Mixmaster Rehabilitation NEWSLETTER

October 2020

this issue

Project Status

The Mixmaster Rehabilitation project is into its 28th month and is on track to be completed on time.

A summary of ongoing activities include:

Bridge 3191B I-84 Westbound: Partial and full depth patches, rebuilding parapets and temporary paving.

Bridge 3191A I-84 Eastbound: Paving, deck end reconstruction in the right auxiliary lane.

Bridge 3190A Route 8 Northbound: Stage 1 reconstruction of deck and parapet was completed including paving and line striping. Stage 2 construction started which includes replacing the deck substructure, parapets and paving.

Bridge 3190B Route 8 Southbound: Completed Stage 1 reconstruction of deck substructure, parapets and paving. Bridge planned to open prior to the Winter.

Miscellaneous: Concrete repairs throughout the substructure which consists of chipping out delaminated unsound areas of concrete and replacing with Class S mix strengthening the concrete integrity.

If you have any comments or concerns relative to this project, please feel free to contact us at info@mixmaster-rehab.com or visit our project website https://mixmaster-rehab.com/. All future updates will continue to be posted on all social media outlets.

Employee Spotlight

Florencio Barros

COMPANY: Walsh Construction

Mr. Barros began his career as a mason in 1976. His 44 years of experience has provided him a feeling of personal accomplishment. He finds it rewarding to be a part of the Mixmaster team and the construction industry. Mr. Barros moved to America in 1987 from Portugal where he continued his career in masonry.

As part of the Mixmaster project, Mr. Barros performs concrete repairs to the superstructures parapet walls, Class S patches and deck pours. Other projects include the Q-Bridge in New Haven, Connecticut and Sikorsky Bridge in Stratford/Milford, Connecticut.

He holds so much pride in his work and plans to continue working to add to his in-depth experience.

In his spare time, Mr. Barros enjoys making homemade wine and Portugese bread.

An Interview with .....

Dean Bagdasarian

Field Design Engineer

GM2 Associates, Inc.

1. What is your role on this project?

I am the Lead Field Design Engineer working for GM2 Associates, Inc., the Construction Engineer and Inspection firm on the project. My role is to coordinate all design related questions, concerns and issues that arise during the course of construction.

2. Comparing this project to others that you have encountered, has this project had many changes?

This project is absolutely unique. Bridge rehabilitation projects, by nature, are ever changing as bridge deterioration is always progressing. Additionally, design engineers can only fix what they can see and when it comes to a project of this magnitude ($150 million), the potential is very high that once rehabilitation begins, conditions will have worsened.

3. Can you give an example on a planned design that needed to be altered?

The largest change to date relates to the Route 8 Southbound bridge deck. The scope of work required that we rehabilitate the existing concrete deck. This involved the full replacement of five (5) spans and the repair of the remaining 16 spans using concrete patching techniques. Once the bituminous was striped to expose the underlying concrete deck, it was quickly apparent that it was uneconomical to patch the existing concrete deck due to its excessively poor condition. A full concrete deck replacement would be required to achieve the 25-year service life.

4. What are some of the challenges associated with your role on this project?

One of the most unique challenges is prioritizing the work. The contractor and our inspection staff are finding differing conditions each and every day. Each task needs to be prioritized.

5. What happens if the Contractor wants to make a change in the design?

If the contractor proposes to make a change to the original design, they are required to submit a request for change (RFC) to the Department. RFC's give the contractor some flexibility in procuring material and allow the contractor to utilize their expertise during construction without reducing the intent or performance of the proposed work. These change requests typically involve a contractor constructability concern (i.e. requesting to splice the proposed steel cover plate to facilitate handling during erection) or a contractor material substitution (i.e. requesting to use epoxy coated wire mesh in lieu of galvanized wire mesh due to availability issues). Sometimes the response is straightforward with direct District review and acceptance. Most other times, it is more complicated as it relates to changes in a contract plan details and/or specifications. Regardless of the complexity, the RFC is initially vetted by field personnel to determine legitimacy of the request and claim. It is then further discussed with District personnel to determine if the State is interested in entertaining the requested change. If the District agrees that this could be further considered, the change request is discussed with the design team to ensure that the requested change does not compromise the initial intent of the design. If the requested change is accepted, it is commonly accepted assuming no additional cost to the State and/or assuming that no additional time will be granted to incorporate the change.

History of the Mixmaster

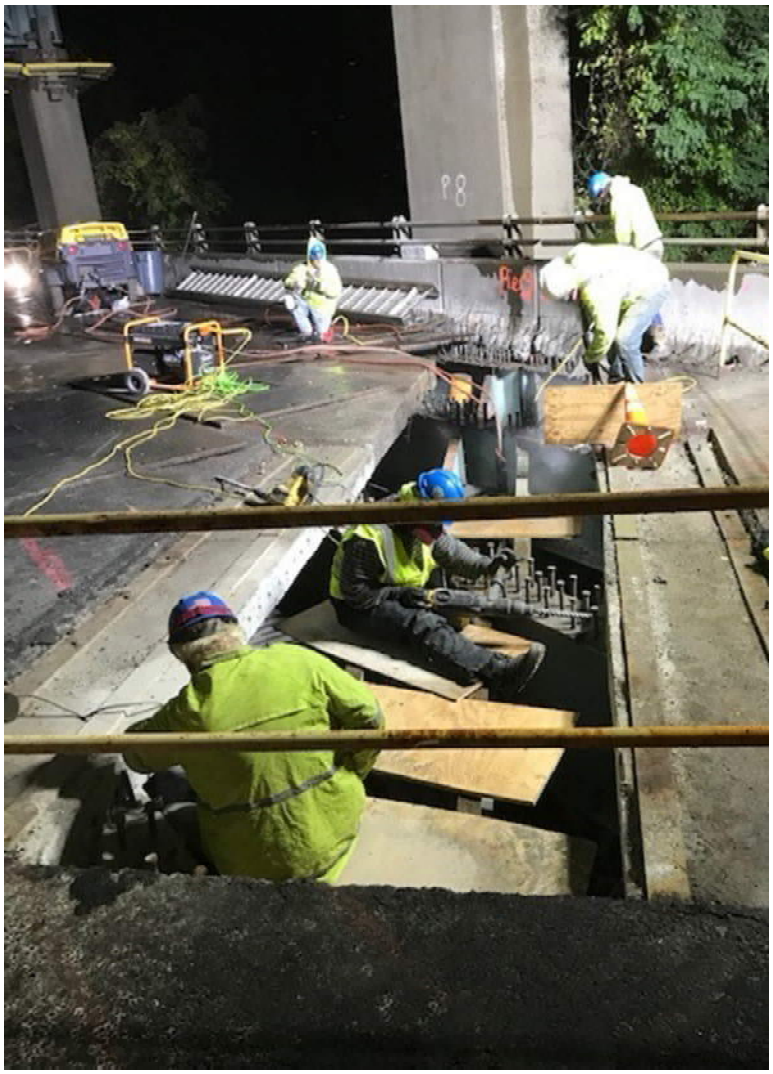
The Mixmaster was constructed in 1962. In fact, there were at least ten projects needed to complete the initial structure. Check it out!

- 1962-1965: Construction of I-84 (west of Mixmaster)
- 1963-1966: Relocation of Route 8 (north of Mixmaster)
- 1964-1965: I-84 and Relocation of Route 8 (Mixmaster Substructure)
- 1964-1967: Relocation of Route 8 and Grading on I-84 (south of Mixmaster)
- 1965-1968: I-84 and Relocation of Route 8 (Mixmaster Superstructure)
- 1988-1989: I-84/Route 8 Interchange Structural Steel Repairs
- 1994-1995: Rehabilitation of Various Bridges on the Interchange and I-84 over Naugatuck River
- 1995-1997: Bridge Painting, Seismic Retrofit, and Illumination, I-84 over Route 8, Naugatuck River, Railroad
- 2005: I-84/Route 8 Interchange Pier Cap/Deck Joint Repair
- On-Going: Continual Deck Patching
- On-Going: I-84/Route 8 Interchange Structural Steel Repairs
- ***2018-2022: Route 8/I-84 Mixmaster Rehabilitation***

Waterbury Mixmaster Ribbon Cutting, 1966

The ***superstructure*** is the portion of the bridge that supports the deck and connects one substructure element to another.

The ***substructure*** is the portion of the bridge that supports the superstructure and distributes all bridge loads to below-ground bridge footings.



Refurbishing Interstate 84

I-84 was fully open to travel in 1968. During the era in which the Mixmaster was constructed, the "finger joint" expansion deck joint was the prevailing joint system. A finger joint is a steel joint design that allows water to pass through the joint. A steel trough directs roadway water to the bridge's drainage network. As long at this trough remains intact and unimpeded by debris, the system functions efficiently; however, this requires constant upkeep. Unfortunately, if not well maintained, sand, salt and debris block the trough leading to steel and concrete deterioration.

Finger Joints

- Accommodate movements greater than 3 inches
- Comprised of cantilevered fingers loosely interlocking each other over the opening
- Sometimes installed with drainage troughs to catch and channel away water and debris
- Can jam, bend, or break during service due to horizontal and/or vertical misalignment during construction

Bridge decks have both fixed and expansion ends that allow the bridge to expand and contract under temperature changes. For reference, a 200-foot bridge span will expand 1 inch given a 60 F temperature change. It is important that a joint be able to accommodate these movements freely so that the forces from the movements of the bridge are not transferred to the substructure below.

This is not the first time that the ten (10) bridges that make up the Mixmaster have undergone deck and joint repairs, which is a major component of most bridge rehabilitation projects. For those of us who remember the late 80's, extensive repairs were made to the Mixmaster at that time, including the complete repainting of the structure.

In the early 80's, the asphaltic plug joint (APJ) design became the preferred joint system throughout the country. During the refurbishing of the Mixmaster in the late 80's, the finger joints were modified to accommodate APJs. APJs are still commonly used and consist of an elastoplastic bituminous binder with a mineral aggregate filler.

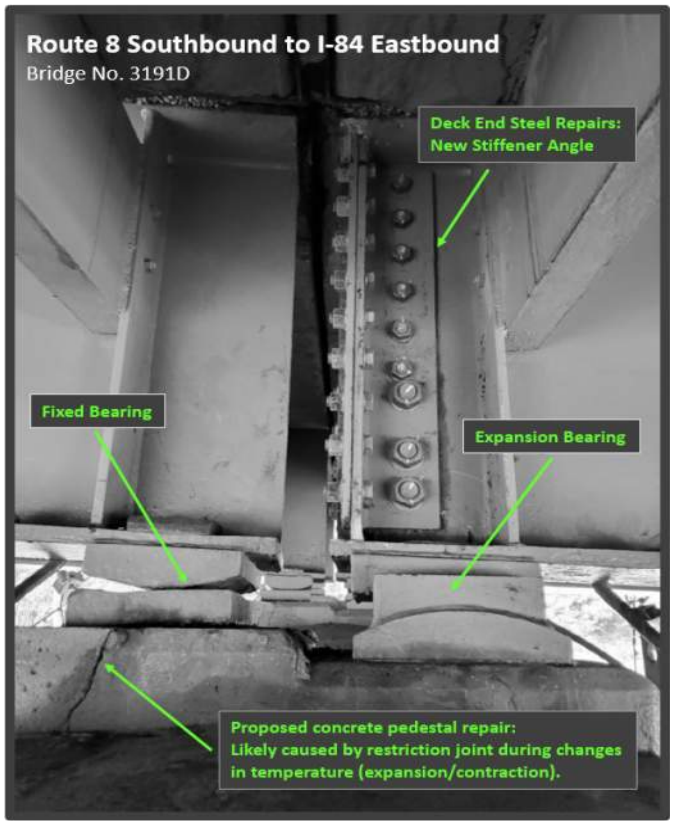
Asphalt Plug Joints

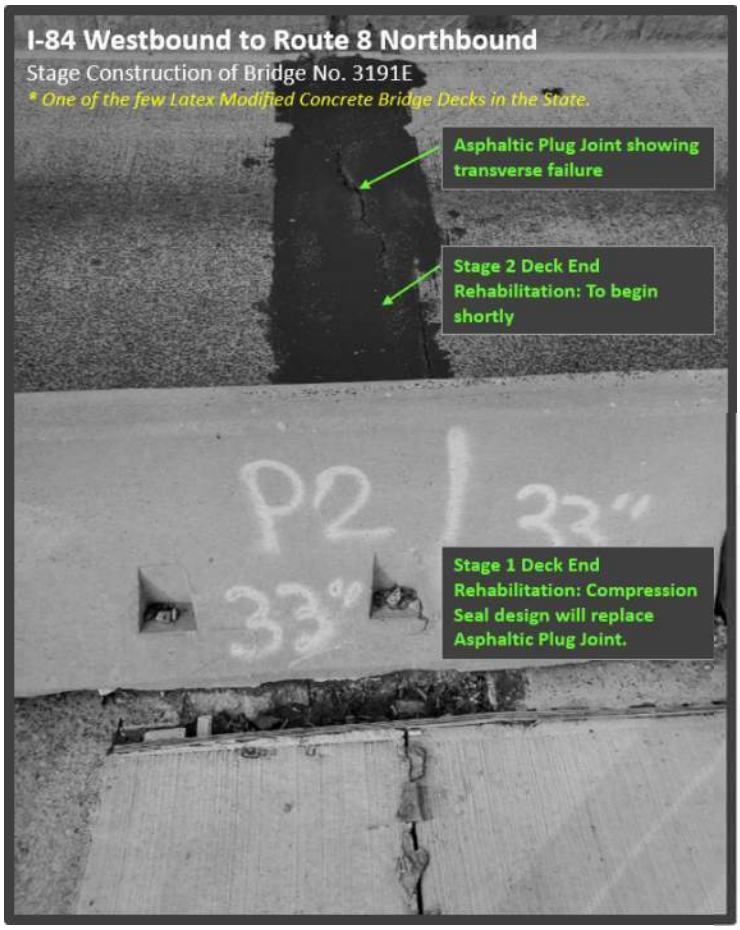
- Accommodate movements less than 2 inches
- Constructed by placing a modified elasto-plastic bituminous binder with mineral aggregate in a block-out centered over the joint, with a backer rod in place
- Can sustain damage when subjected to very rapid changes in temperature

APJ's reduce maintenance costs and eliminate water from permeating the joint but tend to crack within the joint or rut under heavy traffic loads. APJ's are not suggested where significant expansion and contraction is required.

Today, with improvements in materials, most deck-end repairs within the Mixmaster group of bridges will utilize an Elastomeric Concrete Header with a preformed bonded rubber joint seal insert. Elastomeric Concrete is best described as a more flexible concrete comprised of a 2-part polyurethane material mixed with aggregates and water (traditional Portland Cement does not include polyurethane).

As a driver, we are sure you to have felt the "thud" of your tire impacting gaps in the roadway, a feeling that is more pronounced during the winter when colder temperatures cause the contraction of the steel and concrete. Often the "thud" is the result of your vehicle passing over a bridge joint. Elastomeric Concrete in these locations is better suited to handle impact and withstand the rigors of daily traffic and winter maintenance.





As shown in the illustration below, fitted between the deck-end headers is a preformed EMSEAL expansion joint. The joint seal will prevent water and road salts from coming in contact and deteriorating the structural steel and concrete substructure below. The foam-backed joint system has an "M" shaped silicone rubber top face. EMSEAL expansion joints are easier to repair and less expensive to maintain.

In next month's article, we will provide information pertaining to the extensive effort required to replace a bridge joint, the difficulties we have encountered and the progress to date.