March 1, 2012

Mr. Shoukry Elnahal, PE
Deputy Chief Engineer, Bridges and Tunnels
Massachusetts Department of transportation
Accelerated Bridge Program
10 Park Plaza, Room 6500
Boston, MA 02116

Atten: Joseph A. Pavao, Jr., PE

Re: Chatham C-07-001, Bridge Street of Mitchell River
Section 106 Consulting Parties Comments

Dear Mr. Pavao:

Per your request, URS has completed a review of the latest sketches produced by Mr. John Smolen, PE, of Smolen Engineering, Ltd., consultant to the Friends of the Mitchell River Bridge, a recognized Consulting Party to this project under Section 106.

The sketches represent a new concept and differs from the previous concept submitted [previously referenced as Schedule 2 of the Friends of the Mitchell River Bridge letter to Pamela Stevenson of FHWA dated December 9, 2011]. Similar to the previous concept, the new concept is intended to illustrate the use of timber in the bascule span for the replacement bridge.

Similar to the previous sketches, these sketches do not meet the requirements of a "Preliminary Design" as MassDOT would typically define the term. The submittal lacks calculations that can be used to validate the adequacy of the concept. Furthermore, the sketch is not to scale and does not accurately reflect the dimensions and details required for a properly operating drawbridge. The sketch does convey a concept that might be developed into a preliminary design. Comments below reflect URS' interpretation of the concept as it might be developed.

- The sketch depicts the elimination of a concrete bascule pier that fully encloses the pivoting counterweight with the use of a counterweight suspended by a hanger under the bascule leaf tail in lieu of counterweight fixed to the underside of the bascule leaf tail. This concept would not eliminate the need for a concrete bascule pier that fully encloses the pivoting counterweight. Although the concept will slightly reduce the length of the tail end of the bascule leaf with the leaf in the lowered position, the overall length including the length of the tail end of the bascule leaf and the length of the suspended counterweight will be significantly

URS Corporation
260 Franklin Street, Suite 300
Boston, MA 02110
Tel: 617.542.4244
Fax: 617.542.3301
www.urscorp.com

longer with the bascule leaf in the raised position, which will require a deeper counterweight pit. (Note: The mass of a suspended counterweight is generally the same as the mass for a fixed counterweight. However, the suspended counterweight can be dimensioned with a shorter horizontal dimension and longer vertical dimension than a fixed counterweight. Because the suspended counterweight would be supported from a hanger, it pivots independently as the span operates and adds to the overall length of the bascule leaf tail with the span in the raised position.)

- The sketch depicts the bascule span superstructure supported on a pile bent with concrete cap and battered piles. This configuration is unlikely to provide adequate stiffness to limit lateral deflections and is likely to result in conditions where the tip end of the bascule leaf will contact the fixed span superstructure at the rest pier. Significant longitudinal bracing between pile bents would be necessary to stiffen this configuration. The need for a concrete bascule pier that fully encloses the pivoting counterweight supersedes the use of this pile bent configuration.

- The sketch does not depict the mechanism that would be used to operate the span. Because the concept proposes timber beams for the bascule leaf superstructure and timber beams do not have adequate strength to cantilever from the pivot to the tip is the bridge operates, a cable operated drive system, similar to the existing bridge, with the cables attached to the tip end of the bascule leaf would be required. The concerns with a cable operated drive system have been well documented in previous correspondence.

- The sketch depicts the use of steel tubes to strengthen timber beams from the pivot to the tail end of the bascule leaf. This does not address the limited capacity of timber beams to cantilever from the pivot to the tip end of the leaf. The steel tubes would need to extend a significant length forward of the pivot (i.e. 2/3 to 3/4 the length of the span) to provide the required strength, if this is the intent. The steel tubes would completely hide the timber for a majority of the span thus making the timber inaccessible for maintenance and inspection. It is expected that the timber will not fit tightly within the steel tubes and as such will permit moisture to enter the space between the timber and steel tube. This moisture will promote decay of the wood and corrosion of the interior surfaces of the steel tubes.

- The sketch depicts the cantilevered tail end of the bascule leaf supporting the roadway deck. It is anticipated that the deflection of the beams under traffic loading will result in a significant undesirable discontinuity in the deck as traffic crosses the joint between the fixed approach span and bascule leaf tail. In addition, traffic on the cantilevered tail end of the bascule leaf will act to lift the tip end of the leaf. In order to address these issues, operating locking devices at the tail end and tip end of the leaf would be required. Alternatively, if the beams on the fixed approach deck were to overlap with the beams on the bascule leaf tail, similar to the

existing bridge, a deck flap similar to the existing bridge, but much larger in width and length and thus much heavier than the existing, will be required to permit the bridge to be operated.

As with all bascule spans, the details of the design must be evaluated closely even at the conceptual level to confirm that the concept is appropriate and practical.

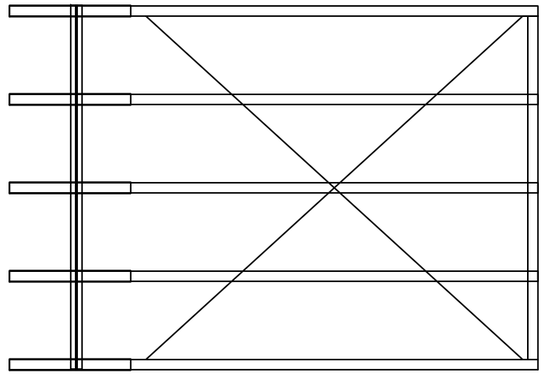
In consideration of the complex design and associated detail challenges, the aesthetic challenges, increased maintenance for the Town of Chatham and potential for safety issues, URS does not recommend pursuing this concept.

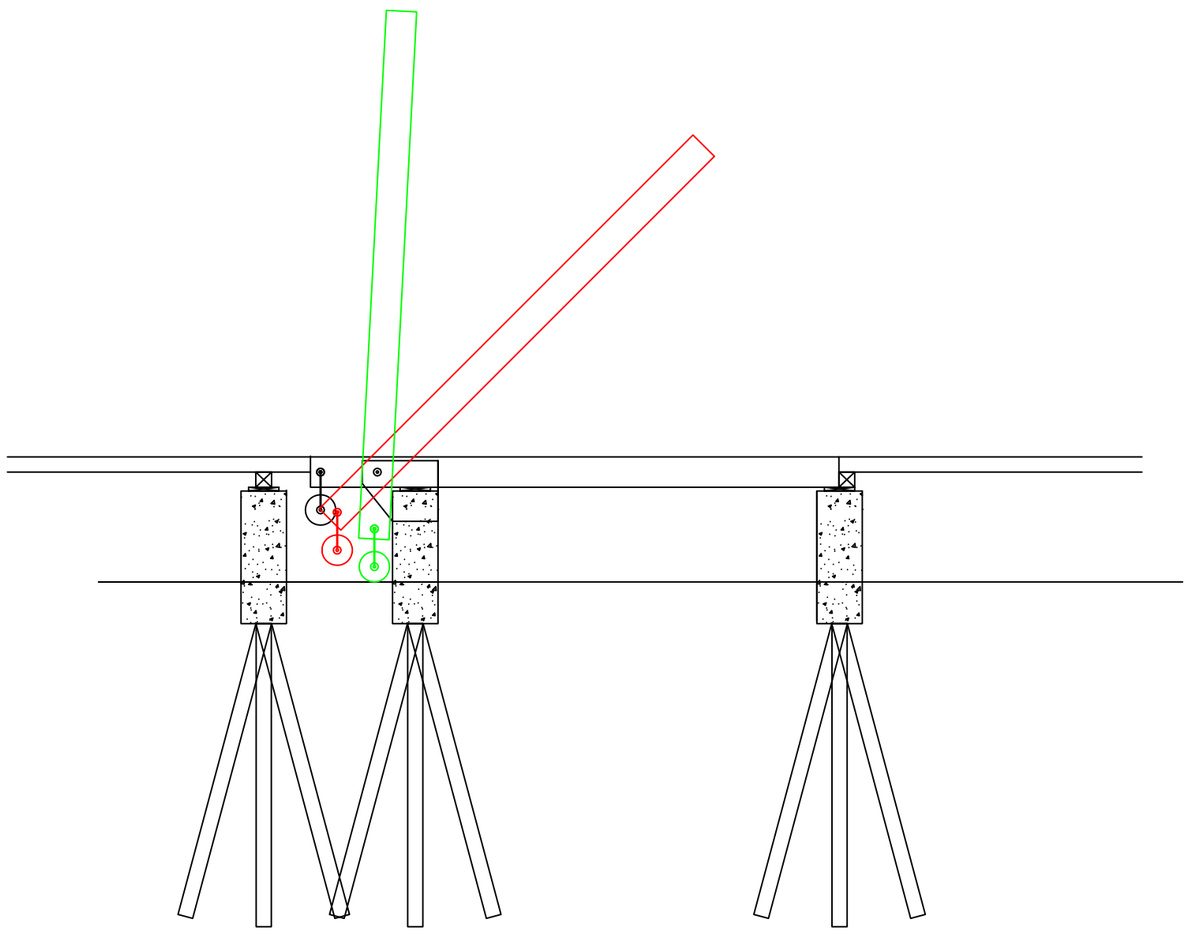
Sincerely,

URS Corporation

Mark E. Shamon, PE
Vice President, Engineering Services

Enclosure





NOTE:
THE TOP PRELIMINARY SKETCH SHOWS THE REINFORCED BASCULE AS VIEWED FROM THE WATER SIDE/BOTTOM. IT IS X-BRACED WITH FIVE ROWS OF TIMBER BEAMS WHICH FIT INTO STEEL TUBES ON THE LEFT. THE HINGE OF THE BASCULE RUNS VERTICALLY ON THE LEFT. THE TUBES COULD BE APPROXIMATELY 5 FEET LONG AND THE VISIBLE PART OF THE TIMBER BEAMS WOULD BE APPROXIMATELY 20 FEET LONG. THE BOTTOM PRELIMINARY SKETCH SHOWS THE BASCULE AT THE CLOSED, 45 DEGREE AND 90 DEGREE POSITIONS ATOP THREE SETS OF PILINGS.