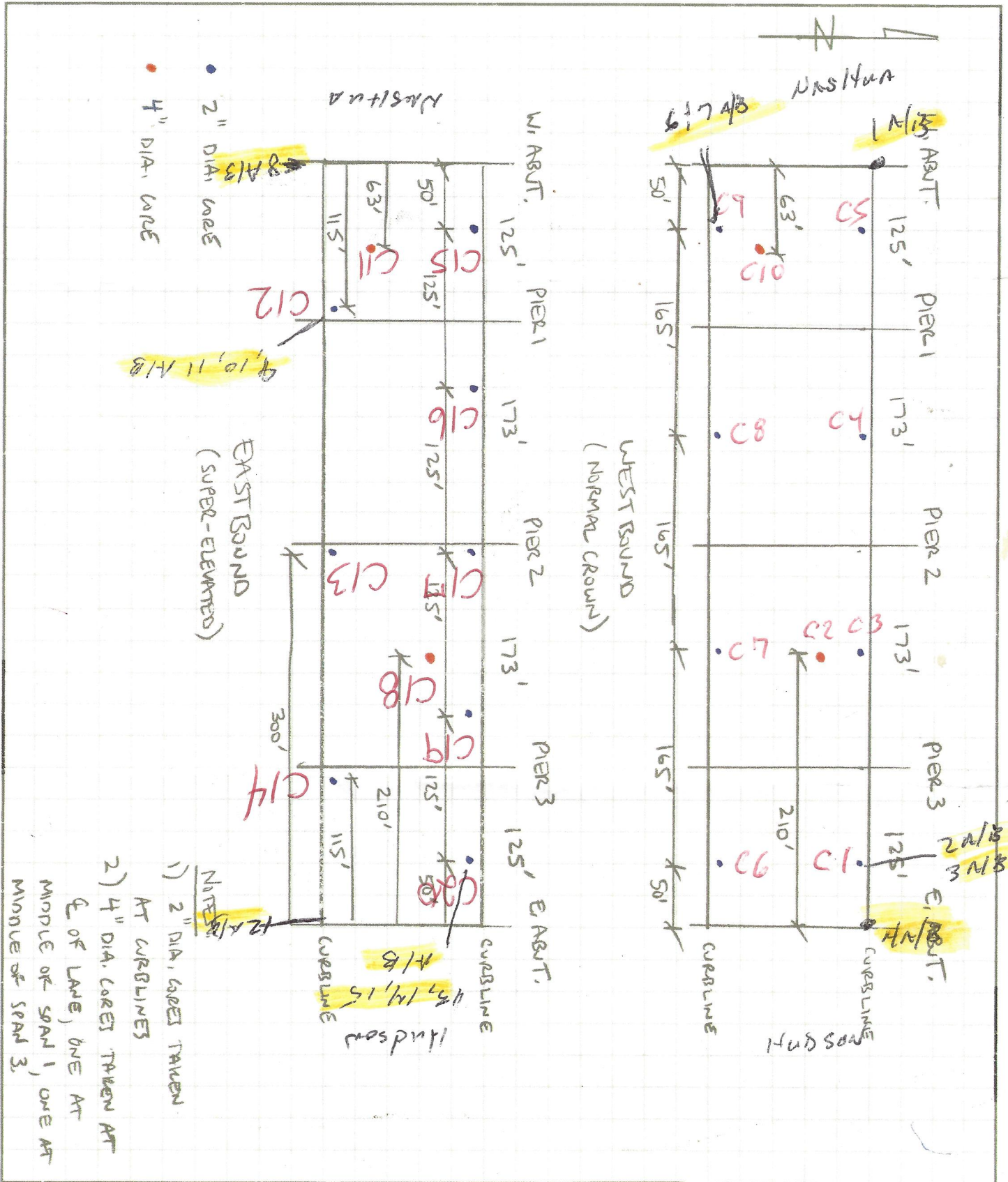
Engineering, Planning & Construction Administration  
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SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_

CALCULATED BY JAL DATE \_\_\_\_\_

CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

SCALE DECK CORE LAYOUT PLAN



- NOTES
- 1) 2" DIA. CORES TAKEN AT CURBLINES
  - 2) 4" DIA. CORES TAKEN AT 1/2 OF LANE, ONE AT MIDDLE OF SPAN 1, ONE AT MIDDLE OF SPAN 3.

# APPENDIX 3

CONCRETE STRENGTH



## Summary of Compressive Strength of Cored Concrete Cylinders ASTM C42

**CLIENT:** McFarland Johnson

**PROJECT:** Bridge Deck Evaluations  
Hudson, NH

**DATE:** August 31, 2018

**REPORT #:** 18-20-034-001E

**Field Representative:** Michael Vantran

**Date Cored:** 8-7-18 and 8-8-18

**Date Received:** 8/10/2018

**Lab Technician:** Ted Moody

**Reviewed By:** Jeff Young

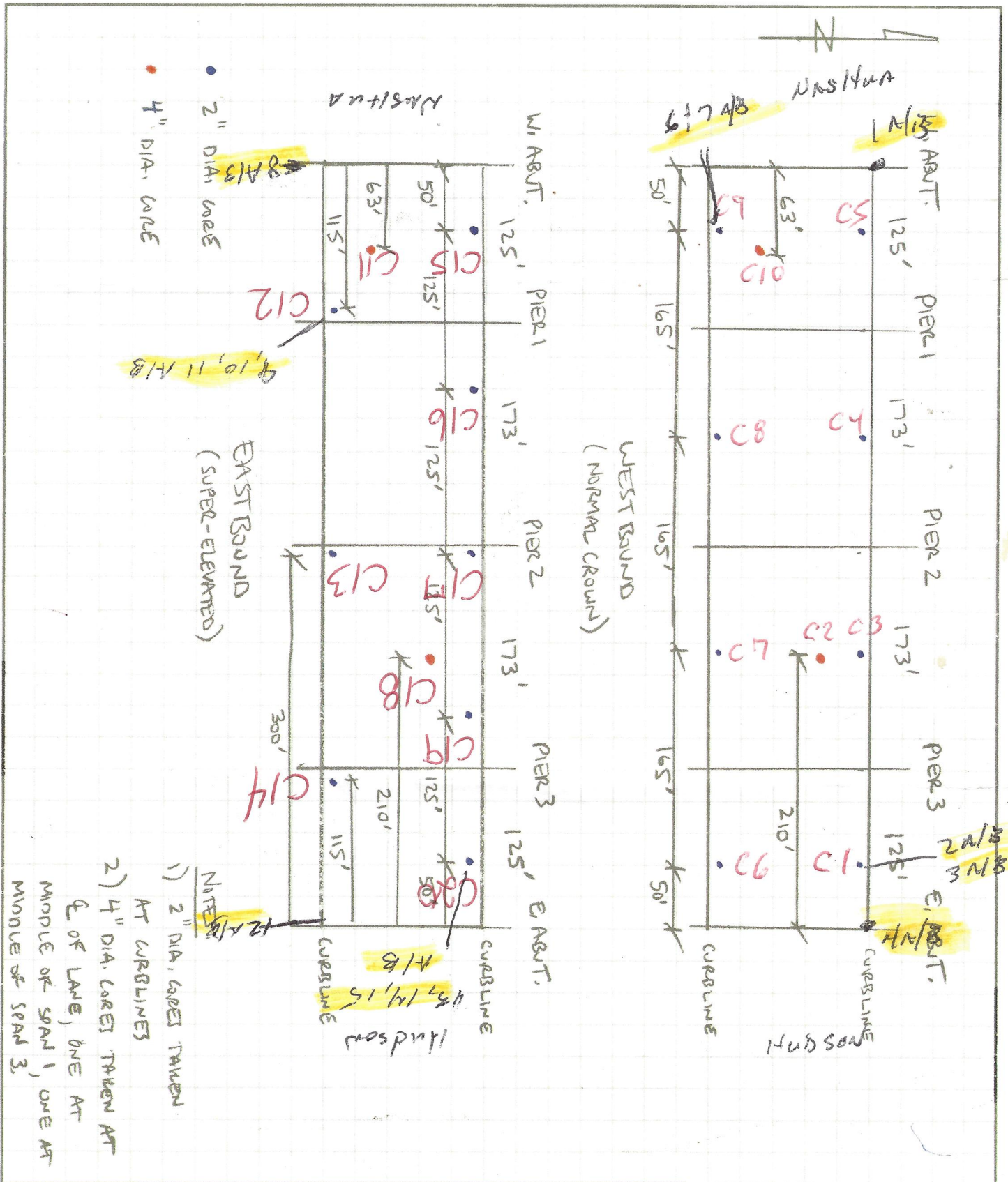
Sample ID	Date Broken	Area (in <sup>2</sup> )	L/D Ratio	Load	Correction Factor	Compressive Strength (PSI)	Break Type
C-2	8/13/2018	7.07	2.000	45550	1.00	6440	3
C-10	8/13/2018	7.07	2.000	43920	1.00	6210	3
C-11	8/13/2018	7.07	2.000	43200	1.00	6110	3
C-18	8/13/2018	7.07	2.000	46670	1.00	6600	2

**REMARKS:**

**McFARLAND JOHNSON**

Engineering, Planning & Construction Administration

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# APPENDIX 4

ASBESTOS TEST REPORT



## REPORT OF LIMITED ASBESTOS SAMPLING

Prepared by:

JOHN TURNER CONSULTING, INC.

19 Dover Street

Dover, New Hampshire 03820

[www.ConsultJTC.com](http://www.ConsultJTC.com)

TO: Joshua Lund, PE  
Transportation Manager - Structures  
McFarland Johnson  
53 Regional Drive  
Concord, NH 03301

FROM: Ray Lavery  
Environmental Consultant

Michael Vantran  
Vice President, Special Inspections

DATE: August 14, 2018

RE: Report of Limited Asbestos Sampling  
Bridge - Route 111, Hudson, NH  
JTC Project No. 18-20-034

Dear Mr. Lund:

John Turner Consulting, Inc. (JTC) was retained by McFarland Johnson to assess Bridge 95 located on Route 111 in Hudson, New Hampshire for the presence of asbestos-containing materials (ACM) prior to planned re-paving and repair work of the bridge. The subject bridges cross the Merrimack River and join Hudson and Nashua, NH. There are two bridge structures, the northern bridge traffic flows west into Nashua and the southern bridge traffic flows east into Hudson. Each bridge is approximately 600 feet in length and both were built in the 1970's.

The survey conducted by JTC consisted of a walkthrough of the subject structure including visual observations of the bridge construction materials. The survey also included collecting samples of materials suspected of containing asbestos.



## 1.0 LIMITED ASBESTOS SURVEY

The asbestos survey was conducted on August 7th and 8th, 2018 by JTC representative, Mr. Denis Daudelin, a United States Environmental Protection Agency (EPA) certified Asbestos Inspector. Prior to sampling, suspect building materials were divided into homogeneous groups based on type of material, color, appearance, and construction date. Multiple samples were collected from each homogeneous material. A total of 30 layered bulk samples were collected and analyzed for asbestos content.

The following represents a general list of suspect ACM that were identified and sampled within the subject bridge spaces:

- Expansion Joint
- Asphalt
- Tar Paper
- Concrete

The samples collected during the field survey were delivered under full chain-of-custody on August 8, 2018 to Optimum Analytical and Consulting, LLC (Optimum Analytical), an accredited Asbestos Laboratory located in Salem, New Hampshire. Bulk samples were analyzed by Optimum Analytical to determine the asbestos content of the sampled materials. Samples were analyzed in accordance with the EPA recommended analytical method of polarized light microscopy (PLM) with dispersion staining. Laboratory analytical results are attached to this report.

Optimum Analytical is fully accredited to perform bulk sample analysis under the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology (NIST). Samples were handled and stored in a manner so as to maintain their integrity and are routinely retained for a period of 90 days after results are reported to allow for any desired analytical follow-up and/or re-analysis.

The US Environmental Protection Agency (EPA) has established greater than one percent (>1%) as the minimum asbestos content for a material to be considered to be ACM. The results of JTC's asbestos sampling and analysis are contained in Table 1.

TABLE 1: ASBESTOS SAMPLING ANALYSIS RESULTS

Sample Number	Sample Description/Location	Percent Asbestos (%)
1 A-B	Black Expansion Joint, West Bridge, West End	None Detected
2 A-B	Black Asphalt, West Bridge, East End	None Detected
3 A-B	Black Tar Paper, West Bridge, East End	None Detected
4 A-B	Black Expansion Joint, West Bridge East End	None Detected
5 A-B	Concrete, West Bridge, East End	None Detected
6 A-B	Black Asphalt Comp. Shingle, West Bridge West End	None Detected
7 A-B	Concrete, West Bridge West End	None Detected
8 A-B	Black Expansion Joint, East Bridge, West End	None Detected
9 A-B	Black Asphalt, East Bridge, West End	None Detected
10 A-B	Black Tar Paper, East Bridge, West End	None Detected
11 A-B	Concrete, East Bridge, West End	None Detected
12 A-B	Black Expansion Joint, East Bridge, East End	None Detected
13 A-B	Black Asphalt, East Bridge, East End	None Detected
14 A-B	Black Tar Paper, East Bridge, East End	None Detected
15 A-B	Concrete, East Bridge, East End	None Detected

## 2.0 EVALUATION

None of the sampled materials contained asbestos. Should any additional suspect ACM be encountered, work should stop immediately and these suspect materials should be sampled and analyzed for asbestos content.

### 3.0 CLOSING

JTC appreciates the opportunity to assist McFarland Johnson with this project, and looks forward to supporting your future industrial hygiene, environmental, and regulatory needs. If you have any questions, please do not hesitate to contact the undersigned at 603-749-1841.

Sincerely,

John Turner Consulting, Inc.



Ray Lavery  
Environmental Consultant



(John D. Turner, President)

Michael Vantran  
Vice President, Special Inspections

Enclosures



Mr. Ray Lavery  
John Turner Consulting  
19 Dover Street  
Dover NH 03820

Project Reference: 18-20-034  
Laboratory Batch #: 1826319  
Date Samples Received: 08/08/2018  
Date Samples Analyzed: 08/12/2018  
Date of Final Report: 08/12/2018

**SAMPLE IDENTIFICATION:**

Thirty (30) samples from Hudson/ Nashua NH; Route 111 Bridge 95 project were submitted by D. Drudelin on 08/08/2018

This bulk sample(s) was delivered to Optimum Analytical Consulting, LLC (Optimum) located in Salem, New Hampshire for asbestos content determination.

**ANALYTICAL METHOD:**

Analytical procedures were performed in accordance with the U.S. Environmental Protection Agency (EPA) Recommended Method for the Determination of Asbestos in Bulk Samples by Polarized Light Microscopy and Dispersion Staining (PLM/DS)(EPA-600/M4-82-020, EPA-600/ R-93-116). This report relates only to those samples analyzed, and may not be indicative of other similar appearing materials existing at this, or other sites. Quantification of asbestos content was determined by Calibrated Visual Estimation. Optimum is not responsible for sample collection activities or analytical method limitations. The laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples.

In any given material, fibers with a small diameter (<0.25µm) may not be detected by the PLM method. Floor tile and other resinously bound material may yield a false negative if the asbestos fibers are too small to be resolved using PLM. Additional analytical methods may be required. Optimum recommends using Transmission Electron Microscopy (TEM) for a more definitive analysis.

Optimum will retain all samples for a minimum of three months. Further analysis or return of samples must be requested within this three month period to guarantee their availability. This report may not be reproduced except in full, without the written approval of Optimum Analytical and Consulting, LLC.

Use of the NVLAP and AIHA Logo in no way constitutes or implies product certification, approval, or endorsement by the National Institute of Standards and Technology or the American Industrial Hygiene Association.

Detection Limit <1%, Reporting Limits: CVES = 1%, 400 Point Count = .25%, 1000 Point Count = 0.1%; Present or Absent are observations made during a qualitative analysis.

This report is considered preliminary until signed by both the Laboratory Analyst and Laboratory Director or Supervisor. If you have any questions regarding this report, please do not hesitate to contact us.

Jamie L. Noel  
Laboratory Director

Kristina Scaviola  
Laboratory Supervisor



**CLIENT:** John Turner Consulting  
**ADDRESS:** 19 Dover Street  
**CITY / STATE / ZIP:** Dover NH 03820  
**CONTACT:** Mr. Ray Lavery  
**DESCRIPTION:** PLM Analysis  
**LOCATION:** Hudson/ Nashua NH; Route 111 Bridge 95

**ORDER #:** 1826319  
**PROJECT #:** 18-20-034  
**DATE COLLECTED:** 08/08/2018  
**COLLECTED BY:** D. Drudelin  
**DATE RECEIVED:** 08/08/2018  
**ANALYSIS DATE:** 08/12/2018  
**REPORT DATE:** 08/12/2018  
**ANALYST:** Jamie Noel

### REPORT OF ANALYSIS

Laboratory ID Sample No.	Sample Location Description	Layer No. Layer %	Asbestos Type (%)	Non-Asbestos Components (%)
1826319-001 1A	Nashua- West Bridge- West End Expansion Joint, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-002 1B	Nashua- West Bridge- West End Expansion Joint, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-003 2A	Hudson- West Bridge- East End Asphalt, Black	LAYER 1 100%	None Detected	Cellulose Fiber 2% Binder/Filler 98%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-004 2B	Hudson- West Bridge- East End Asphalt, Black	LAYER 1 100%	None Detected	Cellulose Fiber 2% Binder/Filler 98%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-005 3A	Hudson- West Bridge- East End Tar Paper, Black	LAYER 1 100%	None Detected	Cellulose Fiber 15% Synthetic Fiber 25% Binder/Filler 60%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-006 3B	Hudson- West Bridge- East End Tar Paper, Black	LAYER 1 100%	None Detected	Cellulose Fiber 15% Synthetic Fiber 25% Binder/Filler 60%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-007 4A	Hudson- West Bridge- East End Expansion Joint, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-008 4B	Hudson- West Bridge- East End Expansion Joint, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%



85 Stiles Road, Suite 201, Salem, NH 03079 Phone: (603)-458-5247

**CLIENT:** John Turner Consulting  
**ADDRESS:** 19 Dover Street  
**CITY / STATE / ZIP:** Dover NH 03820  
**CONTACT:** Mr. Ray Lavery  
**DESCRIPTION:** PLM Analysis  
**LOCATION:** Hudson/ Nashua NH; Route 111 Bridge 95

**ORDER #:** 1826319  
**PROJECT #:** 18-20-034  
**DATE COLLECTED:** 08/08/2018  
**COLLECTED BY:** D. Drudelin  
**DATE RECEIVED:** 08/08/2018  
**ANALYSIS DATE:** 08/12/2018  
**REPORT DATE:** 08/12/2018  
**ANALYST:** Jamie Noel

### REPORT OF ANALYSIS

Laboratory ID Sample No.	Sample Location Description	Layer No. Layer %	Asbestos Type (%)	Non-Asbestos Components (%)
1826319-009 5A	Hudson- West Bridge- East End Concrete, Gray	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-010 5B	Hudson- West Bridge- East End Concrete, Gray	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-011 6A	Nashua- West Bridge- West End Asphalt Comp.Shingle, Black	LAYER 1 100%	None Detected	Cellulose Fiber 2% Binder/Filler 98%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-012 6B	Nashua- West Bridge- West End Asphalt Comp.Shingle, Black	LAYER 1 100%	None Detected	Cellulose Fiber 2% Binder/Filler 98%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-013 7A	Nashua- West Bridge- West End Concrete, Gray	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-014 7B	Nashua- West Bridge- West End Concrete, Gray	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-015 8A	Nashua- East Bridge- West End Expansion Joint, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-016 8B	Nashua- East Bridge- West End Expansion Joint, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%



85 Stiles Road, Suite 201, Salem, NH 03079 Phone: (603)-458-5247

**CLIENT:** John Turner Consulting  
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**REPORT DATE:** 08/12/2018  
**ANALYST:** Jamie Noel

### REPORT OF ANALYSIS

Laboratory ID Sample No.	Sample Location Description	Layer No. Layer %	Asbestos Type (%)	Non-Asbestos Components (%)
1826319-017 9A	Nashua- East Bridge- West End Asphalt, Black	LAYER 1 100%	None Detected	Cellulose Fiber 8% Binder/Filler 92%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-018 9B	Nashua- East Bridge- West End Asphalt, Black	LAYER 1 100%	None Detected	Cellulose Fiber 8% Binder/Filler 92%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-019 10A	Nashua- East Bridge- West End Tar Paper, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-020 10B	Nashua- East Bridge- West End Tar Paper, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-021 11A	Nashua- East Bridge- West End Concrete, Gray	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-022 11B	Nashua- East Bridge- West End Concrete, Gray	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-023 12A	Hudson- East Bridge- East End Expansion Joint, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-024 12B	Hudson- East Bridge- East End Expansion Joint, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%



# OPTIMUM

Analytical and Consulting, LLC

85 Stiles Road, Suite 201, Salem, NH 03079 Phone: (603)-458-5247

## BULK SAMPLE ANALYSIS REPORT POLARIZED LIGHT MICROSCOPY

PLM (EPA-600/M4-82-020, EPA-600/ R-93-116) NVLAP Lab Code: 101433-0

**CLIENT:** John Turner Consulting  
**ADDRESS:** 19 Dover Street  
**CITY / STATE / ZIP:** Dover NH 03820  
**CONTACT:** Mr. Ray Lavery  
**DESCRIPTION:** PLM Analysis  
**LOCATION:** Hudson/ Nashua NH; Route 111 Bridge 95

**ORDER #:** 1826319  
**PROJECT #:** 18-20-034  
**DATE COLLECTED:** 08/08/2018  
**COLLECTED BY:** D. Drudelin  
**DATE RECEIVED:** 08/08/2018  
**ANALYSIS DATE:** 08/12/2018  
**REPORT DATE:** 08/12/2018  
**ANALYST:** Jamie Noel

### REPORT OF ANALYSIS

Laboratory ID Sample No.	Sample Location Description	Layer No. Layer %	Asbestos Type (%)	Non-Asbestos Components (%)
1826319-025 13A	Hudson- East Bridge- East End Asphalt, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-026 13B	Hudson- East Bridge- East End Asphalt, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-027 14A	Hudson- East Bridge- East End Tar Paper, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-028 14B	Hudson- East Bridge- East End Tar Paper, Black	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-029 15A	Hudson- East Bridge- East End Concrete, Gray	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%
1826319-030 15B	Hudson- East Bridge- East End Concrete, Gray	LAYER 1 100%	None Detected	Cellulose Fiber 1% Binder/Filler 99%
<b>Total % Asbestos:</b>			No Asbestos Detected	<b>Total % Non-Asbestos:</b> 100.0%

**Analyst  
Signatory:**  
Jamie Noel







# OPTIMUM

Analytical and Consulting, LLC

## BULK SAMPLE ANALYSIS REPORT POLARIZED LIGHT MICROSCOPY

PLM (EPA-600/M4-82-020, EPA-600/ R-93-116) NVLAP Lab Code: 101433-0

85 Stiles Road, Suite 201, Salem, NH 03079 Phone: (603)-458-5247

**CLIENT:** John Turner Consulting  
**ADDRESS:** 19 Dover Street  
**CITY / STATE / ZIP:** Dover NH 03820  
**CONTACT:** Mr. Ray Lavery  
**DESCRIPTION:** PLM Analysis  
**LOCATION:** Hudson/ Nashua NH; Route 111 Bridge 95

**ORDER #:** 1826319  
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**DATE COLLECTED:** 08/08/2018  
**COLLECTED BY:** D. Drudelin  
**DATE RECEIVED:** 08/08/2018  
**ANALYSIS DATE:** 08/12/2018  
**REPORT DATE:** 08/12/2018  
**ANALYST:** Jamie Noel

85 Stiles Road, Suite 201  
 Salem, NH 03079  
 603-458-5247

OPTIMUM ANALYTICAL AND CONSULTING, LLC

1826319

Chain of Custody

Analysis & TAT:	4-6 Hour	24 Hour	48 Hour	Standard (3-5)	Standard (6-10)	Comments (please indicate other test specific information here):
PLM			X			
PCM						
Mold	Not Available					
Lead	Not Available					
Other: (TEM, PCB, etc)	Not Available					
Sampler: D. Drudelin		Email: Ray.Lavery		Positive Stop Analysis: (circle one)		YES NO
Project Manager: Ray Lavery		Sample Location: Hudson/Nashua, NH		Phone Number: 603-384-8185		
Project Information: Ray Lavery w/s. Turner Consulting Site job # 18-20-034; All Samples from 2 in. dia. Cores				Company Name and Address: Ray Lavery w/s. Turner Consulting McFarland Johnson - Client		
Sample Number	Description and location					Date, Time and Temperature at collection:
1A	Expansion Joint - Blk MP1 - West End West Bldg (NASHUA)					
B	" " " " " " " " " " " "					
2A	Blk Asphalt - CI En. End (Hudson) West Bldg					
B	↓					
3A	TAR Paper - CI En. End - West Bldg. Top of Concrete (Hudson)					
B	↓					
4A	Expansion Joint - En. End - West Bldg (Hudson)					
B	↓					
5A	Concrete - CI - En. End - West Bldg (Hudson)					
B	↓					
6A	Asphalt - 109 - West End - West Bldg (Nashua)					
B	↓					
7A & B	Concrete - C9 - West End (Nashua) - West Bldg.					

The EPA Requires that layered samples be separated; Please indicate if a sample is to be analyzed as a composite. Optimum only uses data indicated on the CoC by the client when producing a final report. If information is missing or incorrect on the CoC please contact Optimum with the correct/missing information.

Relinquished by: D. Drudelin Date: 8-8-18 Time: 1336

Received by: J. Noel Date: 8/8/18 Time: 14:00



# OPTIMUM

Analytical and Consulting, LLC

## BULK SAMPLE ANALYSIS REPORT POLARIZED LIGHT MICROSCOPY

PLM (EPA-600/M4-82-020, EPA-600/ R-93-116) NVLAP Lab Code: 101433-0

85 Stiles Road, Suite 201, Salem, NH 03079 Phone: (603)-458-5247

**CLIENT:** John Turner Consulting  
**ADDRESS:** 19 Dover Street  
**CITY / STATE / ZIP:** Dover NH 03820  
**CONTACT:** Mr. Ray Lavery  
**DESCRIPTION:** PLM Analysis  
**LOCATION:** Hudson/ Nashua NH; Route 111 Bridge 95

**ORDER #:** 1826319  
**PROJECT #:** 18-20-034  
**DATE COLLECTED:** 08/08/2018  
**COLLECTED BY:** D. Drudelin  
**DATE RECEIVED:** 08/08/2018  
**ANALYSIS DATE:** 08/12/2018  
**REPORT DATE:** 08/12/2018  
**ANALYST:** Jamie Noel

85 Stiles Road, Suite 201  
 Salem, NH 03079  
 603-458-5247

OPTIMUM ANALYTICAL AND CONSULTING, LLC

1826319

Chain of Custody

Analysis & TAT:	4-6 Hour	24 Hour	48 Hour	Standard (3-5)	Standard (6-10)	Comments (please indicate other test specific information here):
PLM			P			
PCM						
Mold	Not Available					
Lead	Not Available					
Other: (TEM, PCB, etc)	Not Available					
Sampler: D. Drudelin		Email: Ray.Lavery			Positive Stop Analysis: (circle one)	YES NO
Project Manager: Ray Lavery		Sample Location: Hudson/Nashua, NH Rte. 111 Bridge 95			Phone Number: 603-384-8183	
Project Information: Ray Lavery w/ J. Turner Consulting JTC # 18-20-034; All Samples from 2 in. Dia. Core				Company Name and Address: Ray Lavery w/ J. Turner Consulting 11805 McFarland Johnson		
Sample Number	Description and location					Date, Time and Temperature at collection:
8A	BIF (Nashua) Expansion Joint: HT-1 - West End - Ea. Bldg.					
B	↓					
9A	Asphalt - C-12 - West End - Ea. Bldg. (Nashua)					
B	↓					
10A	TAR Paper - C-12 - West End - Ea. Bldg. (Nashua)					
B	↓					
11A	Concrete - C-12 - West End - Ea. Bldg. (Nashua)					
B	↓					
12A	BIF (Hudson) Expansion Joint: HT-1 - Ea. End - Ea. Bldg.					
B	↓					
13A & B	Asphalt - C-20 - Ea. End - Ea. Bldg. (Hudson)					
14A & B	TAR Paper - C-20 - Ea. End - Ea. Bldg. (Hudson)					
15A & B	Concrete - C-20 - Ea. End - Ea. Bldg. (Hudson)					

The EPA Requires that layered samples be separated; Please indicate if a sample is to be analyzed as a composite. Optimum only uses data indicated on the CoC by the client when producing a final report. If information is missing or incorrect on the CoC please contact Optimum with the correct/missing information.

Relinquished by: *D. Drudelin* Date: 8/8/18 Time: 1356

Received by: *J. Noel* Date: 8/8/18 Time: 14:00

# McFARLAND JOHNSON

Engineering, Planning & Construction Administration  
www.mjinc.com

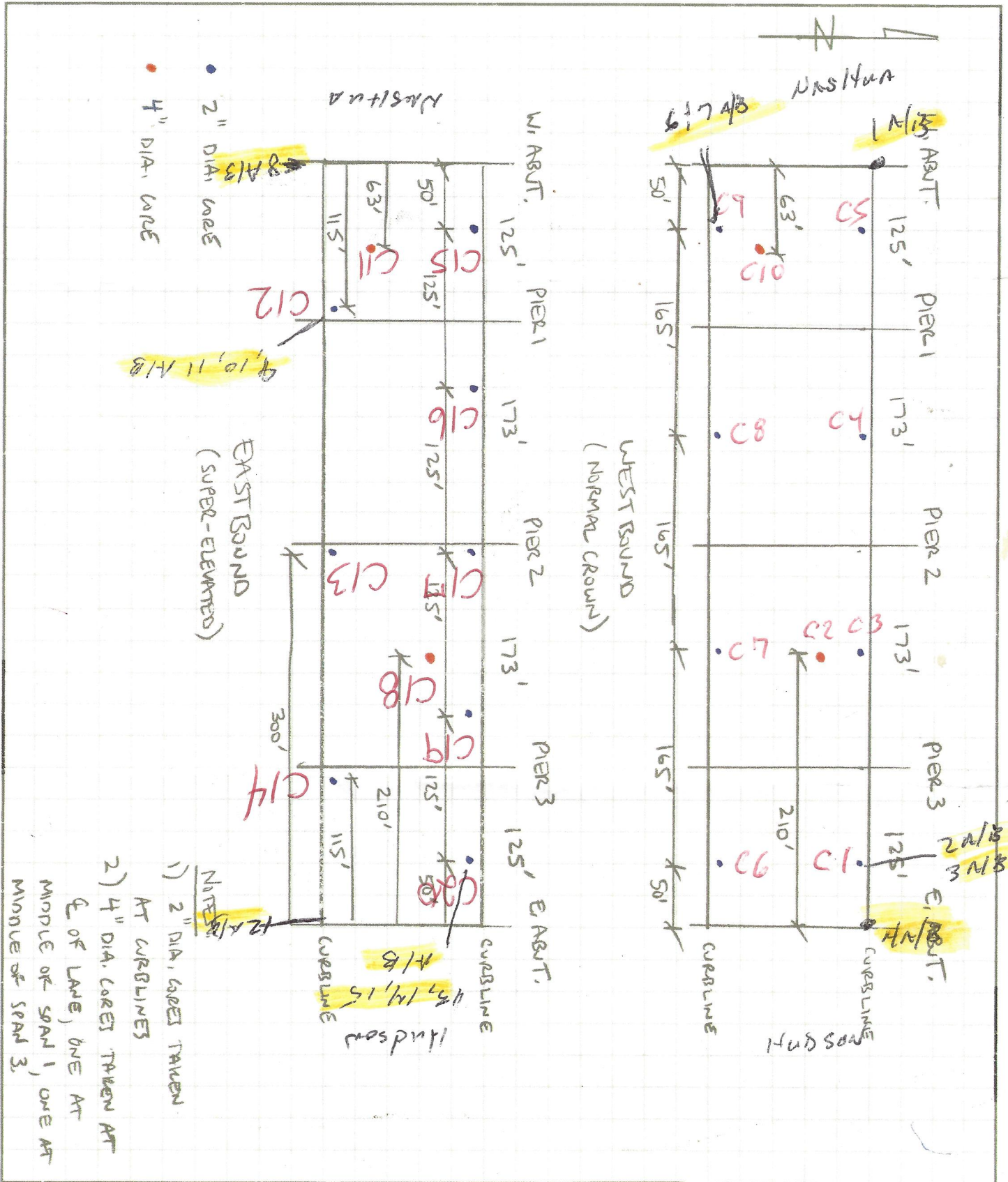
JOB HUDSON - ROUTE 111 BRIDGE DECK EVAL

SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_

CALCULATED BY JAL DATE \_\_\_\_\_

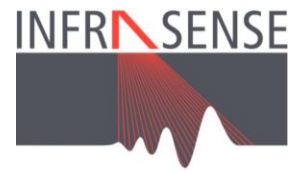
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SCALE DECK CORE LAYOUT PLAN



# APPENDIX 5

GROUND PENETRATING RADAR  
DELAMINATION REPORT



# **Ground Penetrating Radar (GPR) Evaluation of Rt 111 Bridge over the Merrimack River in Hudson, New Hampshire**



## **Final Report**

submitted to

**John Turner Consulting**

19 Dover Street  
Dover, NH 03820

by

**INFRASENSE, Inc.**

21-G Olympia Avenue, Suite 45  
Woburn, MA 01801

September 4, 2018

## 1. Introduction

The overall purpose of this condition survey is to quantify and map deterioration within two concrete bridge decks carrying Rt. 111 EB and WB over the Merrimack River in Hudson, NH. In addition to the condition survey, real time rebar mark outs were performed to facilitate the extraction of cores from the bridge deck for chloride and compression testing to be performed by John Turner Consulting (JTC). The condition survey was carried out over two days utilizing ground penetrating radar (GPR). A detailed description of the data collection procedures, analysis methods, and resulting deterioration quantities and maps are provided in the following sections.

## 2. GPR Data Collection

The GPR survey was conducted during the daytime hours on August 8<sup>th</sup> and 9<sup>th</sup>, 2018. The weather conditions were sunny and temperatures in the mid to high 80's (°F). The GPR equipment used for the survey included a ground-coupled 1500-MHz antenna and SIR-4000 control unit manufactured by GSSI, Inc. of Nashua, NH (see Figure 1). The GPR equipment was mounted to a survey cart equipped with an electronic distance-measuring instrument (DMI) mounted to the rear wheel, providing continuous distance data as the GPR data was collected.



Figure 1 – GPR Survey Setup – Control Unit and 900-MHz antenna

The GPR data was collected with a series of orthogonal traverses, each spaced not more than 2 feet apart in the longitudinal direction and not more than 5 in the transverse direction. The GPR data collection was carried out within a series of lane closures over the two days in order to provide access to each of the four travel lanes.

### 3. GPR Data Analysis

The GPR analysis was carried out according to ASTM D6087-08 with GSSI's processing software, *RADAN 7*<sup>®</sup>, using the following steps:

- (1) Identification of the beginning and the end of the structure in each radar file.
- (2) Identification of features (bottom of asphalt overlay, top rebar, bottom of deck) that appear as dielectric discontinuities in the GPR data (see example data, Figure 2);
- (3) Setup of the analysis for all of the traverses, computation of concrete dielectric constant, rebar depth and concrete attenuation; and
- (4) Mapping the results and calculating quantities.

Figure 2 shows a sample of the raw GPR data. The figure represents a longitudinal cross section through the deck, where the time axis is equivalent to depth. The bottom of the asphalt overlay, top mat of rebar and bottom deck are distinct throughout. Note that areas where the signal from the rebar level and bottom deck becomes attenuated (diminished in strength) indicates deterioration.

### 4. Results

The final concrete deterioration map is provided in Attachment A. The potential areas of deteriorated concrete and corrosion activity are identified by a threshold, which is initially calculated from the GPR data and then calibrated using the core chloride test data. The map also shows the core locations with a color code indicating the diameter core extracted (2 or 4 inches).

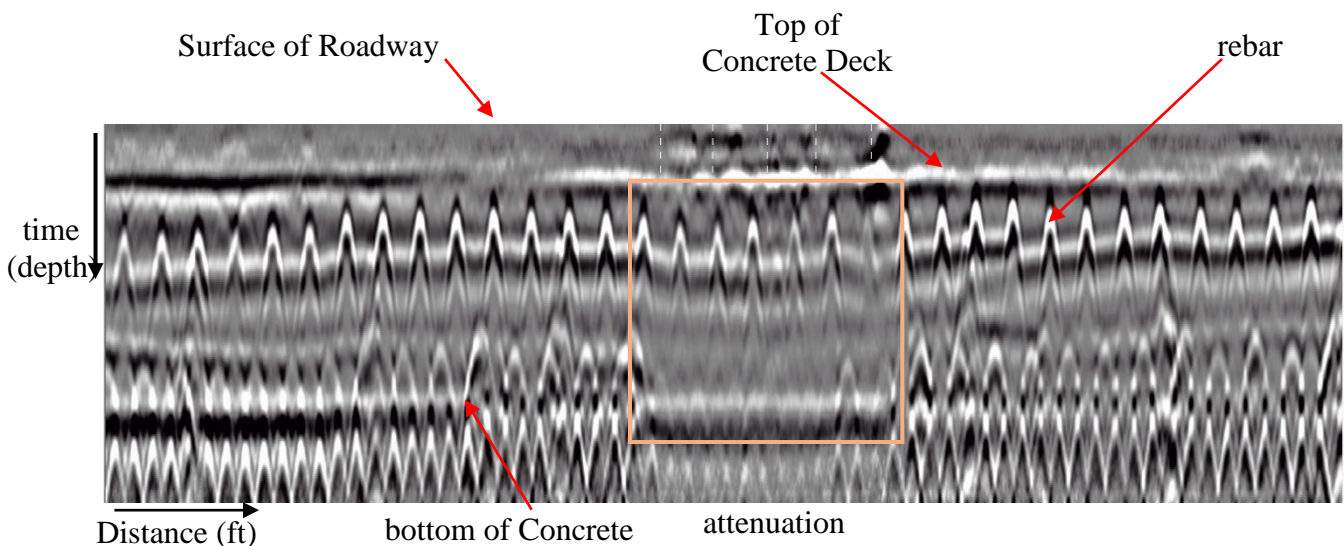


Figure 2 – GPR Data Sample  
(Route 111 eastbound, Left Lane)

The GPR analysis, combined with a review of the chloride test results reveals that 4.6% of the eastbound deck area has evidence of concrete deterioration, and 7.2% of the westbound deck area has evidence of concrete deterioration. A large percentage of the damage is located along either edge of the two bridges and abutments, except for a few large concentrated areas.

## 5. References

ASTM, “*Standard Test Method for Evaluating Asphalt-Covered Concrete Bridge Decks Using Ground Penetrating Radar*”, Designation D 6087-08, ASTM International, West Conshohocken, PA, 2005.

Maser, K.R., “*New Technology for Bridge Deck Assessment*”, Phase I and II Final Report prepared for the New England Transportation Consortium, Center for Transportation Studies, Massachusetts Institute of Technology, Cambridge, MA, 1990.

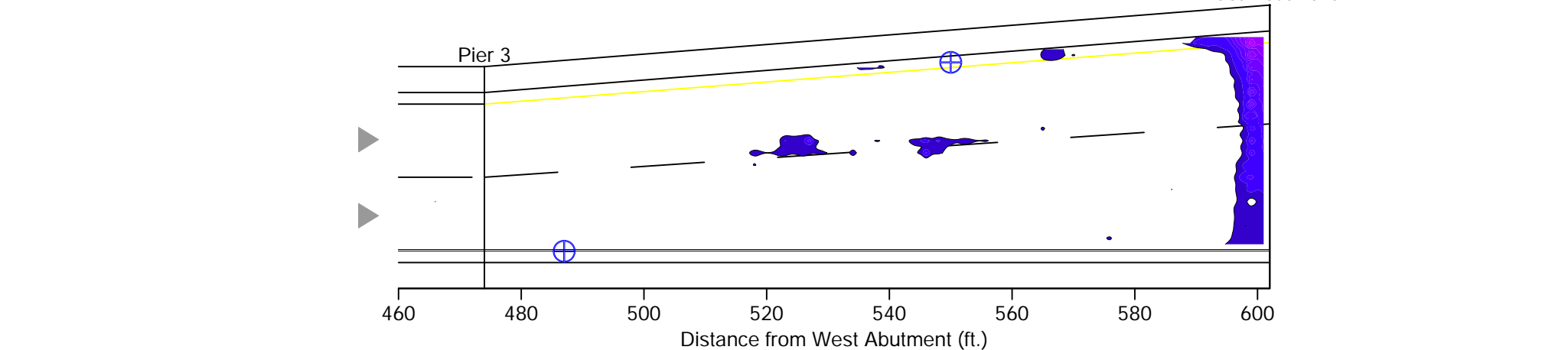
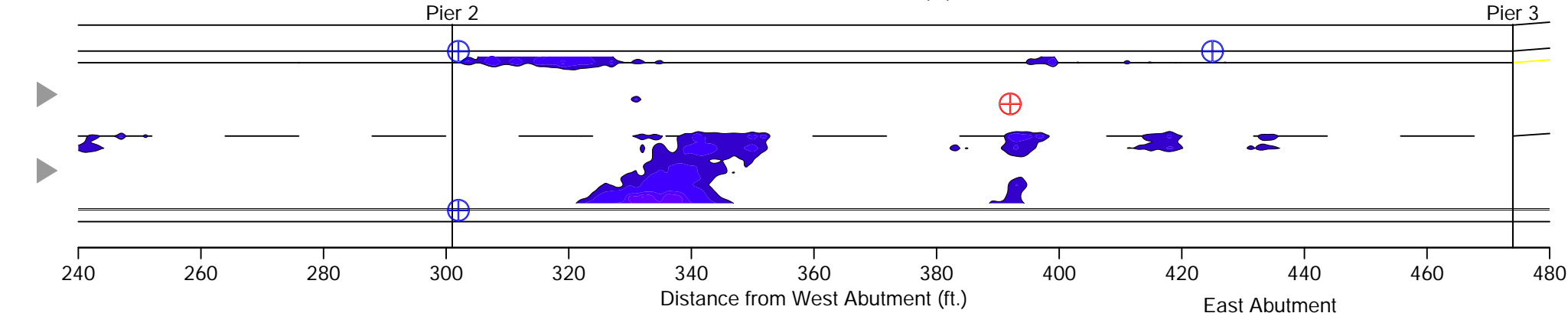
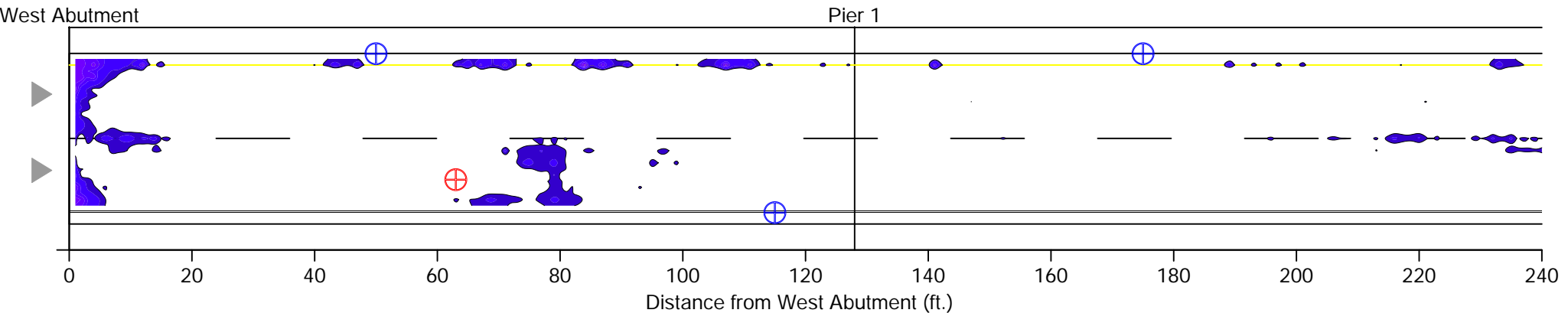
Maser, K.R., and Roddis, W.M.K., “*Principles of Radar and Thermography for Bridge Deck Assessment*”, ASCE Journal of Transportation Engineering, Vol. 116, No. 5, Sept/Oct, 1990.

SHRP C-101, “*Condition Evaluation of Concrete Bridges Relative to Reinforcement Corrosion – Volume 3: Method of Evaluating the Condition of Asphalt-Covered Decks*”, Strategic Highway Research Program Report SHRP-S-325, Washington, DC, 1993.



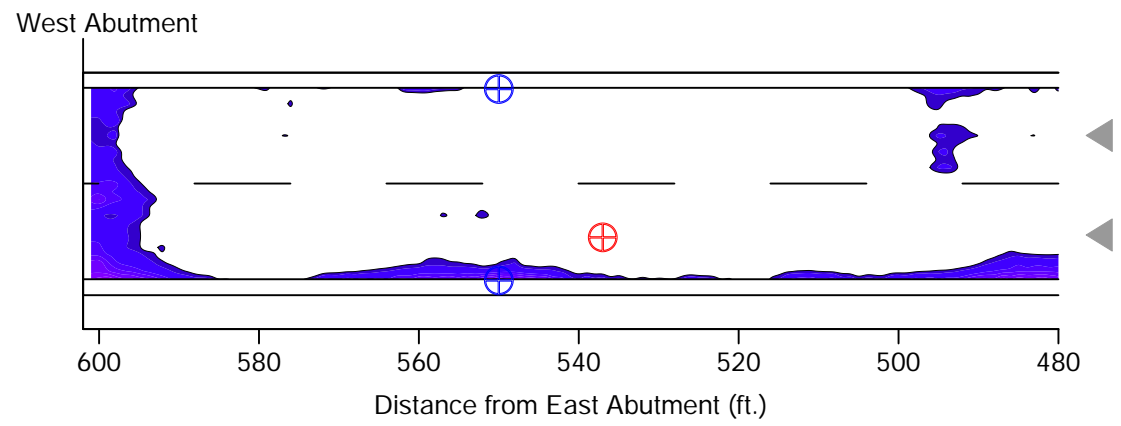
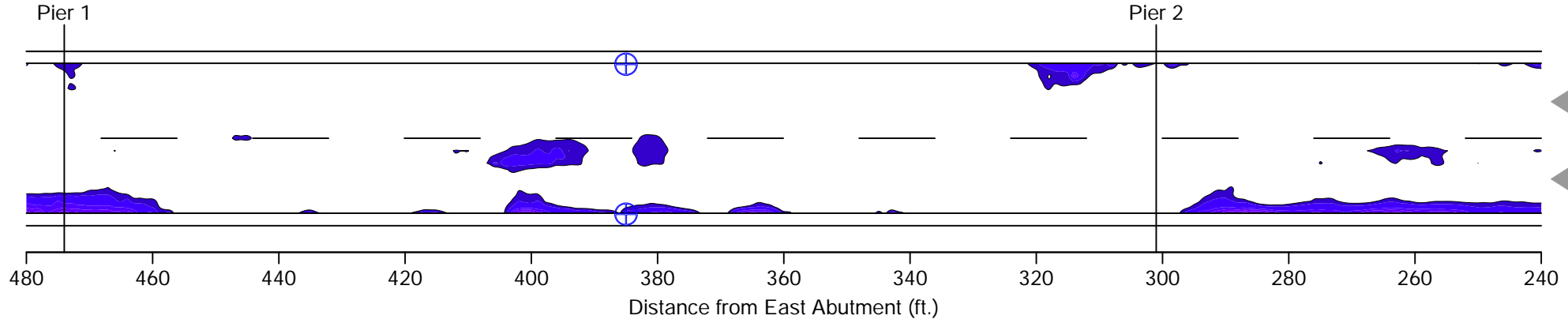
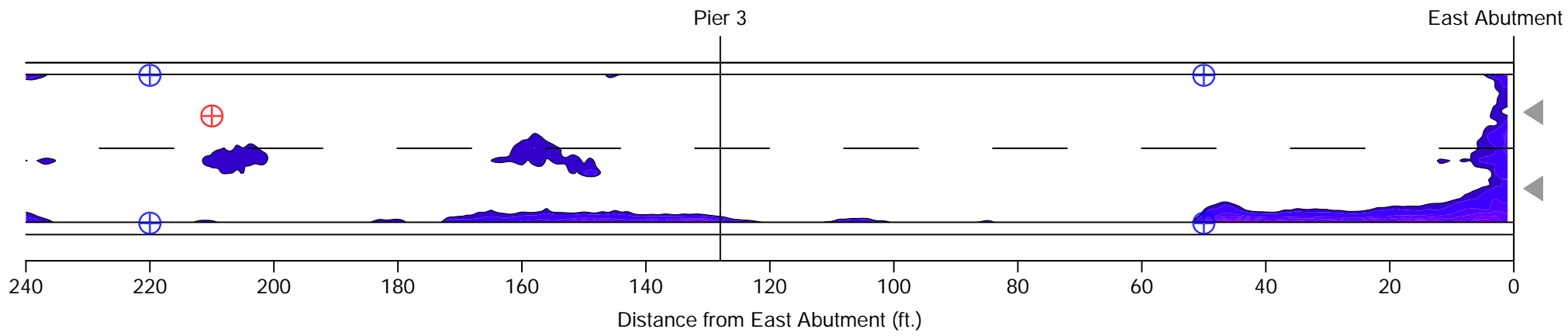
**ATTACHMENT A**





**CONCRETE DETERIORATION MAPS**



Concrete Condition Legend	Orientation	Quantity Summary		General Information	
<p>Deterioration</p> <p>Increasing severity --&gt;</p> <p> 2" Diameter Core</p> <p> 4" Diameter Core</p>	<p></p> <p> Direction of traffic</p>	Condition	Conc. Deterioration (%)	4.6	Ferry Street Bridge Rt. 111 EB over Merrimack River
			Conc. Deterioration (s.f)	706.5	Analyzed by: PG Reviewed by: KS Completed: 9/03/18
					<b>Sheet 1 of 1</b>





Concrete Condition Legend	Orientation	Quantity Summary		General Information	
Deterioration Increasing severity -->	  Direction of traffic	Condition	Conc. Deterioration (%)	7.2	Bridge Street Bridge Rt. 111 WB over Merrimack River Analyzed by: PG Reviewed by: KS Completed: 9/03/18
 2" Diameter Core  4" Diameter Core			Conc. Deterioration (s.f)	1046	
				<b>Sheet 1 of 1</b>	



# APPENDIX 6

DECK REHABILITATION COSTS

# Bridge Deck Rehabilitation Quantity Estimate

Town of Hudson  
 NH Route 111 Westbound (Bridge No. 109/068)  
 over Merrimack River

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
403.911	HOT BITUMINOUS BRIDGE PAVEMENT, 1" BASE COURSE	TON	107	\$155.00	\$16,585.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	TON	161	\$85.00	\$13,685.00
511.00	CONCRETE BRIDGE DECK PAVEMENT REMOVAL (F)	SY	1,880	\$20.00	\$37,600.00
511.02	PREPARATION FOR PARTIAL DEPTH CONCRETE BRIDGE DECK REPAIRS	SY	185	\$375.00	\$69,375.00
511.03	PREPARATION FOR FULL DEPTH CONCRETE BRIDGE DECK REPAIRS	SY	65	\$600.00	\$39,000.00
520.7002	CONCRETE BRIDGE DECK (QC/QA) (F)	CY	30	\$2,400.00	\$72,000.00
538.6	BARRIER MEMBRANE, HEAT WELDED - MACHINE METHOD (F)	SY	1,880	\$26.00	\$48,880.00
618.61	UNIFORMED OFFICERS WITH VEHICLE	\$	1	\$12,500.00	\$12,500.00
618.7	FLAGGERS	HR	425	\$30.00	\$12,750.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$35,000.00	\$35,000.00
619.25	PORTABLE CHANGEABLE MESSAGE SIGN	U	2	\$4,000.00	\$8,000.00
692.	MOBILIZATION	U	1	\$30,000.00	\$30,000.00
698.13	FIELD OFFICE TYPE C	MON	6	\$1,400.00	\$8,400.00
<b>SUBTOTAL =</b>					<b>\$403,775</b>
<b>CONTINGENCY (20%) =</b>					<b>\$80,755</b>
<b>SAY =</b>					<b>\$485,000</b>

# Bridge Deck Rehabilitation Quantity Estimate

Town of Hudson  
 NH Route 111 Eastbound (Bridge No. 110/068)  
 over Merrimack River

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
403.911	HOT BITUMINOUS BRIDGE PAVEMENT, 1" BASE COURSE	TON	113	\$155.00	\$17,515.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	TON	169	\$85.00	\$14,365.00
511.00	CONCRETE BRIDGE DECK PAVEMENT REMOVAL (F)	SY	1,980	\$20.00	\$39,600.00
511.02	PREPARATION FOR PARTIAL DEPTH CONCRETE BRIDGE DECK REPAIRS	SY	190	\$375.00	\$71,250.00
511.03	PREPARATION FOR FULL DEPTH CONCRETE BRIDGE DECK REPAIRS	SY	65	\$600.00	\$39,000.00
520.7002	CONCRETE BRIDGE DECK (QC/QA) (F)	CY	35	\$2,400.00	\$84,000.00
538.6	BARRIER MEMBRANE, HEAT WELDED - MACHINE METHOD (F)	SY	1,980	\$26.00	\$51,480.00
618.61	UNIFORMED OFFICERS WITH VEHICLE	\$	1	\$12,500.00	\$12,500.00
618.7	FLAGGERS	HR	425	\$30.00	\$12,750.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$35,000.00	\$35,000.00
619.25	PORTABLE CHANGEABLE MESSAGE SIGN	U	2	\$4,000.00	\$8,000.00
692.	MOBILIZATION	U	1	\$32,000.00	\$32,000.00
698.13	FIELD OFFICE TYPE C	MON	6	\$1,400.00	\$8,400.00
				<b>SUBTOTAL =</b>	<b>\$425,860</b>
				<b>CONTINGENCY (20%) =</b>	<b>\$85,172</b>
				<b>SAY =</b>	<b>\$515,000</b>

# APPENDIX 7

DECK REPLACEMENT COSTS

# Bridge Deck Replacement Quantity Estimate

Town of Hudson  
 NH Route 111 Westbound (Bridge No. 109/068)  
 over Merrimack River

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
403.911	HOT BITUMINOUS BRIDGE PAVEMENT, 1" BASE COURSE	TON	107	\$155.00	\$16,585.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	TON	161	\$85.00	\$13,685.00
502.	REMOVAL OF EXISTING BRIDGE STRUCTURE	U	1	\$469,000.00	\$469,000.00
520.7002	CONCRETE BRIDGE DECK (QC/QA) (F)	CY	740	\$1,800.00	\$1,332,000.00
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	64	\$95.00	\$6,080.00
538.6	BARRIER MEMBRANE, HEAT WELDED - MACHINE METHOD (F)	SY	1,880	\$26.00	\$48,880.00
550.33	BRIDGE SCUPPER	EA	6	\$1,000.00	\$6,000.00
556.01	PAINTING EXISTING STRUCTURAL STEEL	U	1	\$75,000.00	\$75,000.00
556.201	CONTAINMENT AND ENVIRONMENT PROTECTION	U	1	\$50,000.00	\$50,000.00
556.301	WORKER PROTECTION	U	1	\$7,500.00	\$7,500.00
561.2	PREFABRICATED MODULAR BRIDGE JOINT SYSTEM (F)	LF	73	\$1,800.00	\$131,400.00
563.23	BRIDGE RAIL T3	LF	1,310	\$150.00	\$196,500.00
564.1	BRIDGE LIGHTING SYSTEM	U	1	\$25,000.00	\$25,000.00
565.232	BRIDGE APPROACH RAIL T3 (STEEL POSTS)	U	4	\$7,000.00	\$28,000.00
618.61	UNIFORMED OFFICERS WITH VEHICLE	\$	1	\$25,000.00	\$25,000.00
618.7	FLAGGERS	HR	850	\$30.00	\$25,500.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$35,000.00	\$35,000.00
619.25	PORTABLE CHANGEABLE MESSAGE SIGN	U	2	\$4,000.00	\$8,000.00
692.	MOBILIZATION	U	1	\$202,000.00	\$202,000.00
698.13	FIELD OFFICE TYPE C	MON	12	\$1,400.00	\$16,800.00
				<b>SUBTOTAL =</b>	\$2,717,930
				<b>CONTINGENCY (20%) =</b>	\$543,586
				<b>SAY =</b>	<b>\$3,300,000</b>



# Bridge Deck Replacement Quantity Estimate

Town of Hudson  
NH Route 111 Eastbound (Bridge No. 110/068)  
over Merrimack River

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
403.911	HOT BITUMINOUS BRIDGE PAVEMENT, 1" BASE COURSE	TON	113	\$155.00	\$17,515.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	TON	169	\$85.00	\$14,365.00
502.	REMOVAL OF EXISTING BRIDGE STRUCTURE	U	1	\$518,000.00	\$518,000.00
520.7002	CONCRETE BRIDGE DECK (QC/QA) (F)	CY	800	\$1,800.00	\$1,440,000.00
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	56	\$95.00	\$5,320.00
538.6	BARRIER MEMBRANE, HEAT WELDED - MACHINE METHOD (F)	SY	1,975	\$26.00	\$51,350.00
550.33	BRIDGE SCUPPER	EA	7	\$1,000.00	\$7,000.00
556.01	PAINTING EXISTING STRUCTURAL STEEL	U	1	\$75,000.00	\$75,000.00
556.201	CONTAINMENT AND ENVIRONMENT PROTECTION	U	1	\$50,000.00	\$50,000.00
556.301	WORKER PROTECTION	U	1	\$7,500.00	\$7,500.00
561.2	PREFABRICATED MODULAR BRIDGE JOINT SYSTEM (F)	LF	84	\$1,800.00	\$151,200.00
563.23	BRIDGE RAIL T3	LF	1,320	\$150.00	\$198,000.00
564.1	BRIDGE LIGHTING SYSTEM	U	1	\$25,000.00	\$25,000.00
565.232	BRIDGE APPROACH RAIL T3 (STEEL POSTS)	U	4	\$7,000.00	\$28,000.00
618.61	UNIFORMED OFFICERS WITH VEHICLE	\$	1	\$25,000.00	\$25,000.00
618.7	FLAGGERS	HR	850	\$30.00	\$25,500.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$35,000.00	\$35,000.00
619.25	PORTABLE CHANGEABLE MESSAGE SIGN	U	2	\$4,000.00	\$8,000.00
692.	MOBILIZATION	U	1	\$216,000.00	\$216,000.00
698.13	FIELD OFFICE TYPE C	MON	12	\$1,400.00	\$16,800.00
				<b>SUBTOTAL =</b>	\$2,914,550
				<b>CONTINGENCY (20%) =</b>	\$582,910
				<b>SAY =</b>	<b>\$3,500,000</b>

# APPENDIX 8

LIFE-CYCLE COST ANALYSIS

**Town of Hudson  
NH 111 Eastbound**

**LIFE CYCLE COST CALCULATION -Westbound (Eastbound Similar)**

(PRESENT WORTH METHOD)

<b>Project</b> NH Route 111 EB over Merrimack River			Deck Rehabilitation		Deck Replacement	
<b>Location</b> Hudson, NH						
PROJECT LIFE CYCLE (YEARS) <span style="background-color: #00FFFF; padding: 2px;">60</span>						
DISCOUNT RATE (% in decimals) <span style="background-color: #00FFFF; padding: 2px;">4%</span>						
<b>Construction Costs</b>			Est.	PW	Est.	PW
A)	Construction	0	485,000	485,000	3,300,000	3,300,000
B)	_____	0	_____	0	_____	0
C)	_____	0	_____	0	_____	0
D)	_____	0	_____	0	_____	0
E)	_____	0	_____	0	_____	0
F)	_____	0	_____	0	_____	0
<b>Other Initial Costs</b>						
A)	Design Cost	0	48,500	48,500	330,000	330,000
B)	_____	0	_____	0	_____	0
<b>Total Initial Cost Impact (IC)</b>						
<b>Initial Cost PW Savings</b>					(3,096,500)	
<b>Replacement/Salvage Costs</b>						
		Year	Factor			
A)	Minor Rehabilitation	20	0.4564	0	485,000	221,347
B)	Major Rehabilitation	20	0.4564	3,465,000	1,581,380	0
C)	Minor Rehabilitation	40	0.2083	485,000	101,020	101,020
D)	Salvage	60	0.0951	0	0	0
E)	_____	_____	_____	0	_____	0
F)	_____	_____	0.0000	_____	0	0
G)	_____	_____	0.0000	_____	0	0
H)	_____	_____	0.0000	_____	0	0
<b>Total Replacement/Salvage PW Costs</b>					1,682,400	322,367
<b>Operation/Maintenance Cost</b>			Escl..00%	PWA		
A)	_____	_____	0.000	_____	0	0
B)	_____	_____	0.000	_____	0	0
C)	_____	_____	0.000	_____	0	0
D)	_____	_____	0.000	_____	0	0
E)	_____	_____	0.000	_____	0	0
F)	_____	_____	0.000	_____	0	0
G)	_____	_____	0.000	_____	0	0
<b>Total Operation/Maintenance (PW) Costs</b>					0	0
<b>Total Life Cycle Costs for O&amp;M and Replacement</b>					1,682,400	322,367
<b>Total Cost - Present Worth Life Cycle Costs</b>					2,215,900	3,952,367
<b>Life Cycle (PW) Savings</b>					(1,736,467)	

PW - Present Worth    PWA - Present Worth of Annuity

**Notes:**

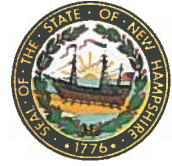
- 1). Assume Bridges will be replaced in 60 years (they will have zero or equal salvage value at that time).
- 2). Minor rehabilitation will be performed every 20 years.
- 3). Major rehabilitation will occur every 60 years. Assume Deck Rehabilitation alternative will have Deck Replacement in 20 years
- 4). Assume both alternatives will have the same O&M Costs
- 5). Assume value of bridge replacement linearly depreciates.
- 6). Right of way costs are not included in the life cycle cost analysis.





THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

February 7, 2020



Victoria F. Sheehan
Commissioner

William Cass, P.E.
Assistant Commissioner

Daniel Hudson
Nashua City Engineer
9 Riverside Street
Nashua NH 03062

RE: COPY OF INTERIM INSPECTION REPORTS OF MUNICIPALLY OWNED BRIDGES AND NHDOT'S
RECOMMENDED BRIDGE POSTINGS FOR WEIGHT, HEIGHT, WIDTH, AND/OR CLOSURE
TOWN OF NASHUA

Dear Mr. Hudson:

Enclosed are copies interim bridge inspection reports for two municipally owned bridges in the City of
Nashua which have been used to update our annual submission to the Federal Government.

In addition, NHDOT'S recommended bridge postings for weight, height, width, and/or closure are noted
below. Please note that Red List bridges are in bold type, if there are any in your municipality.

Table with 3 columns: Bridge #, Location, NHDOT Recommended Posting. Contains two rows of bridge data.

Please note if there are any changes in the recommended weight postings, width postings, height
postings, closure postings, or lack of postings for your bridge. Even though a bridge may be recommended for a
weight, height, width or closure posting by the State, the decision to properly post or close the structure is the
responsibility of the municipal officials. It is in the best interest of the municipality to post or sign your bridges in
accordance with these recommendations. A failure to warn motorists of potential bridge hazards could result in
tort liability claims. Also, if your bridges are not posted properly, it will result in forfeiture of any possible Federal
highway funds for projects in your municipality.

Our bridge inspectors have indicated that the bridges listed above are in compliance with DOT's closure
posting recommendation; therefore no posting or closure action needs to be taken by the Town. Please call if
there are any questions.

Sincerely,

Handwritten signature: C. R. Willeke, P.E.
Municipal Highways Engineer
Bureau of Planning and Community Assistance
Tel.: (603) 271-6472 / Fax: (603) 271-8093

Enclosures

cc: Nashua Public Works Director
Commissioner, Department of Education

S:\Planning\Community Assistance\1-Municipalities\Nashua\Bridge Insp\Interim JO 2-7-2020.doc



# Bridge Inspection Report

NBI Structure Number: 013101100006800

Hudson 110/068

Date of Inspection: 09/16/2019

Date Report Sent: 01/28/2020

Owner: Municipality

Bridge Inspection Group: D-Team

Bridge Maintenance Crew: OTHER

Bridge also in: **Nashua, New Hampshire**

NH111 EB

over

MERRIMACK RIVER

Taylor Falls Bridge

### Recommended Postings:

Weight: **E-2**

SIGNS IN PLACE. 9/16/19

Weight Sign OK

Width: **Not Required**

Width Sign OK

Primary Height Sign Recommendation: *None*

Optional Centerline Height Sign Rec: *None*

Clearances: Over: 99.99  
(Feet) Under: 0.00  
Route: 99.99

Height Sign OK

### Condition:

Red List Status: Not on the Redlist

Deck: 7 Good

Superstructure: 7 Good

Substructure: 7 Good

Culvert: N N/A (NBI)

Sufficiency Rating: 63 %

Bridge Rail: Substandard

Rail Transition: Substandard

Bridge Approach Rail: Substandard

Approach Rail Ends: Substandard

### Structure Type and Materials:

Number of Main Spans: 4

Number of Approach Spans: 0

#### Main Span Material and Design Type

Steel Continuous/Stringer/Girder

NH Bridge Type: IB-C (I Beams w/ Concrete Deck)

Deck Type: Concrete-Cast-in-Place

Wearing Surface: Bituminous

Membrane: Other

Deck Protection: None

Curb Reveal: 8 in

Plan Location: 4-2-1-1

Total Bridge Length: 602.0 ft

Right Curb/Sidewalk Width: 0.8 ft

Total Bridge Width: 36.4 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 1973

### Bridge Dimensions:

Length Maximum Span: 173.0 ft

Left Curb/Sidewalk Width: 5.0 ft

Width Curb to Curb: 28.0 ft

Approach Roadway Width: 28.0 ft  
(W/Shoulders)

# Bridge Inspection Report

NBI Structure Number: 013101100006800

Hudson 110/068

## Bridge Service:

Type of Service on Bridge: Highway and Pedestrian

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 15,503

Percent Trucks: 5%

Year of AADT: 2017

Future AADT: 22,944

Year of Future AADT: 2040

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: NHS Roadway on Bridge

Roadway Functional Class: Urban, Other Principal Arterial

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Possibly eligible for

Traffic Direction: 1-way traffic

## National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: 3 Intolerable - Correct

Underclearances: N Not applicable (NBI)

Approach Alignment: 8 Equal Desirable Crit

Structural Evaluation: 7 Above Min Criteria

Channel/Channel Protection: 6 Bank Slumping

Waterway Adequacy: 9 Above Desirable

Bridge Scour Critical Status: 8 Stable Above Footing

Riprap Condition: Good Condition

Debris Present: No Debris Present

Channel Notes: LIGHT AROUND P#2. SHEET PILE EXPOSED. COBBLE & SAND BOTTOM.



# Bridge Inspection Report

NBI Structure Number: 013101100006800

Hudson 110/068

**Element Details (see disclaimer below)**

No.	Description	Material Notes and Condition Notes:
12	Reinforced Concrete Deck	SIDEWALK- MINOR SPALLS ALONG GRANITE CURB. CURB- LIGHT CRACKS. UNDERSIDE OF DECK- SEVERAL FINE TRANSVERSE CRACKS WITH EFFLORESCENCE, MINOR SPALLS. FULL DEPTH PATCH IN SPAN #1, BAY #2; NO LEAKAGE. FINE CRACKS, RUST STAINED AND LIGHT EFFLORESCENCE UNDER CURBS.
L 510	Wearing Surfaces	ASPHALT- FEW CRACKS, SEVERAL AREAS OF HOLLOW SOUNDING CIRCULAR MEMBRANE FAILURES.
L 1120	Efflorescence/Rust Staining	FINE CRACKS WITH MINOR EFFLORESCENCE UNDER DECK AND CURB FASCIA.
107	Steel Open Girder/Beam	EXTERIORS FADED, LIGHT PAINT PEELING WITH MINOR RUST. PACK RUST DEVELOPING ON ALL EXTERIOR SPLICE PLATES, PACK RUST APPROXIMATELY 3/8"+. MINOR CRACK IN HORIZONTAL STIFFENER WELD IN SPAN TWO, STRINGER THREE; EAST OF X FRAME #4. TOP OF BOTTOM FLANGE, GUANO COVERED IN AREAS
L 515	Steel Protective Coating	
L 1000	Corrosion	FRECKLED RUST IN AREAS.
L 1020	Connection	CREVICE CORROSION DEVELOPING AT BASE OF ALL EXTERIOR SPLICE PLATES WITH APPROXIMATELY 3/8"+ OF PACK RUST.
152	Steel Floor Beam	FLOOR BEAMS- LOCATED IN SPAN #4, BAY #4.
L 515	Steel Protective Coating	
210	Reinforced Concrete Pier Wall	CONCRETE IN GOOD CONDITION WITH ONLY MINOR DEFECTS. PIERS ARE SUBJECT TO SCOUR WITH HOLES UP TO 10' MEASURED ALONG STEEL SHEET PILE. NO UNDERMINING OBSERVED.
215	Reinforced Concrete Abutment	MINOR CRACKS.
L 6000	Scour	FOOTING AND SHEET PILE EXPOSURE AT PIER #2. FOOTING EXPOSED PIER #3.
234	Reinforced Concrete Pier Cap	FINE CRACKS.
300	Strip Seal Expansion Joint	DEBRIS FILLED. LIGHT TO MODERATE GOUGES IN JOINT ARMOR ON WEST. JOINT ARMOR CRACKED NEAR CENTER, WEST.
311	Movable Bearing	ROCKER #5 RUSTED UNDER WEEPER LEAKAGE ON NORTHWEST.
L 515	Steel Protective Coating	
L 1000	Corrosion	BEARING #5 MINOR CORROSION, DUE TO WEEPERS ON NORTHWEST.
313	Fixed Bearing	PAINT PEELING.
L 515	Steel Protective Coating	
330	Metal Bridge Railing	** 2-Bar Aluminum **  RAIL- FEW SCRAPES AND MINOR GOUGES. SEVERAL AREAS OF MISSING OR LOOSE BALUSTERS. MODERATE DAMAGE ON POST AND RAIL, NORTHWEST. TOP RAIL CRACKED OVER JOINT, SOUTHEAST.

## Bridge Inspection Report

NBI Structure Number: 013101100006800

Hudson 110/068

## Element States (see disclaimer below)

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
12	Reinforced Concrete Deck	21,915	sq.ft	90%	10%	0%	0%
└ 510	Wearing Surfaces	—	—	83%	17%	0%	0%
└ 1120	Efflorescence/Rust Staining	2,191	sq.ft	0%	100%	0%	0%
107	Steel Open Girder/Beam	3,061	ft	97%	3%	0%	0%
└ 515	Steel Protective Coating	—	—	100%	0%	0%	0%
└ 1000	Corrosion	60	ft	0%	100%	0%	0%
└ 1020	Connection	24	ft	0%	100%	0%	0%
152	Steel Floor Beam	49	ft	100%	0%	0%	0%
└ 515	Steel Protective Coating	—	—	100%	0%	0%	0%
210	Reinforced Concrete Pier Wall	111	ft	100%	0%	0%	0%
215	Reinforced Concrete Abutment	173	ft	100%	0%	0%	0%
└ 6000	Scour	1	ft	100%	0%	0%	0%
234	Reinforced Concrete Pier Cap	106	ft	100%	0%	0%	0%
300	Strip Seal Expansion Joint	72	ft	100%	0%	0%	0%
311	Movable Bearing	20	each	95%	5%	0%	0%
└ 515	Steel Protective Coating	—	—	100%	0%	0%	0%
└ 1000	Corrosion	1	each	0%	100%	0%	0%
313	Fixed Bearing	5	each	100%	0%	0%	0%
└ 515	Steel Protective Coating	—	—	100%	0%	0%	0%
330	Metal Bridge Railing	1,302	ft	100%	0%	0%	0%

Element Disclaimer: NHDOT is transitioning from CoRe elements to AASHTO elements. The AASHTO element data shown above is the product of the automated element migration routine from the AASHTOWare BrM software. This migrated data has undergone limited field verification. Adequate quality control of this element data is not expected to be achieved until the conclusion of the 2020 inspection season. Please utilize element data with caution.

## Bridge Notes:

LIFT USED 7/12/01, 6/15/05, 8/19/09, 10/8/13, 9/21/17

UNDERWATER INSPECTION 6/23/2010. DMB UNDERWATER INSPECTION COMMENTS- PIERS ONLY INSPECTED.

CONCRETE IN GOOD CONDITION WITH ONLY MINOR DEFECTS. PIERS ARE SUBJECT TO SCOUR WITH HOLES UP TO 10' MEASURED ALONG STEEL SHEET PILE. NO UNDERMINING OBSERVED. PIER #1 NOW HAS NO EXPOSED CONCRETE FOOTING. P#2 HAS EXPOSED CONCRETE FOOTING ALL AROUND AS WELL AS SHEET PILE EXPOSURE EXCEPT AT THE SE CORNER. P#3 HAS EXPOSED CONCRETE FOOTING ALL AROUND. WATER DEPTHS AROUND P#1 RANGE FROM 5' TO 10.0'. DEPTHS AROUND P#2 RANGE FROM 9.0' TO 19'. DEPTHS AROUND P#3 RANGE FROM 3.5' TO 6.0'. 18.0' TO 19' DEPTH AT NORTH PIER NOSE #2 AND ALONG WEST SIDE OF P#2. REFERENCE ELEVATION 6.7' FROM TOP OF EXPOSED FOOTING AT THE SW CORNER OF P#2 TO WATERLINE.

## Inspection Notes: 09/16/2019

BTB inspection comments -

DECK: ASPHALT- FEW CRACKS, SEVERAL AREAS OF HOLLOW SOUNDING CIRCULAR MEMBRANE FAILURES. SIDEWALK-SMALL SPALLS ALONG GRANITE CURB. CURB- LIGHT CRACKS. UNDERSIDE OF DECK- SEVERAL FINE TRANSVERSE CRACKS WITH EFFLORESCENCE, MINOR SPALLS. FULL DEPTH PATCH IN SPAN #1, BAY #2; NO LEAKAGE. FINE CRACKS, RUST STAINED AND LIGHT EFFLORESCENCE UNDER CURBS. JOINTS- DEBRIS FILLED. LIGHT TO MODERATE GOUGES ON WEST. JOINT ARMOR CRACKED NEAR CENTER, WEST. RAIL- FEW SCRAPES AND MINOR GOUGES. SEVERAL AREAS OF MISSING OR LOOSE BALUSTERS. MODERATE DAMAGE ON POST AND RAIL, NORTHWEST. TOP RAIL CRACKED OVER JOINT, SOUTHEAST.

SUBSTRUCTURE: GIRDERS- EXTERIORS FADED, LIGHT PAINT PEELING WITH MINOR RUST. PACK RUST DEVELOPING ON ALL EXTERIOR SPLICE PLATES, PACK RUST APPROXIMATELY 3/8"+. MINOR CRACK IN HORIZONTAL STIFFENER WELD IN SPAN TWO, STRINGER THREE; EAST OF X FRAME #4. TOP OF BOTTOM FLANGE, GUANO COVERED IN AREAS

SUBSTRUCTURE: ABUTMENTS- MINOR CRACKS. PIERS- SEE UNDERWATER INSPECTION.

PICTURES: D208-

13. SOUTH ELEVATION.

14. WEST APPROACH.

15. ASPHALT CRACKED AND POTHOLED ALONG JOINT, WEST.

16. JOINT ARMOR CRACKED NEAR CENTER, WEST.

# Bridge Inspection Report

NBI Structure Number: 013101100006800

Hudson 110/068

**Previous Inspection Notes:** 09/21/2017

NJL inspection comments -

DECK: ASPHALT- FEW CRACKS, SEVERAL AREAS OF HOLLOW SOUNDING CIRCULAR MEMBRANE FAILURES. SIDEWALK-SMALL SPALLS ALONG GRANITE CURB. CURB- LIGHT CRACKS. UNDERSIDE OF DECK- SEVERAL FINE TRANSVERSE CRACKS WITH EFFLORESCENCE, MINOR SPALLS. FULL DEPTH PATCH IN SPAN #1, BAY #2; NO LEAKAGE. FINE CRACKS, RUST STAINED AND LIGHT EFFLORESCENCE UNDER CURBS. JOINTS- DEBRIS FILLED. LIGHT TO MODERATE GOUGES ON WEST. RAIL- FEW SCRAPES AND MINOR GOUGES. SEVERAL AREAS OF MISSING OR LOOSE BALUSTERS. MODERATE DAMAGE ON POST AND RAIL, NORTHWEST. TOP RAIL CRACKED OVER JOINT, SOUTHEAST.  
SUPERSTRUCTURE: GIRDERS- EXTERIORS FADED, LIGHT PAINT PEELING WITH MINOR RUST. PACK RUST DEVELOPING ON ALL EXTERIOR CONNECTION PLATES, PACK RUST APPROXIMATELY 3/8"+. MINOR CRACK IN HORIZONTAL STIFFENER WELD IN SPAN TWO, STRINGER THREE; EAST OF X FRAME #4. TOP OF BOTTOM FLANGE, GUANO COVERED IN AREAS  
SUBSTRUCTURE: ABUTMENTS- MINOR CRACKS. PIERS- SEE UNDERWATER INSPECTION.

PICTURES: D208-

- 04. WEEPER BROKEN OFF NEAR NORTHWEST ABUTMENT WITH LEAKAGE ONTO #5 MOVEABLE BEARING CREATING LIGHT SCALE.
- 05. PACK RUST DEVELOPING ON EXTERIOR CONNECTION PLATE IN SPAN #1, TYPICAL OF ALL EXTERIORS; PACK RUST APPROXIMATELY 3/8"+.
- 06. VIEW OF UNDERSIDE OF DECK IN SPAN #1, FINE TRANSVERSE CRACKS WITH EFFLORESCENCE; FULL DEPTH PATCH SOUND.
- 07. BOLT BROKEN OFF FIXED BEARING #3, PIER #2 ON EAST.
- 08. VIEW OF UNDERSIDE OF DECK IN SPAN #3, FINE TRANSVERSE CRACKS WITH EFFLORESCENCE.

**Approach and Roadway Notes:**

APPROACH ASPHALT- CRACKED, PATCHED AND SETTLED ON WEST EXPOSING EDGE OF JOINT ARMOR. MINOR CRACKS ON EAST.  
APPROACH RAIL- MODERATE DAMAGE ON NORTHWEST.

**Inspection History**

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
09/16/2019	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
09/21/2017	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
09/23/2015	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
06/29/2015	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
10/08/2013	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
08/08/2013	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
08/17/2011	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
06/23/2010	DMB	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
08/19/2009	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
08/10/2007	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
06/15/2005	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
10/02/2003	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
07/12/2001	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
07/01/1997		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
10/01/1995		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	7	7	N	<input type="checkbox"/>	E-2
11/01/1993		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	8	8	N	<input type="checkbox"/>	E-2
09/01/1991		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	8	8	N	<input type="checkbox"/>	E-2

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	60



N.H. D.O.T.

TOWN HUDSON - NASHUA

BRIDGE CAPACITY SUMMARY

BRIDGE NUMBER 110/068

DESIGN LOAD H520

DESIGN METHOD WSD

RATED BY DES DATE 2/16/88

RATING METHOD INSPECTION

CHECKED BY A-2-2-1

DATE

RATED MEMBER	EFFECTIVE SPAN LENGTH	REQUIRED CAPACITY			AVAILABLE CAPACITY							
		CURRENT LEGAL LOADS	CERTIFIED VEHICLES		MULTIPLE LANES LOADED		SINGLE LANE LOADED		INVENTORY OPERATING POSTL.			
			SINGLE UNIT	MULTIPLE UNIT	INVENTORY	OPERATING	INVENTORY	OPERATING				
DECK	71'	H514.3			H520	H530	H520	H530				
PLATE GIRDERS	2@125' 2@173'	H520.2 H518.7			H520	H527.4 H527.4	H525.4 H525.4	H534.8 H534.8				

RECOMMENDED POSTING: Post "E-2" UNTIL EVALUATED FOR CERTIFIED LOADS

64. (Op.) 249

66. (Inv.) 236



**HUDSON 110/068**  
**NH111 EB over MERRIMACK RIVER**

Owner: Municipality  
Inspection Team: D

Monday, September 16, 2019

**JOINT ARMOR CRACKED  
NEAR CENTER, WEST.**



D233 16





**HUDSON 110/068**  
**NH111 EB over MERRIMACK RIVER**

Owner: Municipality  
Inspection Team: D

Monday, September 16, 2019

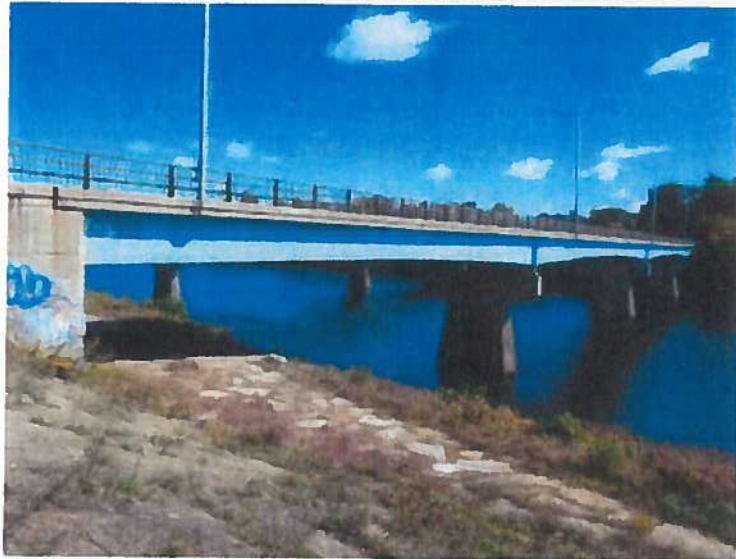
WEST APPROACH.



D233 14

Monday, September 16, 2019

SOUTH ELEVATION.



D233 13

Monday, September 16, 2019

ASPHALT CRACKED AND  
POTHOLED ALONG JOINT,  
WEST.



D233 15



# Bridge Inspection Report

NBI Structure Number: 013101090006800

Hudson 109/068

Date of Inspection: 09/16/2019

NH111 WB

Date Report Sent: 01/28/2020

over

Owner: Municipality

MERRIMACK RIVER

Bridge Inspection Group: D-Team

Taylor Falls Bridge

Bridge Maintenance Crew: OTHER

Bridge also in: Nashua, New Hampshire

## Recommended Postings:

Weight: E-2

Weight Sign OK

SIGNS IN PLACE. 9/16/2019

Width: Not Required

Width Sign OK

Primary Height Sign Recommendation: None

Clearances: Over: 99.99

Height Sign OK

Optional Centerline Height Sign Rec: None

(Feet) Under: 0.00

Route: 99.99

## Condition:

Red List Status: Not on the Redlist

Deck: 6 Satisfactory

Superstructure: 7 Good

Substructure: 6 Satisfactory

Culvert: N N/A (NBI)

Sufficiency Rating: 63 %

Bridge Rail: Substandard

Rail Transition: Substandard

Bridge Approach Rail: Substandard

Approach Rail Ends: Substandard

## Bridge Dimensions:

Length Maximum Span: 173.0 ft

Left Curb/Sidewalk Width: 5.0 ft

Width Curb to Curb: 28.0 ft

Approach Roadway Width: 28.0 ft  
(W/Shoulders)

## Structure Type and Materials:

Number of Main Spans: 4

Number of Approach Spans: 0

### Main Span Material and Design Type

Steel Continuous/Stringer/Girder

NH Bridge Type: IB-C (I Beams w/ Concrete Deck)

Deck Type: Concrete-Cast-in-Place

Wearing Surface: Bituminous

Membrane: Other

Deck Protection: None

Curb Reveal: 8 in

Plan Location: 3-14-2-1

Total Bridge Length: 602.0 ft

Right Curb/Sidewalk Width: 0.7 ft

Total Bridge Width: 37.0 ft

Median: No median

Bridge Skew: 0.00°

Year Built/Rebuilt: 1970

# Bridge Inspection Report

NBI Structure Number: 013101090006800

Hudson 109/068

## Bridge Service:

Type of Service on Bridge: Highway and Pedestrian

Type of Service Under: Waterway

Lanes on Bridge: 2

Lanes Under: 0

AADT: 17,152

Percent Trucks: 5%

Year of AADT: 2017

Future AADT: 25,384

Year of Future AADT: 2040

Federal or State Definition Bridge: Fed-Definition Bridge

National Highway System: NHS Roadway on Bridge

Roadway Functional Class: Urban, Other Principal Arterial

New Hampshire Bridge Tier: 5

Eligibility for the National Register of Historic Places: Possibly eligible for

Traffic Direction: 1-way traffic

## National Bridge Inventory (NBI) Appraisal Ratings:

Deck Geometry: 3 Intolerable - Correct

Underclearances: N Not applicable (NBI)

Approach Alignment: 8 Equal Desirable Crit

Structural Evaluation: 6 Equal Min Criteria

Channel/Channel Protection: 6 Bank Slumping

Waterway Adequacy: 9 Above Desirable

Bridge Scour Critical Status: 3 SC - Unstable

Riprap Condition: Fair Condition

Debris Present: Debris Present

Channel Notes: Scour Critical, CHA Study, Will further investigate piles stability during flood events. SOME FOOTING & SHEET PILE EXPOSURE.

# Bridge Inspection Report

NBI Structure Number: 013101090006800

Hudson 109/068

**Element Details (see disclaimer below)**

No.	Description	Material Notes and Condition Notes:
12	Reinforced Concrete Deck	CURB- ON SOUTH, FEW CRACKS WITH MINOR SPALLS. SIDEWALK- ON NORTH, FEW CRACKS WITH LARGE SPALLS. UNDERSIDE OF DECK- MINOR CRACKS WITH EFFLORESCENCE. RUST STAINS, SMALL TO MEDIUM DELAMINATIONS AND MINOR TO LIGHT SPALLS WITH REBAR EXPOSED. UNDERSIDE OF CURBS- SEVERAL LARGE DELAMINATIONS, FEW SPALLS WITH REBAR EXPOSED.
L 510	Wearing Surfaces	ASPHALT- SEVERAL CRACKS AND DEPRESSIONS.
L 1080	Delamination/Spall/Patched Area	SEVERAL DELAMINATIONS UNDER BOTH CURBS, FEW AREAS UNDER DECK.
L 1090	Exposed Rebar	SEVERAL SMALL AREAS OF EXPOSED REBAR UNDER CURBS ON BOTH SIDES, ONE UNDER DECK.
107	Steel Open Girder/Beam	EXTERIORS FADED, AREAS OF EXPOSED METAL ON BOTTOM FLANGES, DIAPHRAGMS AND WEBS. LATERAL BRACING CONNECTION PLATE BENT AT EAST.
L 515	Steel Protective Coating	
L 1000	Corrosion	AREAS OF EXPOSED METAL WITH FRECKLED RUST.
210	Reinforced Concrete Pier Wall	MINOR CRACKS.
L 6000	Scour	FOOTINGS AND SHEET PILE EXPOSED. SCOUR CRITICAL, CHA STUDY. WILL FURTHER INVESTIGATE PILE STABILITY DURING FLOOD EVENTS.
215	Reinforced Concrete Abutment	TOP OF BACKWALLS SPALLED ALONG JOINT ON BOTH SIDES AT EAST AND WEST. SOUTHWEST WING SPALLED, SMALL AREA OF REBAR EXPOSED. LARGE SPALL WITH REBAR EXPOSED ON INTERIOR OF SOUTHWEST CHEEK WALL, SMALL DELAMINATION ON NORTHWEST INTERIOR CHEEK.
L 1080	Delamination/Spall/Patched Area	TOP OF BACKWALL, NINE FOOT SPALL ON SOUTHWEST AND TWO FOOT ON SOUTHEAST. THREE FOOT SPALL ON NORTHEAST. TWO FOOT DELAMINATION ON NORTHWEST INTERIOR CHEEK WALL.
L 1090	Exposed Rebar	REBAR EXPOSED ON INTERIOR CHEEK WALL AND SOUTHWEST WING.
234	Reinforced Concrete Pier Cap	MINOR CRACKS.
300	Strip Seal Expansion Joint	JOINTS- DEBRIS FILLED.
311	Movable Bearing	ANCHOR BOLT LIFTED ON #1 AND #3 ROCKER ON EAST ABUTMENT; ROCKERS SLIGHTLY TIPPED ON BOTH ENDS.
L 515	Steel Protective Coating	
313	Fixed Bearing	BOLT LIFTED ON BEARING #3, PIER #2 ON WEST.
L 515	Steel Protective Coating	
330	Metal Bridge Railing	RAIL- ONE BRIDGE POST DAMAGED ON SOUTHEAST, SEVERAL SCRAPES ON RAIL. FEW SECTIONS OF BALUSTERS DAMAGED AND MISSING ON NORTH.

## Bridge Inspection Report

NBI Structure Number: 013101090006800

Hudson 109/068

## Element States (see disclaimer below)

No.	Description	Quantity	Units	State 1	State 2	State 3	State 4
12	Reinforced Concrete Deck	22,274	sq.ft	91%	9%	0%	0%
L 510	Wearing Surfaces	---	---	40%	30%	30%	0%
L 1080	Delamination/Spall/Patched Area	2,000	sq.ft	0%	100%	0%	0%
L 1090	Exposed Rebar	100	sq.ft	0%	100%	0%	0%
107	Steel Open Girder/Beam	2,408	ft	90%	10%	0%	0%
L 515	Steel Protective Coating	---	---	100%	0%	0%	0%
L 1000	Corrosion	240	ft	0%	100%	0%	0%
210	Reinforced Concrete Pier Wall	75	ft	99%	1%	0%	0%
L 6000	Scour	1	ft	0%	100%	0%	0%
215	Reinforced Concrete Abutment	151	ft	83%	17%	0%	0%
L 1080	Delamination/Spall/Patched Area	16	ft	0%	100%	0%	0%
L 1090	Exposed Rebar	9	ft	0%	100%	0%	0%
234	Reinforced Concrete Pier Cap	108	ft	100%	0%	0%	0%
300	Strip Seal Expansion Joint	72	ft	100%	0%	0%	0%
311	Movable Bearing	16	each	100%	0%	0%	0%
L 515	Steel Protective Coating	---	---	100%	0%	0%	0%
313	Fixed Bearing	4	each	100%	0%	0%	0%
L 515	Steel Protective Coating	---	---	100%	0%	0%	0%
330	Metal Bridge Railing	1,309	ft	100%	0%	0%	0%

Element Disclaimer: NHDOT is transitioning from CoRe elements to AASHTO elements. The AASHTO element data shown above is the product of the automated element migration routine from the AASHTOWare BrM software. This migrated data has undergone limited field verification. Adequate quality control of this element data is not expected to be achieved until the conclusion of the 2020 inspection season. Please utilize element data with caution.

## Bridge Notes:

SERVI-LIFT USED 6/15/05, 8/19/09 10/7/13, 9/21/17

UNDERWATER INSPECTION 6/23/2010. DMB UNDERWATER INSPECTION COMMENTS- PIERS ONLY INSPECTED.

CONCRETE IN GOOD CONDITION WITH ONLY MINOR DEFECTS. PIERS ARE SUBJECT TO SCOUR WITH HOLES UP TO 12' MEASURED ALONG STEEL SHEET PILE. NO UNDERMINING OBSERVED. A COMPARISON WITH PRIOR REPORTS INDICATES NO SIGNIFICANT CHANGE FROM 5 YEARS AGO. PIER #1 HAS SOME EXPOSED CONCRETE FOOTING ON THE EAST SIDE. P#2 HAS EXPOSED CONCRETE FOOTING ALL AROUND AS WELL AS SHEET PILE EXPOSURE AT THE SOUTH END AND SE CORNER. P#3 HAS EXPOSED CONCRETE FOOTING ALL AROUND AS WELL AS EXPOSED SHEET PILE ALONG THE WEST SIDE AND THE SOUTH END. ONE AREA HAS PULLED AWAY FROM CONCRETE ABOUT 12". WATER DEPTHS AROUND P#1 RANGE FROM 5' TO 7.9'. DEPTHS AROUND P#2 RANGE FROM 13.9' TO 18'. DEPTHS AROUND P#3 RANGE FROM 4.0' TO 15'. REFERENCE ELEVATION 6.6' FROM TOP OF EXPOSED FOOTING AT THE SW CORNER OF P#2 TO WATERLINE.

FLOOD EVENT 8/28-29/2011. SCOUR CRITICAL POST FLOOD EVENT INSPECTION, 9/1/11.

## Inspection Notes: 09/16/2019

NJL inspection comments-

DECK: ASPHALT- SEVERAL CRACKS AND DEPRESSIONS. CURB- ON SOUTH, FEW CRACKS WITH MINOR SPALLS. SIDEWALK- ON NORTH, FEW CRACKS WITH LARGE SPALLS. UNDERSIDE OF DECK- MINOR CRACKS WITH EFFLORESCENCE. RUST STAINS, SMALL TO MEDIUM DELAMINATIONS AND MINOR TO LIGHT SPALLS WITH REBAR EXPOSED. UNDERSIDE OF CURBS- SEVERAL LARGE DELAMINATIONS, FEW SPALLS WITH REBAR EXPOSED. JOINTS- DEBRIS FILLED. RAIL- ONE BRIDGE POST DAMAGED ON SOUTHEAST, SEVERAL SCRAPES ON RAIL. FEW SECTIONS OF BALUSTERS DAMAGED AND MISSING ON NORTH.

SUPERSTRUCTURE: GIRDERS- EXTERIORS FADED, AREAS OF EXPOSED METAL ON BOTTOM FLANGES, DIAPHRAGMS AND WEBS. LATERAL BRACING CONNECTION PLATE BENT AT EAST.

SUBSTRUCTURE: TOP OF BACKWALLS SPALLED ALONG JOINT ON BOTH SIDES AT EAST AND WEST. SOUTHWEST WING SPALLED, SMALL AREA OF REBAR EXPOSED. LARGE SPALL WITH REBAR EXPOSED ON INTERIOR OF SOUTHWEST CHEEK WALL, SMALL DELAMINATION ON NORTHWEST INTERIOR CHEEK.

PICTURES: D233-

07. TOP OF SOUTHEAST BACKWALL SPALLED ADJACENT TO JOINT.
08. ASPHALT DEPRESSIONS IN SPAN #1, TYPICAL OF SEVERAL AREAS.
09. TOP OF SOUTHWEST BACKWALL SPALLED ADJACENT TO JOINT.
10. EAST APPROACH.
11. SOUTH ELEVATION.
12. INTERIOR OF SOUTHWEST CHEEK WALL SPALLED WITH REBAR EXPOSED.

# Bridge Inspection Report

NBI Structure Number: 013101090006800

Hudson 109/068

Previous Inspection Notes: 09/21/2017

BTB inspection comments-

DECK: ASPHALT- FEW CRACKS, A COUPLE OF MEMBRANE BLISTERS ON EAST; SEVERAL ON WEST. CURB- ON SOUTH, FEW CRACKS WITH MINOR SPALLS. SIDEWALK- ON NORTH, CRACKED, SPALLED WITH LARGE DELAMINATED AREAS; SOME REPAIRED. UNDERSIDE OF DECK- MINOR CRACKS, EFFLORESCENCE, RUST STAINS, SMALL TO MEDIUM DELAMINATIONS AND MINOR TO LIGHT SPALLS WITH REBAR EXPOSED. UNDERSIDE OF CURBS, SEVERAL LARGE DELAMINATIONS, FEW SPALLS WITH REBAR EXPOSED. JOINTS- DEBRIS FILLED. RAIL- ONE BRIDGE POST DAMAGED ON SOUTHEAST, SEVERAL SCRAPES ON RAIL. FEW SECTIONS OF BALUSTERS DAMAGED AND MISSING ON NORTH.  
SUPERSTRUCTURE: GIRDERS- EXTERIORS FADED, AREAS OF EXPOSED METAL ON BOTTOM FLANGES, DIAPHRAGMS AND WEBS. LATERAL BRACING CONNECTION PLATE BENT AT EAST.  
SUBSTRUCTURE: ABUTMENTS- TOP OF BACKWALL SPALLED ALONG JOINT BOTH SIDES. CHEEKWALL SPALLED AT BASE WITH SMALL AREA OF REBAR EXPOSED ON SOUTHWEST. LARGE DELAMINATION ON INTERIOR OF SOUTHWEST CHEEKWALL; SMALL DELAMINATION ON NORTHWEST INTERIOR CHEEKWALL.

PICTURES: D208-

- 09. TOP OF BACKWALL SPALLED ALONG EAST JOINT.
- 10. UNDERSIDE OF CURB SPALLED AT NORTH, TYPICAL OF SOUTH.
- 11. AREAS OF EXPOSED METAL ON BOTTOM FLANGES, DIAPHRAGMS AND WEBS.
- 12. BOLT LIFTED ON BEARING #3, PIER #2 ON WEST.
- 13. DELAMINATIONS UNDER NORTH CURB, TYPICAL OF SOUTH.
- 14. DELAMINATION IN BAY #2, SPAN #2.
- 15. TWO DELAMINATIONS IN BAY #3, SPAN #1.
- 16. TOP OF BACKWALL SPALLED ALONG WEST JOINT.

**Approach and Roadway Notes:**

APPROACH ASPHALT- CRACKED, SETTLED ON BOTH ENDS EXPOSING EDGE OF JOINT ARMOR; POTHOLED ON WEST. RAIL POSTS LOOSE AT NORTHEAST DUE TO IMPACT. NORTHEAST AND SOUTHWEST TERMINAL ENDS WITH CRACKED WELDS.

**Unusual or experimental features:**

**Inspection History**

Inspection Date	Inspector Initials	Inspection Type(s) Performed				Major Element Ratings				Red list	Posting
		NBI	Elem	FCM	U/W	Deck	Super	Sub	Culvert		
09/16/2019	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	6	N	<input type="checkbox"/>	E-2
09/21/2017	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
09/23/2015	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
06/29/2015	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
10/07/2013	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
08/08/2013	NJL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
09/01/2011	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
08/17/2011	KLM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
06/23/2010	DMB	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
08/19/2009	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
08/10/2007	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
06/15/2005	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	7	7	N	<input type="checkbox"/>	E-2
10/02/2003	JEL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
07/12/2001	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
11/05/1999	FNM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
07/01/1997		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
10/01/1995		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
11/01/1993		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	8	7	N	<input type="checkbox"/>	E-2
09/01/1991		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	8	8	N	<input type="checkbox"/>	E-2

Inspection Frequency (mo.)			
NBI	Elem	FCM	U/W
24	24	N/A	60





**BRIDGE CAPACITY SUMMARY**

TOWN: HUDSON  
 BRIDGE NUMBER: 109/068  
 RATED BY: JTP DATE: 5/31/2013  
 CHECK BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 OVER: MERRIMACK RIVER

DESIGN LOAD: HS20-44 DESIGN METHOD: UNKNOWN  
 RATING METHOD: LOAD FACTOR PLAN FILE: 3-14-2-1  
 ROUTE: NH 111 WESTBOUND

RATED MEMBER	LONGITUD. EFFECTIVE SPAN LENGTH	REQUIRED CAPACITY (HS Tons)		AVAILABLE CAPACITY (HS Tons)						
		CURRENT LEGAL LOADS	CERTIFIED VEHICLES		MULTIPLE LANES LOADED		SINGLE LANES LOADED			
			SINGLE UNIT	MULTIPLE UNIT	INVENTORY	OPERATING	INVENTORY	OPERATING	POSTING	
Concrete Deck	1'-0"	HS 14.0	HS 15.4	HS 14.7	HS 24.4	HS 14.7	HS 24.4	HS 14.7	HS 24.4	
Interior Girder Span 1/4 Shear	125'-0"	HS 20.1	HS 26.4	HS 22.2	HS 37.1	HS 28.3	HS 47.2	HS 28.3	HS 47.2	
Interior Girder Span 1/4 Flexure	125'-0"	HS 20.2	HS 26.4	HS 29.2	HS 48.8	HS 37.2	HS 62.1	HS 37.2	HS 62.1	
Interior Girder Span 2/3 Shear	173'-0"	HS 16.9	HS 22.7	HS 30.2	HS 50.5	HS 38.5	HS 64.2	HS 38.5	HS 64.2	
Interior Girder Span 2/3 Flexure	173'-0"	HS 18.7	HS 24.2	HS 26.8	HS 45.0	HS 34.1	HS 57.3	HS 34.1	HS 57.3	
Exterior Girder Span 1/4 Shear	125'-0"	HS 20.1	HS 26.4	HS 27.4	HS 45.7	HS 27.4	HS 45.7	HS 27.4	HS 45.7	
Exterior Girder Span 1/4 Flexure	125'-0"	HS 20.2	HS 26.4	HS 34.0	HS 56.6	HS 34.0	HS 56.6	HS 34.0	HS 56.6	
Exterior Girder Span 2/3 Shear	173'-0"	HS 16.9	HS 22.7	HS 35.1	HS 58.6	HS 35.1	HS 58.6	HS 35.1	HS 58.6	
Exterior Girder Span 2/3 Flexure	173'-0"	HS 18.7	HS 24.2	HS 31.2	HS 52.2	HS 31.2	HS 52.2	HS 31.2	HS 52.2	
				Rating Method		English Tons		Metric Tons		
				(Op.) 63.	LF	64. (Op.)		39.8		
				(Inv.) 65.	LF	66. (Inv.)		24.0		

RECOMMENDED POSTING: E-2



**HUDSON 109/068**  
NH111 WB over MERRIMACK RIVER

Owner: Municipality  
Inspection Team: D

Monday, September 16, 2019

ASPHALT DEPRESSIONS IN  
SPAN #1, TYPICAL OF  
SEVERAL AREAS.



D233 08

Monday, September 16, 2019

TOP OF SOUTHWEST  
BACKWALL SPALLED  
ADJACENT TO JOINT.



D233 09

Monday, September 16, 2019

INTERIOR OF SOUTHWEST  
CHEEK WALL SPALLED  
WITH REBAR EXPOSED.



D233 12

