# STATE OF CONNECTICUT
# DEPARTMENT OF TRANSPORTATION








Project No. 135-301
*Atlantic Street, Elm Street, East Main Street*
*Stamford, Connecticut*

# Accelerated Project Delivery Study Report

*Submitted December 2012*

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# Acknowledgements

CME Associates, Inc. thanks URS Corporation, for the time and effort invested in this project thus far. The site facts and documentation gathered to date made this study possible, as well as their sharing of vital project information and constraints. Thanks also extend to the panel of experts from Gannett Fleming, Hatch Mott McDonald, Keville Enterprises, and Metro-North Railrod who attended all three days of the workshop and offered their experience and skillful advice.

Private industry and the Connecticut Department of Transportation (ConnDOT) partnerships make great advances possible in the field of Transportation. ConnDOT expresses appreciation to its employees and industry partners for their sustained efforts to expedite projects that employ financial prudence and that advance Accelerated Bridge Construction in the State of Connecticut. ConnDOT T also expresses thanks and appreciation to Mr. Michael P. Culmo and Mr. Bryan L. Busch of CME Associates and their staff for preparations of workshop materials, coordination for the workshop, and for accomplishing the goals of the workshop in such a short period of time.

**About the Workshop**

A team of expert consultants and ConnDOT employees gathered for an invitation-only three-day workshop held from November 19 to 21, 2012, at the ConnDOT building in Newington, Connecticut. The purpose of this workshop, sponsored by ConnDOT, was to obtain comments and recommendations for ways to accelerate the design, procurement, and construction of the South Stamford Accessibility and Bridge Replacement Project. The affected structures are located on Atlantic Street, Elm Street, and East Main Street in Stamford Connecticut. This report documents the activities and products of the workshop. The workshop's agenda and list of attendees/participants have been included in the appendices.

Michael P. Culmo, P.E., VP of Transportation and Structures, CME Associates, Inc.
Workshop Moderator / Facilitator and Author of Study Report

The Connecticut Department of Transportation (ConnDOT) hosted a three-day event workshop from November 19 to 21, 2012 as part of their investigation of ways to accelerate the design, procurement, and construction of the South Stamford Accessibility and Bridge Replacement Project. The goal of the workshop was to accelerate the delivery of the project from a completion date of 2019 to 2016.

This Project arose from the need to improve roadway connections between the northern and southern sections of the City of Stamford which are separated by I-95 and the Metro North Railroad (MNRR). Railroad bridges span over a number of the roadways connecting the north and south sections of the city. These structures create pinch points for traffic, utilities, and drainage, as they have an insufficient number of travel lanes, narrow lane widths, and substandard vertical clearances. As a result, the original scope for said Project included the replacement of the MNRR Bridges over Atlantic Street, Greenwich Avenue, Canal Street, Elm Street and East Main Street. Due primarily to lack of funding, a decision was made to split the Project into two phases; Phase One would consist of the MNRR Bridges over Atlantic Street, Elm Street and East Main Street, while Phase Two would occur at a later date and include Greenwich Avenue and Canal Street. The three structures in Phase One were those studied during the APD workshop.

The workshop consisted of three sessions; *project introduction, brainstorming, and presentation of findings and recommendations*. Timing of this workshop was good, as the extent of the work performed to date consists solely of a thorough feasibility study and ConnDOT's efforts to solicit input from all parties affected by this project. It will allow new recommendations and findings being easily implemented into the Project.

The major general recommendations were as follows:

a. Construct substructures prior to track closures. Use jump spans to support tracks over excavations for substructures. This allows for continuous construction with minimal impacts to train operations.
b. Use SPMT and lateral slide techniques to replace the superstructure in two pieces (even tracks, and odd tracks). Closure of one side of the railroad would be required for these weekend activities (inbound and outbound). This will dramatically reduce construction time and railroad impacts, since each bridge superstructure could be installed in two weekends.
c. Piles should be eliminated and spread footings used instead. This reduces railroad and catenary impacts.
d. Prefabricated elements should be used wherever possible. The proposed use of AMTRAK girders meets this recommendation.
e. Piers should be eliminated wherever possible.

Other secondary recommendations are included in Section3 of this report.

The conclusion of the team is that the construction of the project can be completed in 2016. This will not be an easy task. It will require cooperation of all stakeholders including Department units, The City of Stamford, The Metro North Commuter Railroad, and all other partner agencies.

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Much effort and work was completed during the Preliminary Engineering Phase of this project. During this phase, an extensive feasibility study was conducted by URS Corporation with multiple options for bridge superstructures and substructures explored. Associated costs for each alternate were developed and stake holders were identified. Issues that could impact rail operations, local traffic patterns, utilities, rights-of-way and drainage systems were also explored and documented. These efforts were instrumental as they provided the necessary foundation for the Accelerated Project Delivery Study.

The Connecticut Department of Transportation has made a significant effort to advance the practice of Accelerated Bridge Construction (ABC) in Connecticut. This project is an opportunity for showcasing the technologies of ABC.

The objective of this invitation-only three-day workshop was to gather input from expert consultants in the bridge planning, design, and construction industry who regularly employ Accelerated Bridge Construction (ABC) methods in order to assist ConnDOT in determining the extent to which ABC can reduce the design, procurement, and construction schedule of the South Stamford Accessibility and Bridge Replacement Project. Industry input is an important aspect of the ABC effort and investigating all possible construction methods, is an important aspect for ConnDOT to continue working towards meeting project goals, financial commitments, and building high quality structures.

The main objective of the study was to reduce the project delivery timeframe. The current schedule calls for completion of construction in 2019. The goal was to reduce the delivery time to completion of construction in 2016.

## Section 3 - WORKSHOP NOTES
## DAY 1 – Project Introduction

The purpose of the Day 1 Session was to become familiar with the project and begin investigating ways to accelerate the design and construction schedule of the South Stamford Accessibility and Bridge Replacement Project located on Atlantic Street, Elm Street, and East Main Street in Stamford Connecticut. In order to facilitate the exchange of ideas and discussion, talking points were developed and presented to each participant. Facilitator, Michael Culmo, used each of these talking points to keep the discussions on track. Note takers were also used to capture the discussions and comments as the sessions ran daily from 8:00 A.M. to 4:30 P.M. The following is a description of the discussions from the Workshop Day 1 of 3:

1. The morning began with Mr. Culmo welcoming everyone to the Workshop and allowing everyone around the room to introduce themselves. He then introduced Mr. Timothy Field, from ConnDOT's Bridge Design Unit, who elaborated on the importance of the workshop and thanked everyone for the cooperative effort of organizing and attending this meeting on such short notice. He continued with a brief summary of the current project schedule and goals for this Study.

2. Mr. Culmo proceeded to give a brief overview of Accelerated Project Delivery (APD) and Accelerated Bridge Construction (ABC) technologies. This included ways to reduce the schedule by employing innovative project delivery methods and contracting provisions. He explained that the deliverables will consist of a presentation on the last day of the workshop followed by the submission of a Study Report approximately four weeks after the workshop.

3. Following the APD overview, a summary of available technologies for ABC was presented. It was explained that the FHWA is moving towards bringing new technologies to the bridge market and "changing the way we build highways" with their motto of "Get in, get out and stay out" approach. Mr. Culmo offered a copy of the FHWA's latest manual for anyone's viewing, as he reported that studies have shown the general public greatly supports a more expensive option if it means shorter durations to traffic impacts. There were five ABC methods described in Mr. Culmo's presentation:

    - Prefabricated Elements
    - Modular Construction
    - Large Scale Structure Placement Methods
    - Accelerated Geotechnical Work
    - Fast Track Contracting

4. The following list of techniques was created as the framework from which the brainstorming would stem:

    - Grouted Couplers and Grouted Reinforcing Splice Connectors
    - Corrugated Void Pockets with and without Integral Abutments
    - Complete Bridge Element Prefabrication
    - Precast Decks on PS Beams or on Steel Framing
    - Various Connection Types
    - NEXT Beam Designs
    - Modular Superstructures
    - Gantry Cranes and Self Propelled Modular Transporters (SPMT)
    - Lateral Sliding of a Superstructure
    - Longitudinal Launching

Specific examples of the above listed points were cited and short time lapse videos of various ABC techniques were shared with the attendees. The outcomes of ABC bridge inspections in Utah were also reported. The bridges all yielded positive results and are performing very well. He stated that ABC is gaining momentum and that user satisfaction is the driving factor. The FHWA has provided the motivation for the movement towards ABC, while Utah and Massachusetts have become leaders in implementing the new technologies. Mr. Culmo closed his presentation with a statement that the Northeast region is looking to join the movement towards ABC and affirmed that ABC technology is not only a concept, but is also developed and market ready. The floor was then open for questions. The following is a summary:

- Mr. Larry Williamson asked if he could show a quick video of a superstructure slid into place. He was welcomed to present the project and give a quick synopsis of the ABC method used.
- A question was asked about the cost savings. Mr. Culmo explained that in some cases ABC is not necessary more costly and sometimes a "wash" when the reduced cost of non-bid items such as agency costs and railroad flagmen is factored in.

5. Mr. Sacchi followed the ABC presentation with an overview of the current project status. The following is a brief summary of his presentation:

   Project Overview

   - Description of the project and surrounding areas. The three major areas of discussion were the Atlantic Street, Elm Street, and East Main Street locations.
   - The purpose of the project is to improve accessibility, add lanes, increase vertical clearances, improve pedestrian safety, and replace aging railroad bridges.
   - A summary of the proposed improvements consisted of the additional lanes, eight-foot sidewalks, five-foot bike lanes, 14'-6" vertical clearance, and enhanced pedestrian access.
   - Phase I Construction is proposed to begin with the simultaneous construction of the Atlantic, Elm, and East Main Street bridges due to the Metro-North operations they have in common. Additionally, their concurrent construction minimizes disruption to the public and yields a considerable cost savings.
   - There were three profile studies performed: Two-span Replacement, Three-span Replacement, and Single-span Replacement. Mr. Sacchi briefly described the highlights to each study.
   - Construction impacts to local streets were described and included a summary of detours, road closures, and number of lanes maintained opened to traffic.
   - Proposed construction impacts to Metro-North consist of single track closings, impacts to the Stamford Station platforms during the Atlantic Street bridge construction, impacts to the Noroton Heights, Darien and Rowayton Station platforms during the Elm and East Main Street bridge constructions. It is proposed to leave rail grades and alignments unchanged.
   - A net savings of $16 million is estimated if these three projects are constructed concurrently as opposed to each one separately.

   The feasibility studies for the bridge replacements are complete. The Project is set to enter the Preliminary Design phase.

Atlantic Street Overview

- The proposed improvements consist of providing three travel lanes each in the northbound and southbound directions, increased capacity, relocation of I-95 northbound Exit 8 ramp to improve traffic operations on Atlantic and South State Streets, improved pedestrian safety and access, improved vertical clearance, complements and enhancements to access of the SUT and Stamford Streets projects, one shared lane in each direction for possible future street car system, and replacement of an aging railroad bridge.
- The three-span improvements and cross-sections were discussed, as well as the reasons for not selecting a two-span bridge due to the need for the closure of Atlantic Street for the duration of construction.
- The existing conditions and the construction Stages 1 through 5 were presented

Elm Street Overview

- The proposed improvements include the increase in travel lanes to three northbound and two southbound, increased traffic capacity, reduced queuing and congestion, improved pedestrian safety and vertical clearance, complements and enhancements to the SUT, and replacement of an aging railroad bridge.
- The three-span improvements and cross sections were discussed, as well as the three-span features that make this the preferable option over the two-span bridge features.

East Main Street Overview

- The proposed improvements include higher vertical clearance, the increase to two travel lanes each northbound and southbound, increased traffic capacity, reduced queuing and congestion, improved pedestrian and bicycle safety, complements and enhancements to the terminus of SUT, and replacement of an aging railroad bridge.
- The maps showing the proposed improvements, cross sections, and construction schedule were presented.

Impacts Overview

- There do not appear to be property impacts at Atlantic Street; however, there are impacts to the Dunkin Donuts and Metro-North Maintenance Facility at the Elm Street bridge site, and impacts to the Firestone Tire Dealer and adjacent business at the East Main Street bridge site.
- Telephone, water, gas, and electric utilities are all affected by the roadway lowering at all three sites; 4 feet at Atlantic Street, 3 feet at Elm Street, and 2.5 feet at East Main Street.
- The existing drainage will have to be relocated as needed to match the proposed profile.

Geotechnical Overview

- There is bedrock below local roadway surface between 5-7 feet at Atlantic Street, 13-22 feet at Elm Street, and 24 feet at East Main Street.
- The preliminary study recommended that drilled mini-piles with rock sockets be used at all locations. It should be noted that this was based on limited investigations.

Phase 2 Construction

- It is anticipated that once these three sites are completed, work will begin for the design and construct the Greenwich Avenue and Canal Street bridges.

Mr. Sacchi then opened the floor for questions. The following is a summary:

- *What is the current vertical clearance?*
  Existing is 13'-6" but we are shooting for 14'-6".

- *What is the current volume of traffic on the rails?*
  The Stamford Train Station serves approximately 70,000 passengers per day.

- *Are all tracks in service?*
  Yes, all the tracks are in service.

- *In a two-hour period, what is the peak traffic on rails?*
  The tracks service anywhere from 60 to 80 trains in a two-hour period.

- *Where is the railway yard?*
  It is located to the south of the main line just west of Elm Street.

- *Are you proposing to lower the sidewalks as well?*
  Yes.

- *Have you studied converting the East Main Street Bridge from a skewed structure to a square structure? Perhaps a saw toothed structure could be used?*
  The proposed structure is skewed. There is not sufficient ROW to accommodate a squared structure.

- *Are you taking the property at corner of Atlantic Street?*
  This property has already been taken as part of the Stamford Transitway project..

- *Can you elaborate on the operation lane on I-95?*
  We are leaving a space for it, but not building it. It is intended to be used for I-95 in the future.

- *Is there a study to ease the curve on the railroad at Elm Street?*
  Yes, it was looked at with options for different alignments for access, but it is conceptual only and very brief as it was not pursued.

- *Will all utilities have to be lowered?*
  Yes.

- *Are there fiber-optics along the track?*
  Yes.

- *When are utilities being relocated, before or after the bridge construction?*
  Utilities will be address before the bridge construction.

- *Why is the goal a 14'-6" clearance and what is gained by it?*
  Mostly for safety reasons and future rails. ConnDOT wants to prevent bridge hits due to low clearances and allow for vertical curves on long trailers.

- *Can the drainage system be lowered?*
  Yes, they can handle approximately 4 feet of lowering without a pump station. There may be a need for a pump station at several sites.

- *What is the deflection criterion?*
  Depending on calculations, Metro-North Engineer can waive the minimum if needed.

- *How does this project affect the Parking Garage Project?*
  We will need to coordinate this project with the Parking Garage project.

- *There seem to be many projects around the area affecting Metro-North simultaneously. Has anyone coordinated amongst all these projects?*
  Yes, but we are looking into better coordination.

- *What is the status of the top of rail?*
  We will maintain the top of rail elevation.

- *Please review some of the power issues.*
  If and when needed, power will be shut off during construction. There are high voltage lines at top of catenaries. Minimum 10 feet of clearance must be maintained from catenary and 25 feet clearance from electric transmission line that are over catenaries.

- *Is there any possibility that Metro-North can use diesel engines, rented from* ConnDOT*?*
  No, there may not be enough diesel engines available or operational, but worth looking into and considering.

- *Did you consider salvaging any stone abutments?*
  Yes, all that can be salvaged will be salvaged. No major cracking or settlement has been found.

- *Have the stone abutments been verified for seismic events?*
  No, not yet.

6. Following the project overview, Mr. Culmo began a group discussion of the project stake holders and constraints, identified as follows:

   <u>Stake Holders</u>

   | | | |
   |---|---|---|
   | Metro-North RR | South Stamford Association | |
   | BLT Development (4000-resident apartments) | | |
   | City of Stamford | Commuter Council | Emergency Response Services |
   | Amtrak and CSX | Parking Garage | Environmental |
   | Businesses | Transit Oriented Development | Urban Transit Way |
   | Utilities | Regional Planning Agency | ConnDOT Management |
   | SHPO | Connecticut Contractors | Other ConnDOT Projects |
   | Bus Facility | Other Amtrak Projects | FTA/FRA Monies |

   <u>Constraints</u>

   | | | |
   |---|---|---|
   | Power | Railroad Operations | No street closures preferred |
   | Available Funds | ROW not fully evaluated yet | Force Account and Staff Availability |
   | Staging | Materials Lead Time | Various Project Coordination |
   | Work Hours | Noise Issues | Holiday Schedules – before and after |
   | Utility Relocations | Contractor Capacities | Temperature Sensitive Work |
   | Planned Future Improvements | | |

7. Mr. Culmo ended the morning by summarizing that this workshop is not meant to resolve all the issues or design the project in three days. He reiterated that the purpose of the workshop was to investigate and discuss ways to accelerate the design and construction of these three bridges. He thanked Metro-North, URS, and ConnDOT for the work they have done thus far. Their findings will greatly assist during the brainstorm sessions. He noted that is the perfect time to perform this study as nothing is yet set in stone and new findings can be easily implemented. Mr. Fields added that ConnDOT has not been working on this project in a vacuum during the past three years and noted that they solicited input from all parties affected by this project.

8. The morning session of the meeting broke up and everyone went to Stamford to reconvene at the project sites. The group met at the Metro North Maintenance Facility, adjacent to the Elm Street Bridge for the site walkout. The team met with Mr. Dan McCarthy of Metro North. The following points were discussed after the team was provided with an overview of the operation of the mainline tracks and the Stamford Yard area:

   a. Stamford Yard is the busiest yard on the east coast next to Grand Central Station. Approximately 350 trains (commuter and freight) pass by/use this facility on a daily basis.

   b. Metro-North was told that one of the objectives of this study is to minimize the impacts to train operations. This might possibly be done by removing and replacing all the odd numbered tracks on a bridge over the course of one weekend. The even numbered tracks on the bridge would be replaced over a subsequent weekend. Dan McCarthy was in general agreement with this approach, especially if the catenary wires were not affected during the weekend.

   c. There is a car wash for the train cars located east of the bridge over Elm Street. Mr. McCarthy was asked if this could be taken out of service for some time. It was noted that the car wash was typically out of service during cold weather; therefore, short closures of the facility were acceptable.

   d. Mr. McCarthy was asked about the options for the cut and throw cross over to get cars into the rail yard. Several options were discussed including a cut and throw from Track No. 4. These all seemed reasonable to Mr. McCarthy.

   The following are photos from the maintenance facility meeting:

*Meeting with Dan McCarthy*

*View of rail yard looking west*

*View of entrance to rail yard*

9. After the tour of the MNRR Facility, the group visited the site of the MNRR Bridge over Elm Street, which carries seven tracks. A strategy for taking tracks out of service was discussed. It was confirmed by Dan McCarthy that the odd numbered tracks could potentially be removed and replaced simultaneously. The same sequence might be possible for the even numbered tracks. It would not be possible to remove odd and even numbered track together. When the lower yard lead track is taken out of service, there is no entrance/egress to the Stamford Yard. Having this lead track open is critical to MNRR operations (hence the cut and throw). Potential staging area was identified in the Dunkin Donuts property.

   The following are photos from the Elm Street bridge site:

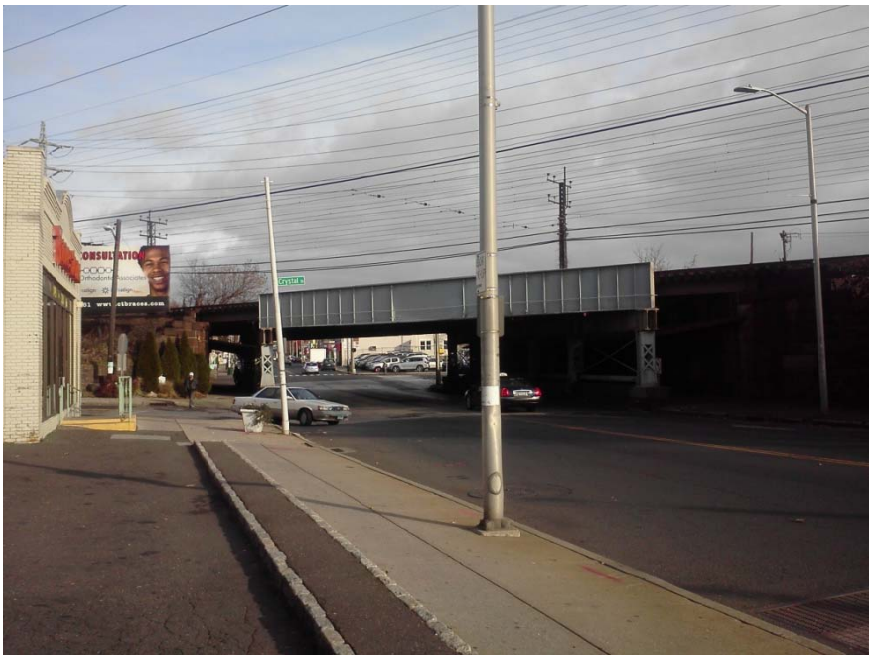
*Top View of the Elm Street Bridge looking east*

*South Elevation of the Elm Street Bridge*


*North Elevation of the Elm Street Bridge*

10. The second bridge site visited was that located over East Main Street, which was observed as being the most restrictive site in terms of areas for construction staging. Physical constraints such as the proximity of the Firestone building located to the northwest and the grades of that street at the intersection with East Main Street make the lowering of East Main Street under the MNRR structure to obtain adequate vertical clearance, difficult. This structure carries five mainline tracks.

    The following are photos from the Elm Street bridge site:



*North Elevation of the East Main Street Bridge*

*South Elevation of the East Main Street Bridge*

11. The final stop was at the MNRR Bridge over Atlantic Street. This structure carries five tracks. South of the railroad structure is a large intersection that was recently reconstructed as part of the Stamford Urban Transitway (SUT) project. Lowering of the roadway under the structure here impacts the I-95 northbound Exit 8 off-ramp and South State Street.

The following are photos from the Atlantic Street bridge site:


*South Elevations of the Atlantic Street Bridge*

## DAY 2 – Brainstorming

The purpose of the day two session was to begin the brainstorm portion of the study. Only the core team members attended this session with a brief afternoon visit from Mr. Harley and Mr. Hill, who listened to a brief summary of findings to date. The following is a list of discussions and notes from the Workshop Day 2 of 3:

1. The morning began with Mr. Culmo briefly summarizing the day's agenda. Discussions began by listing ideas for rail staging, superstructure types, substructure types and geotechnical conditions, construction approaches, highway traffic management, rail management, contracting types and contracting language, rights-of-way issues, roadway design, permitting, schedules, and a brief cost analysis.

2. The second half of the morning was spent focusing on each bridge intersection, starting with East Main Street, then Elm Street, and lastly focusing on Atlantic Street right after the lunch break. During this portion of the study, each team member focused on ideas for site specific approaches. Ideas for each site covered the bridge options, construction zones, and construction methods. Following the discussion of possible approaches for each site, team members selected the top five ideas and discussed the advantages, disadvantages, and risk assessments of Design Build, CMGC/CM at Risk, Incentives/Disincentives, Jump Spans, and Spread Footings.

3. Mr. Harley and Mr. Hill stopped in to listen on the progress of the study. Mr. Culmo gave a very brief ten-minute summary of the topics discussed. Mr. Harley and Mr. Hill commended the team's progress thus far and left the meeting. Brainstorm discussions resumed and the day adjourned at about 4:30.

A detailed outline of the above discussions follows on the next few pages.

## Brainstorming Ideas

1. Rail Staging
    a. General:
        i. Look into a New Track alignment for the New Canaan Branch
        ii. Take out track 1, 3, and 5 over a continuous weekend outage
        iii. Next stage take out tracks 2, 4 and 6 over a subsequent on weekend outage
        iv. Providing additional high-speed crossovers at the interlockings
        v. Look into alternate storage and maintenance locations for the trains (New Haven?)
        vi. Investigate long term closure of car wash facility for the trains
        vii. At Elm Street, work one track north and one track south simultaneously
        viii. At Elm Street, provide cut and throw to tie the yard lead to track 4
        ix. Coordinate staging for the entire corridor
        x. Split out Atlantic Street as a separate staging plan
        xi. Coordinate Elm Street and East Main Street staging together – May allow for closure of Atlantic Street after these two bridges are done

2. Superstructure Type
    a. Orthotropic Steel
    b. Through Girders – Paired Girders
    c. Multi-beam Deck Girders
    d. Direct Fixation
    e. Consider eliminating the skew at Elm Street
    f. Investigate relaxation of deflection criteria
    g. Investigate lower live load loadings

3. Substructure and Geotechnical
    a. Investigate the use of spread footings
    b. Use Precast Elements
    c. Lateral Sliding
    d. Outboard Foundations
    e. Eliminate Piers
    f. Use HMA for Approach Slabs
    g. Eliminate Approach Slabs?
    h. Tie-back Walls
    i. Consider MSE / Modular Block Walls
    j. Tie-back Temporary Sheeting
    k. Investigate Separate Pedestrian Tunnels
    l. Use of Jump Spans for Construction of Abutments
    m. Drill Piles Through Tracks Prior to Substructure Construction

4. Construction Approach
    a. Consider SPMT
    b. Consider Lateral Slide
    c. Modular Units
    d. Erection Truss Mounted on Rail Cars
    e. Relocate all Utilities/Attachment to the Bridges

5. Highway Traffic Management
    a. Close Manhattan Street during construction
    b. Investigate long-term closure of all three roadways under the bridges (one at a time)
    c. Short-term closure of each bridge for weekend work
    d. Close I-95 Exit 8 Off-ramp during construction

6. Rail Management
    a. Consider re-profiling of rail at East Main Street

7. Contracting and Contract Language
    a. Early Separate Utility Contract
    b. Remove Concrete Pavement at East Main Street in an early release project
    c. Design Build
        i. Consider Risk Allocation Pool
    d. Consider Construction Management General Contractor (CM at Risk) (look into triggers)
    e. Innovating Contracting Language
        i. A+B Bidding
        ii. Incentives/Disincentives
        iii. Track Rental

8. Right of Way
    a. Temporary Construction Easement (entire parcel) of the Dunkin Donuts property. Possible take.
    b. Consider making Atlantic Street one way and use the northbound side for a staging area
    c. Consider taking Firestone store at East Main Street
    d. Investigate off-site staging areas on the south end

9. Roadway Design
    a. Consider converting East Main Street into a Single Point Urban Interchange (SPUI)
    b. Consider eliminating one of the I-95 off-ramps

10. Permitting
    a. Recommend obtaining permits at 30% Design

Schedule Discussion

| | |
|---|---|
| DBB | Base for comparison |
| DB | 6-10 months shorter time |
| CMGC | 8-12 months shorter time |

11. Cost – URS projected 4 years in construction. Our objective 2 years
    a. Significantly reduce design schedule by having key players involved during the design process (i.e. Metro North)
    b. Compress current schedule – electronic submittals, design submissions,
    c. Agency commitment
    d. RR Force account and ConnDOT costs are not in the bid but is a place where costs can be recovered with ABC

| **Cost** | **URS Study** | **Team Estimate Conventional 4 yrs.** | **ABC 2 yrs.** | **Savings** |
|---|---|---|---|---|
| RR Force Account | $26 million | $40 million | $25 million | $15 million |
| ConnDOT Construction Mgmt. Cost | | $36 million | $26 million | $10 million |

Note: These numbers are very rough at this time. Following a discussion on each cost, the team made an "estimate" of the cost savings based on the anticipated work and schedule

The team reviewed the cost estimate that was prepared by URS. The following general approach was used.

Approach:

Step 1: Take construction cost as estimated by URS (not including Railroad Force Account) and convert to mid-construction cost (2017).

Project Cost + Utility Cost + Incidentals and Contingencies = $127 million
$127 million (2011) → 6yrs→ X $1.05^6$ = $170 million

Step 2: Take ABC Construction Cost and convert to mid-construction cost (2015)

ABC Premium = 20%
Cost = $127 million * 1.2 = $152 million
$152 million (2011) → 4yrs→ X $1.05^4$ = $185 million

Step 3: Totals

Additional Cost for ABC = + $15 million
Savings on RR Force Account = - $15 million
Savings on ConnDOT Project Management = - $10 million
Net Savings to project with ABC = $10 million

**SITE SPECIFIC APPROACH:**

## East Main Street

- Eliminate Piles
- Single-span not an option with deck beams due to skew and span lengths
- Suggesting Two-span bridge
- Suggest reducing sidewalk width to 6 feet
- Use Prefabricated elements
- Consider widening to the inside for staged option or increase track centers to allow for thru-girders
- Use Jump Spans - take abutment out and build new abutment in place
- Build substructures prior to superstructure work

Construction Zones

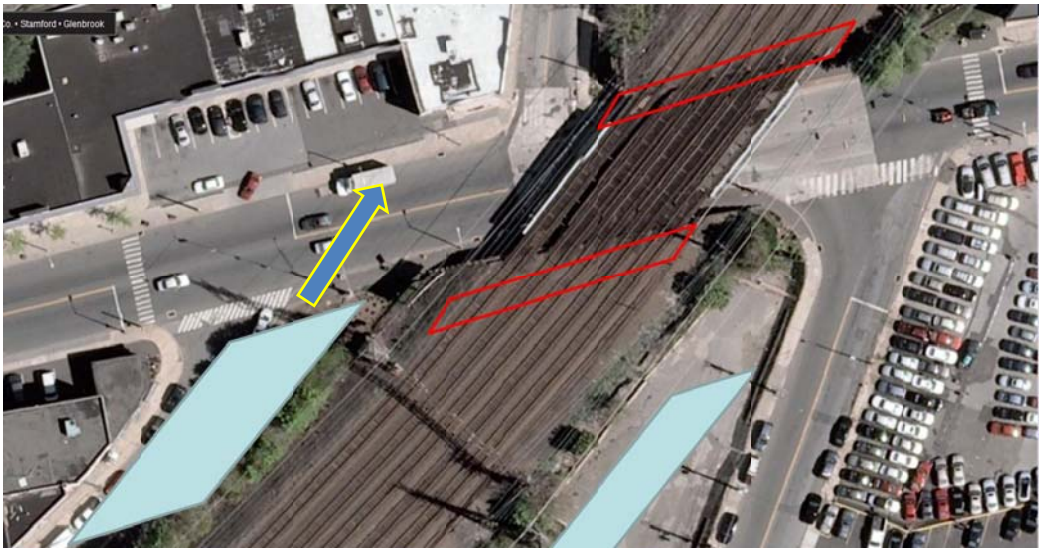
- Use areas both sides of Myrtle Street
- If using SPMT, may need to take the Fire Stone property
- Close North State Street for 6 months and use as staging area
- Potential Staging Areas for SPMT install: West of Myrtle Street, end of North State Street (Temp. close)

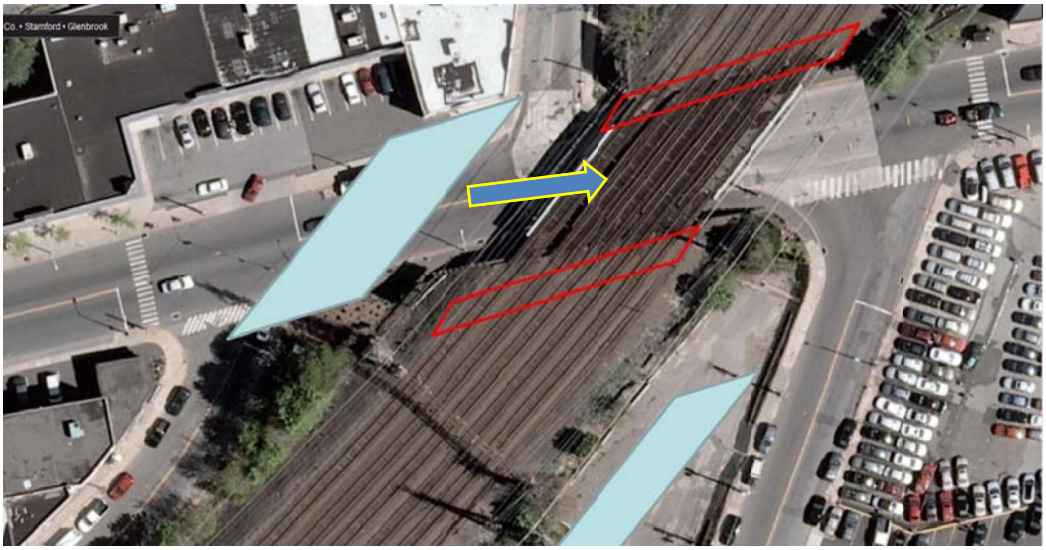
Construction Methods

- Stage Construction with Prefabricated Elements for Substructures
- Use jump spans for substructures
- Build pier under the existing bridge
- Investigate three-track outages with SPMTs (weekend work)
- Use launching truss for delivery of beams if built in place

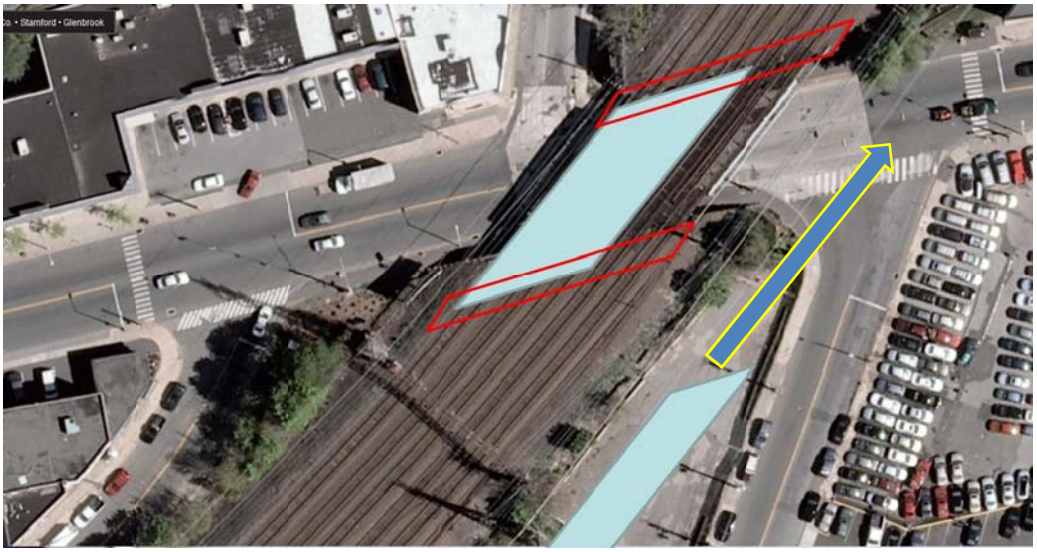
The team discussed all of these recommendations further. While all are worthy of consideration, the conclusion was that installation of the superstructures using SPMTs offered the best opportunity for success. The construction of the bridge can be completed in two very short stages. The substructures could be built under jump spans prior to the weekend track closures. The pier could be built under the existing bridge. The southbound superstructure could be constructed on temporary falsework on North State Street using a short term (6 month) closure. The northbound superstructure could be constructed on temporary falsework along Myrtle Street. The graphics on the following pages were developed for the presentation. They demonstrate the approach for the construction of this bridge.

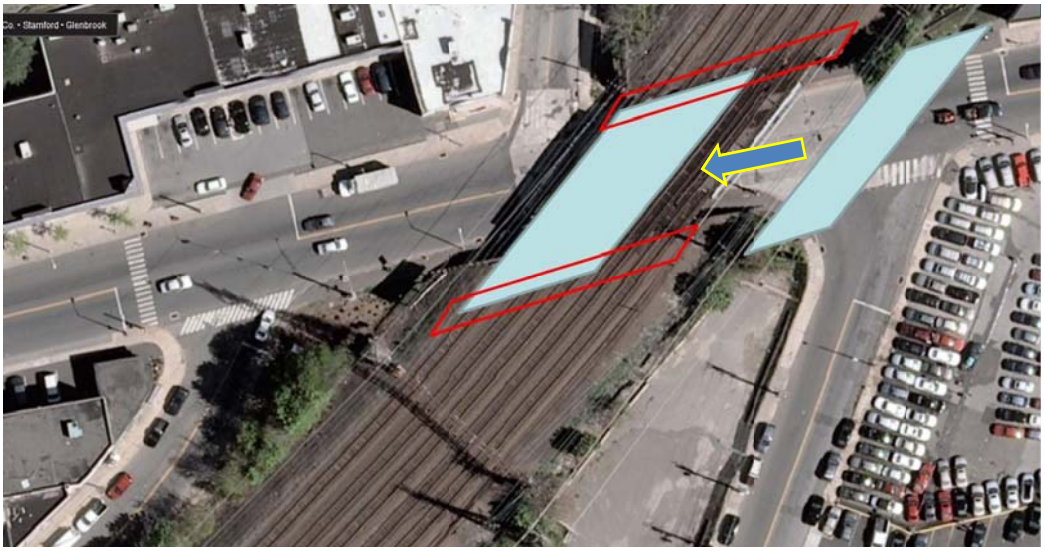
The red boxes on the graphics represent potential locations for the jump spans. The locations of these may need to be adjusted during final. The blue parallelograms represent the two halves of the bridge superstructure. It should be noted that the order of the moves could be reversed.



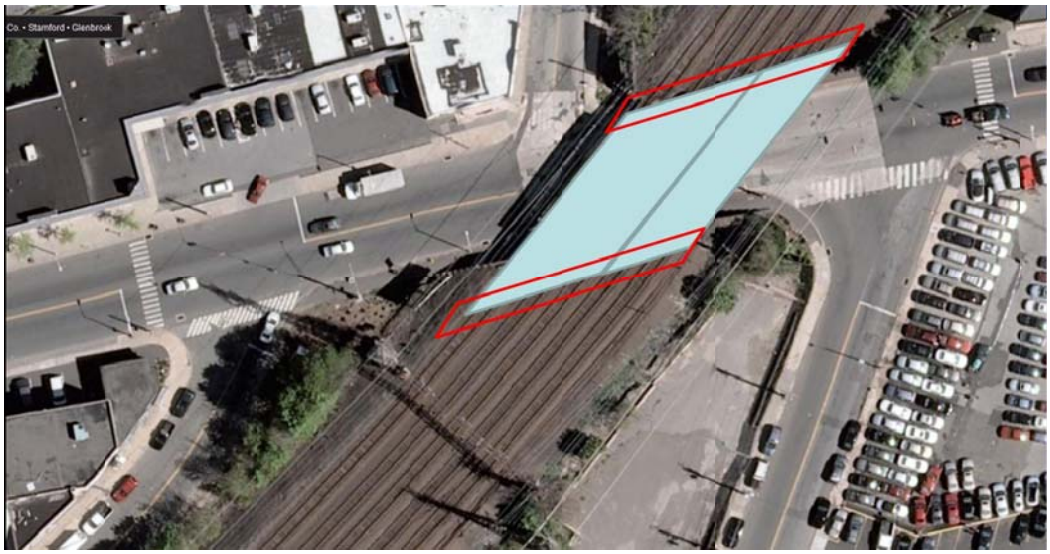


*East Main Street: Stage 1*
*Build 2 Halves of Bridge on Staging*
*Move Southbound Half*





*East Main Street: Stage 2*
*Move Northbound Half*




*East Main Street: Final Condition*

**SITE SPECIFIC APPROACHES:**

## Elm Street

- Eliminate Piles
- Investigate Single-span
- Suggest reducing sidewalk width to 6 feet
- Prefabricated elements
- Widening to the inside for staged option or increase track centers to allow for thru-girders
- Jump Span - take abutment out and build new abutment in place
- Build substructures prior to superstructure work
- Close car wash operations during construction
- Provide cut and throw from yard ladder to Track 4

Construction Zones

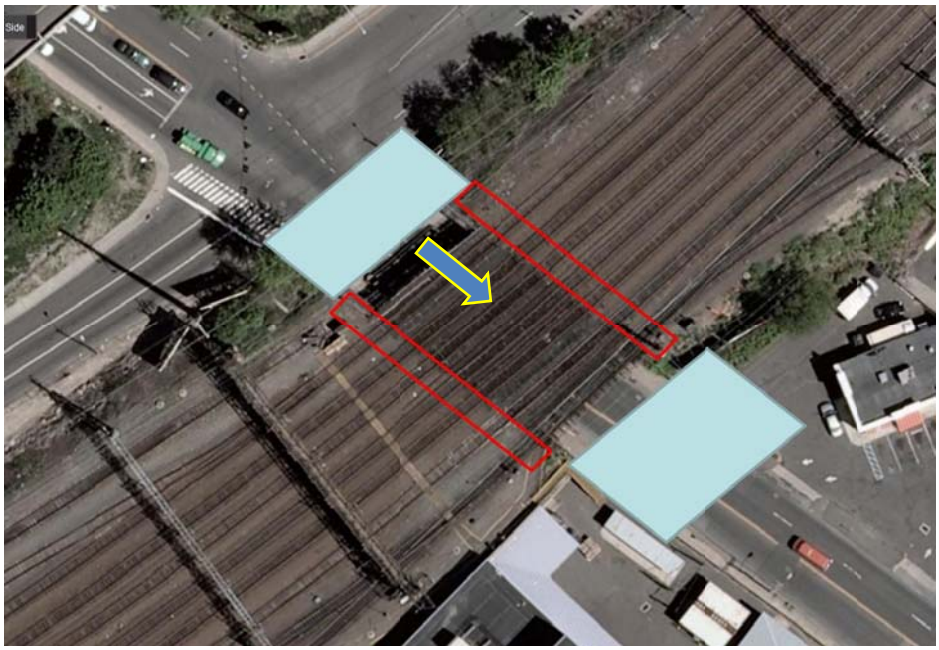
- Potential Staging Areas for SPMT / Lateral Slide Install
    - Dunkin Donuts Property, Metro-North parking lot, build over Elm Street (Lateral Slide)
    - Embankment adjacent to I-95 ramp (consider closing ramp)

Construction Methods

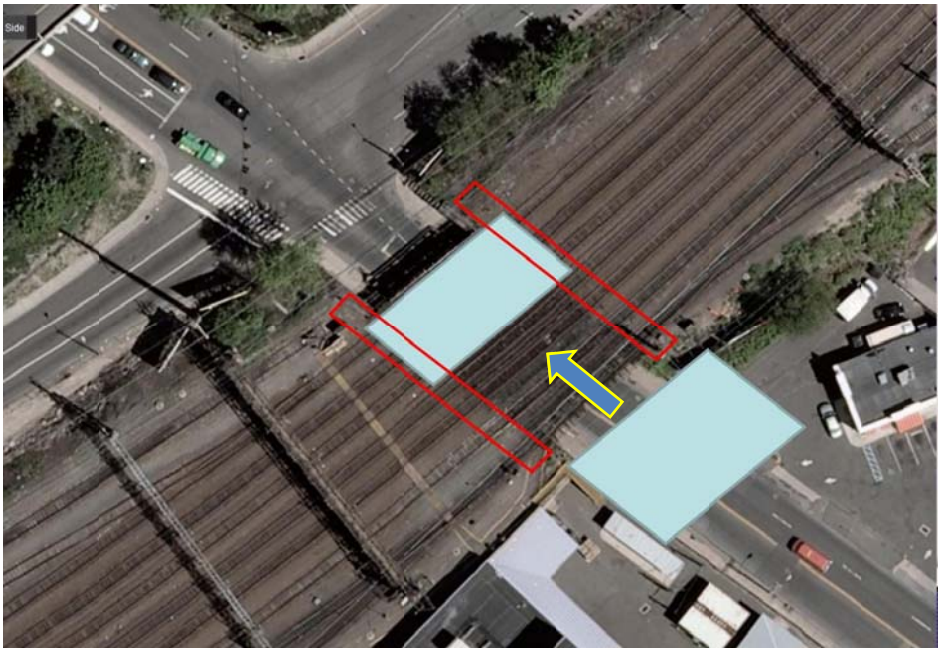
- Stage Construction Prefabricated Elements for Substructures
- Investigate three-track outages with SPMTs (weekend work)
- Use launching truss for delivery of beams

The team discussed all of these recommendations further. While all are worthy of consideration, the conclusion was that installation of the superstructures using SPMTs offered the best opportunity for success. The construction of the bridge can be completed in two very short stages. The substructures could be built under jump spans prior to the weekend track closures. The pier could be built under the existing bridge. The southbound superstructure could be constructed on temporary falsework adjacent to the bridge or in the I-95 ramp gore area. The northbound superstructure could be constructed on temporary falsework adjacent to the bridge. The graphics on the following pages were developed for the presentation. They demonstrate the approach for the construction of this bridge.

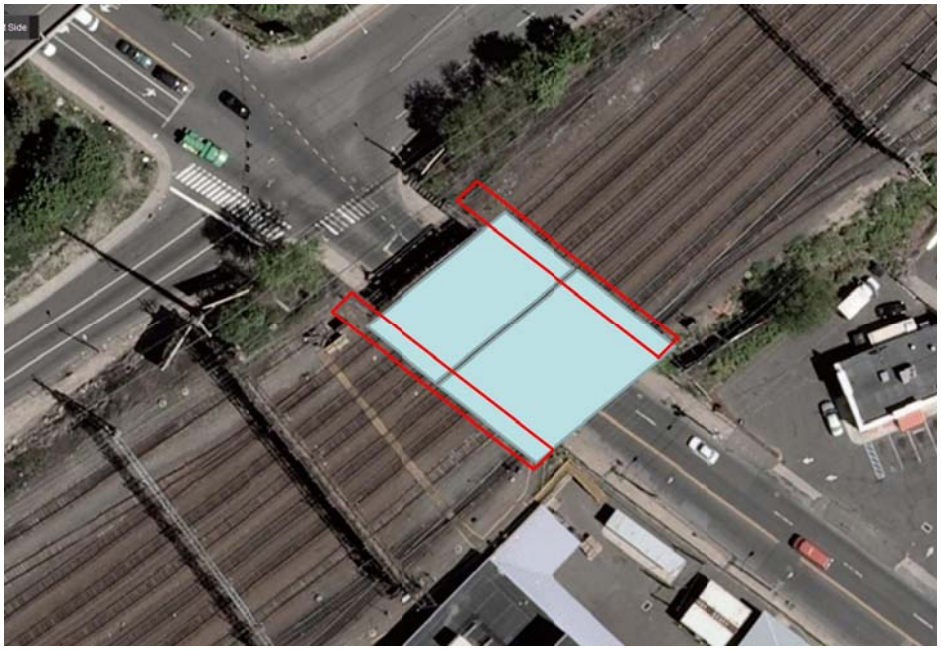
The red boxes on the graphics represent potential locations for the jump spans. The locations of these may need to be adjusted during final. The blue parallelograms represent the two halves of the bridge superstructure. It should be noted that the order of the moves could be reversed.



*Elm Street: Stage 1*
*Build 2 Halves of Bridge on Staging*
*Move Southbound Half*



*Elm Street: Stage 2*
*Move Northbound Half*



*Elm Street: Final Condition*

**SITE SPECIFIC APPROACHES:**

## Atlantic Street

- Eliminate Piles
- Investigate Single-span
- Suggest reducing sidewalk width to 6 feet
- Use Prefabricated elements
- Jump Span - take abutment out and build new abutment in place
- Build substructures prior to superstructure work
- Convert Atlantic to one-way street under the bridge during construction
    - Divert northbound Atlantic Street traffic to Stamford Urban Transit-way (SUT), then north on Canal Street
    - Investigate traffic flow on Canal Street
- Close Manhattan Street
- Widen bridge, increase track spacing, use thru-girders (single-span)

Construction Zones

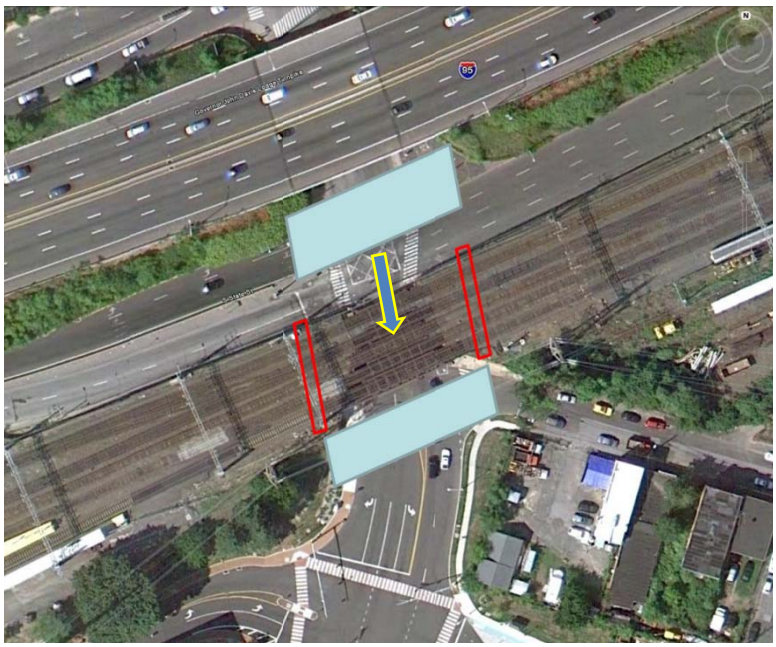
- South side: Build three-track structure over Atlantic Street (lateral slide)
- North side: Close I-95 exit ramp area, build two-track structure
    - Possibly use permanent abutments for new ramp bridge as a temporary abutment for the new RR Bridge superstructure.

Construction Methods

- Investigate Lateral slide/SPMT methods for both sides
- Staged construction with prefabricated elements
- Use launching truss for delivery of beams

The team discussed all of these recommendations further. While all are worthy of consideration, the conclusion was that installation of the superstructures using SPMTs offered the best opportunity for success. The construction of the bridge can be completed in two very short stages. The substructures could be built under jump spans prior to the weekend track closures. The pier could be built under the existing bridge. The southbound superstructure could be constructed on temporary falsework near the I-95 exit ramp. It may be possible to build the RR bridge on the proposed ramp bridge substructures. The northbound superstructure could be constructed on temporary falsework adjacent to the bridge. The graphics on the following pages were developed for the presentation. They demonstrate the approach for the construction of this bridge.

The red boxes on the graphics represent potential locations for the jump spans. The locations of these may need to be adjusted during final. The blue parallelograms represent the two halves of the bridge superstructure. It should be noted that the order of the moves could be reversed.



*Atlantic Street: Stage 1*
*Build 2 Halves of Bridge on Staging*
*Move Southbound Half*

*Atlantic Street: Stage 2*
*Move Northbound Half*

*Atlantic Street: Final Condition*

## DAY 3 – Presentation of Findings and Recommendations

The purpose of the day three of the sessions was two-fold: 1) Continue the brainstorm portion of the study started on day two; and 2) Have the team compile the information gathered and prepared a powerpoint presentation. Later in the afternoon, the preliminary findings and recommendations were presented to Commissioner of CTDOT, representatives from the City of Stamford and Metro-North Railroad, and select CTDOT personnel in a conference-type setting. A list of the presentation attendees can be found in Appendix D. The following is a list of discussions and notes from the Workshop Day 3 of 3:

2. The morning began with a prompt continuation of discussions based on the top ideas, as well as the advantages and disadvantages for each idea. These discussions were started on day two and completed on day three of the workshop and recorded on the Team Recording Form, the details of which can be found in Appendix D.

3. The project schedule was discussed in detail. The goal is to reduce the construction of the bridges to two years. In general, the schedule would be as follows:

    a. Installation of jump spans and substructure construction: 1 year
    b. Installation of retaining walls: In parallel with substructure construction
    c. Relocation of utilities: In parallel with substructure construction
    d. Superstructure construction off-site: 5 months
    e. Superstructure installation: 1 month
    f. Roadway reconstruction: 6 months.

    The following is a rough schedule for construction of the bridges.

    INSERT SCHEDULE HERE SPECIFY SCHEDULE SOOURCE i.e. DOT/URS etc.

4. Key points were identified for inclusion into the presentation. Input was received from all the workshop participants in compiling the presentation.

5. The presentation began at 2:00 P.M. in Conference Room B at ConnDOT Headquarters in Newington, Connecticut.

6. The final recommendations were as follows:

    a. Construct substructures prior to track closures. Use jump spans to support tracks over excavations for substructures. This allows for continuous construction with minimal impacts to train operations.
    b. Use SPMT and lateral slide techniques to replace the superstructure in two pieces (even tracks, and odd tracks). Closure of one side of the railroad would be required for these weekend activities (inbound and outbound). This will dramatically reduce construction time and railroad impacts, since each bridge superstructure could be installed in two weekends.
    c. Piles should be eliminated and spread footings used instead. This reduces railroad and catenary impacts.
    d. Prefabricated elements should be used wherever possible. The proposed use of AMTRAK girders meets this recommendation.
    e. Piers should be eliminated where possible.
    f. Precast soldier pile retaining walls with tie-backs should be considered to minimize the impact to railroad and adjacent roadways.
    g. Design-Build contracting should be considered to save 8 to 12 months.

h. CMGC (CM at Risk) should be considered to save 6 to 10 months.
i. The typical 60% review could be replaced with an on-board review.
j. Consider using incentives and disincentives.
k. Consider A+B bidding.
l. Consider track rentals.
m. Implement interim project milestones.
n. Use special pre-qualifications to minimize risk.
o. Engage stakeholders to provide a consistent and accurate message in order to obtain public buy-in.

During the presentation, it was made very clear that the base cost for ABC will be higher than conventional construction for a project of this scope (about 20%). However, significant non-bid savings can be achieved with ABC, such as RR Force Account, ConnDOT staff resources, and in escalation costs through the reduction of the time in design/construction. Factoring all these parameters, the team estimates potential savings of approximately $10 million.

The conclusion of the team was that the project could be constructed in a reduced timeframe. Completion of construction in 2016 is feasible. This can be done by using accelerated bridge construction techniques and innovative contracting provisions.

- The question and answer session that followed the presentation is summarized below:
  - *Why aren't we pursuing CMGC?*
    CMGC is definitely "on the table". The team was concerned that to implement the first CMGC project on this complex project might be too much for this complex project.
  - *Has consideration been given to breaking out Atlantic Street as its own project?*
    Yes
  - *Can the local roads be kept open during construction of the superstructures overhead?*
    The roadways should be able to be kept open during the majority of the time for this construction. The use of prefabricated AMTRAK girders makes this possible. There will be short term closures for construction of falsework and erection of elements.

Following the presentation, the Commissioner thanked the team for their efforts. He noted that he was impressed by the level of effort and the detail that the team put forth far exceeded his expectations. The Department will move forward with these recommendations and work toward implementing them on the project.

**List of Appendices**

# APPENDIX A
# WORKSHOP AGENDA

CT Department of Transportation
2800 Berlin Turnpike, P.O. Box 317546
Newington, Connecticut 06131-7546

CME Associates, Inc.
333 E. River Dr., Ste. 400, E. Hartford, CT 06108
Phone: 860.290.4100 Fax: 860.290.4114

***AGENDA***

**DATE OF MEETING**: November 19, 2012
**LOCATION OF MEETING**: ConnDOT Room G328; 7:45 AM
**SUBJECT OF MEETING**: Accelerated Project Delivery Study
Project No. 135-301
Atlantic Street, Elm Street, East Main Street
Stamford, Connecticut
**Meeting with All Participants**

---

- **7:45 a.m. Sign-In and Distribute Presentation Materials**

- **8:00 a.m. to 8:15 a.m. Welcome and Introductions: Michael Culmo, CME Associates, Inc.**
  - ConnDOT staff
  - Consultant Team
  - Agency Personnel

- **8:15 a.m. to 8:30 a.m. Timothy Fields, ConnDOT**
  - Current project schedule
  - Goals of the study

- **8:30 a.m. to 8:45 a.m. Overview of the APD/ABC process: Michael Culmo, CME Associates, Inc.**
  - Process for the 3-day workshop

- **8:45 a.m. to 9:30 a.m. Overview of Technologies Michael Culmo, CME Associates, Inc.**
  - Accelerated Project Delivery – Contracting Methods
  - Accelerated Bridge Construction Techniques

- **9:30 a.m. to 9:45 a.m. Break (on your own)**

- **9:45 a.m. to 10:30 a.m. Project Overview: Stephen Mitchell, URS Corporation**

- **10:30 a.m. to 11:00 a.m. Identification of Stakeholders and Issues: All**

- **11:00 a.m. to 11:30 a.m. Identification of Project Constraints: All**

- **11:30 a.m. to 12:00 a.m. APD/ABC Team Questions: All**

- **12:00 a.m. to 4:00 a.m. Site Visit**

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***AGENDA***

**DATE OF MEETING:** November 20, 2012
**LOCATION OF MEETING**: ConnDOT Room G328; 8:00 AM
**SUBJECT OF MEETING**: Accelerated Project Delivery Study
Project No. 135-301
Atlantic Street, Elm Street, East Main Street
Stamford, Connecticut
**All Day Meeting/Workshop with APD/ABC Team**

---

- **8:00 a.m. to 9:30 a.m. Discussion on Potential Accelerated Project Delivery and Accelerated Bridge Construction Techniques**

- **9:30 a.m. to 4:00 p.m. Team Brainstorming of Alternatives/Ideas**
  - Staging (Roadway and Rail)
  - Traffic Management/Rail Management
  - ABC Techniques
  - Potential Contracting Mechanisms and Contracting Provisions

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***AGENDA***

**DATE OF MEETING:** November 21, 2012
**LOCATION OF MEETING**: ConnDOT Room G328; 8:00 AM
**SUBJECT OF MEETING**: Accelerated Project Delivery Study
Project No. 135-301
Atlantic Street, Elm Street, East Main Street
Stamford, Connecticut
**All Day Meeting/Workshop with APD/ABC Team**

---

- **8:00 a.m. to 10:00 a.m. Finalize Alternative Development**
- **10:00 a.m. to 11:30 a.m. Team Review and Ranking of Alternatives**
- **11:30 a.m. to 2:00 p.m. Prepare for Presentation**
- **2:00 p.m. Team Presentation of APD/ABC**
  - Alternatives to ConnDOT and URS, CME and FHWA

**Post Workshop Report:** (Four weeks after workshop.)

- Prepare Report (APD/ABC team).
- Study team will review draft report.
- Submit report.

# APPENDIX B
# ATTENDEE LIST

CT Department of Transportation
2800 Berlin Turnpike, P.O. Box 317546
Newington, Connecticut 06131-7546

CME Associates, Inc.
333 E. River Dr., Ste. 400, E. Hartford, CT 06108
Phone: 860.290.4100 Fax: 860.290.4114

## ATTENDEE LIST

**LOCATION OF MEETING**: ConnDOT, Room G328 – 7:45 AM
**SUBJECT OF MEETING**: State Project No. 135-301
Accelerated Project Delivery Study (APD)
Atlantic Street, Elm Street, and East Main Street in Stamford Connecticut
Workshop Day 1 of 3 – Meeting with All Participants

**DATE OF MEETING**: **NOVEMBER 19, 2012**

| IN ATTENDANCE | AFFILIATION | EMAIL ADDRESS |
|---|---|---|
| Donald Costello | URS Corporation | donald.costello@urs.com |
| Tim Young | URS Corporation | tim.young@urs.com |
| Ronald G. Sacchi | URS Corporation | ron.sacchi@urs.com |
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| Pine Leone | CME Associates, Inc. | gleone@cmeengineering.com |

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## ATTENDEE LIST

**LOCATION OF MEETING:** ConnDOT, Room G328 – 7:45 AM
**SUBJECT OF MEETING**: State Project No. 135-301
Accelerated Project Delivery Study (APD)
Atlantic Street, Elm Street, and East Main Street in Stamford Connecticut
Workshop Day 1 of 3 – Meeting with All Participants

**DATE OF MEETING**: **NOVEMBER 20, 2012**

| IN ATTENDANCE | AFFILIATION | EMAIL ADDRESS |
|---|---|---|
| Eugene Colonese | ConnDOT – Rail Operations | eugene.colonese@ct.gov |
| Steven Hebert | ConnDOT – District 3 | steven.hebert@ct.gov |
| Brian Mercure | ConnDOT – District 3 | brian.mercure@ct.gov |
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## ATTENDEE LIST

**LOCATION OF MEETING:** ConnDOT, Room G328 – 7:45 AM
**SUBJECT OF MEETING**: State Project No. 135-301
Accelerated Project Delivery Study (APD)
Atlantic Street, Elm Street, and East Main Street in Stamford Connecticut
Workshop Day 1 of 3 – Meeting with All Participants

**DATE OF MEETING**: **NOVEMBER 21, 2012**

| IN ATTENDANCE | AFFILIATION | EMAIL ADDRESS |
|---|---|---|
| Steven Hebert | ConnDOT – District 3 | steven.hebert@ct.gov |
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| Jodi-Anne O'Connor | CME Associates, Inc. | joconnor@cmeengineering.com |

The attendees who joined the group listed above for the afternoon presentation are listed on the next page.

**PRESENTATION ATTENDEE**

| IN ATTENDANCE | AFFILIATION | EMAIL ADDRESS |
|---|---|---|
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| Michael A. Chachakis | ConnDOT – Traffic | michael.chachakis@ct.gov |
| Philip J. Cohen | ConnDOT – Traffic | philip.cohen@ct.gov |

# APPENDIX C
# POWER POINT PRESENTATIONS

# PRESENTATION

By: CME Associates, Inc.

## Accelerated Project Delivery Study
## Workshop Overview

***Insert presentation here***

# PRESENTATION

By: CME Associates, Inc.

## Accelerated Bridge Construction

***Insert presentation here***

PRESENTATION

By: URS Corporation

Metro-North Railroad Bridge Replacement Preliminary Design

***Insert presentation here***

# PRESENTATION

By: CME Associates, Inc.

## Team Recommendations

***Insert presentation here***

# APPENDIX D
# TEAM RECORDING FORM

# TEAM RECORDING FORM

| IDEA (Short Name) | IDEA (Detailed Description) | Implementation Details (Barriers, Skill Set Coordination, etc.) |
|---|---|---|
| Design Build | Use Design Build contracting method to reduce the overall project duration. | *Advantages*<br>• Time savings (6 – 10 months)<br>• Innovative construction methods<br>• Contractor has better control of the work<br>• Manage risk through risk allocation pool<br>• Eliminates most of the design risk<br>• Qualification based selection<br>*Disadvantages*<br>• Loss of control<br>• Complexity of having two major stake-holders<br>• Uncommon practice for ConnDOT<br>• Project has to be fully conceptualized by 30% |
| CMGC / CM at Risk | Use construction manager at risk method to reduce overall project duration. | *Advantages*<br>• Time savings – 4 to 8 months<br>• Owner has total control of project<br>• Innovative construction methods<br>• Owner has better control of the work when compared to Design Build<br>• Tends to have fewer change orders<br>• Manage risk through risk allocation pool<br>• Eliminates most of the design risk<br>• Qualification based selection<br>• Design optimized for contractor's preferred means methods (as compared to DBB)<br>*Disadvantages*<br>• Can be more expensive<br>• Uncommon for ConnDOT<br>• Percentage of work performed by construction manager<br>• Complexity of having two major stake-holders |

| IDEA (Short Name) | IDEA (Detailed Description) | Implementation Details (Barriers, Skill Set Coordination, etc.) |
|---|---|---|
| Incentives/Disincentives | Use incentives and disincentive to align the interest of the contractor with the owner. | *Advantages*<br>• Very effective way of accelerating construction<br>• ConnDOT claim waiver provision<br>*Disadvantages*<br>• Has to be meaningful to be effective<br>• Disincentive must be scaled carefully to control overall project cost |
| Jump Span Construction | Build new substructures under the existing bridge and rail without significant impact to rail operations, pedestrians, and general public. | *Advantages*<br>• Proven method<br>• Allows 24/7 construction<br>• Minimizes rail operations impacts<br>• Relatively inexpensive<br>• Facilitates CIP<br>• Improves safety<br>• Expedites future work<br>*Disadvantages*<br>• May conflict with existing substructures, which makes this method more difficult (not impossible)<br>• May require longer spans of the abutments are pushed back farther |

| IDEA (Short Name) | IDEA (Detailed Description) | Implementation Details (Barriers, Skill Set Coordination, etc.) |
|---|---|---|
| Spread Footings | Eliminate piles and build substructures on spread footings. | *Advantages*<br>• No pile driven equipment required<br>• Minimizes overhead catenary concerns<br>• Less expensive<br>• Simplifies precast substructures<br>• Embankment preload<br>*Disadvantages*<br>• Requires larger footing<br>• Potential settlement?<br>• Requires more support of excavation |
| Prefabricated Structures | Use prefabricated elements to expedite on site construction time | *Advantages*<br>• Speeds construction<br>• Cheaper<br>• Higher quality<br>• Able to fabricate during the winter<br>*Disadvantages*<br>• GC not in favor of this method<br>• Requires more handling and rigging<br>• Lead time (slightly longer - minor) |

| IDEA (Short Name) | IDEA (Detailed Description) | Implementation Details (Barriers, Skill Set Coordination, etc.) |
|---|---|---|
| Lateral Slide/SPMT | Construct superstructures off-line and install with SPMT or lateral slide systems | *Advantages*<br>• Improved community relations<br>• Greatly reduces construction time<br>• Minimizes impact to rail operations (overall)<br>• Eliminates cut and throws<br>• Reduces Force Account requirements<br>• Reduces user costs<br>• Potential use of I-95 NB off ramp abutments as temporary piers<br>*Disadvantages*<br>• Higher construction cost<br>• Increases risk (manageable)<br>• Requires short term closure of Manhattan Street and North State Street<br>• Potentially reduces Contractor pool<br>• Significant impact to railroad operations for 6 weekends (reduction in OTP) |
| Retaining Walls | Use precast units (MSE, modular block, soldier piles and soil anchors) | *Advantages*<br>• Cheaper<br>• Minimal excavation<br>• Faster construction<br>• Minimal disruption to railroad<br>• Can be used to underpin existing stone walls<br>*Disadvantages*<br>• Minor roadway impacts for installation of soil anchors |

| IDEA (Short Name) | IDEA (Detailed Description) | Implementation Details (Barriers, Skill Set Coordination, etc.) |
|---|---|---|
| Realign Tracks | Splay tracks to increase track centers to facilitate bridge construction. | *Advantages*<br>• Deeper through girders (improves clearance)<br>• Reduces the required lowering of roadway profile (-$$$)<br>• Potential Elimination of bridge piers<br>• May eliminate pumping stations (-$$$)<br>• Potential reduction in utility relocations<br>*Disadvantages*<br>• Adding track, signal and catenary work (+$$$)<br>• Potential ROW impacts<br>• Increased duration<br>• May require more retaining walls |
| Expedite Pre-construction Process | Investigate ways to reduce project delivery tasks.<br>• Eliminate 60% submission (on-board review workshop with interested parties)<br>• Submit environmental documents at 30%<br>• Obtain ROW at 30%<br>Expedite procurement process | *Advantages*<br>• Potentially eliminate design submissions<br>• Reduce environmental permitting time<br>• Reduce ROW time<br>• Reduce preliminary engineering costs<br>• Reduces overall project delivery time<br>*Disadvantages*<br>• Perceived loss of control by the Department<br>• Different process |
| Scheduling | Establish a detailed project schedule for pre-construction and construction | *Advantages*<br>• Clearly see project milestones<br>• Allows for better coordination with utilities and abutters<br>• Creates a form for performance measures<br>• Allows for focus to be placed on critical path tasks where reductions yield the largest time savings<br>• Able to incorporate a multitude of constraints, e.g. utility cut-over |

| IDEA (Short Name) | IDEA (Detailed Description) | Implementation Details (Barriers, Skill Set Coordination, etc.) |
|---|---|---|
| | | *Disadvantages*<br>• Requires more staffing to maintain the schedule<br>• Detail level needs to be appropriate for the size of the project |
| Innovative Construction Management | Improve the efficiency of construction project management.<br>Electronic submittals<br>Web-based portals (PCM)<br>Dedicated staff for submittal review<br>Dedicated design team during construction in the field office | *Advantages*<br>• Reduce turn-around time of submissions<br>• Potential reduction in cost<br>• Improved contract documentation<br>• Improves claim management<br>• Creates a form for performance measures<br>*Disadvantages*<br>• Requires dynamic maintenance of the system – dedicated document control personnel<br>• Requires training of staff |

# APPENDIX E
# TEAM CONTACT INFORMATION

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**DATE OF MEETING**: November 19 - 21, 2012
**LOCATION OF MEETING**: ConnDOT Room G328
**SUBJECT OF MEETING**: Accelerated Project Delivery Study
Project No. 135-301
Atlantic Street, Elm Street, East Main Street
Stamford, Connecticut

## *TEAM CONTACT INFORMATION*

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