



Date: October 6, 2008

To: Thomas J. Bonfield, City Manager

Through: Theodore L. Voorhees, Deputy City Manager
Kathryn R. Kalb, PE, Director of Public Works

From: Edward R. Venable, PE, Manager of Engineering and Stormwater Services

Subject: American Tobacco Trail Phase E - Pedestrian Bridge over I-40

Executive Summary

Phase E of the American Tobacco Trail (ATT) consists of a bicycle and pedestrian bridge over I-40 and four miles of greenway trail between NC 54 and the Chatham County line. It is the last phase of this project in Durham County. When complete, the entire ATT will stretch approximately 23 miles and will connect Durham with Chatham and Wake Counties providing alternative transportation opportunities as well as regional recreation benefits. City staff recently concluded a public involvement process that involved three well attended meetings the purpose of which was to educate and receive public input concerning the type of pedestrian bridge to be constructed over Interstate 40. The City Administration will be directing the design consultant to design the Cable Stayed Bridge for the I-40 crossing. This recommendation is made based on evaluating the functionality, construction and maintenance costs, aesthetic considerations, and the initial City Council input to create a "signature" bridge that makes a bold statement about Durham. This timely decision will allow the project to move ahead towards the 2010 completion date.

Recommendation

The Department of Public Works recommends that the City Council receive a report on the American Tobacco Trail Phase E - Pedestrian Bridge over I-40.

Background

On January 17, 2006 the City Council approved a municipal agreement for this project. The project at that time was being managed by the Parks and Recreation Department. The project was turned over to the Public Works Department in July 2006 in an effort to better align project management experience with the responsible department. Council approved a new municipal agreement with the NCDOT that formalized additional Federal funding for the project. In December of 2007 the City Council approved an additional \$1,500,000.00 of Two-Thirds Bonds to provide the needed funding for the project.

The firm of PB Americas, Incorporated (formerly Parsons Brinkerhoff Quade and Douglas, Incorporated) teamed with noted bridge architect Steven Grover & Associates and City staff conducted two public informational meetings in November 2007 and April 2008. A final public informational meeting was held on September 17, 2008. The information in this report will be presented to the Appearance Commission on October 15, 2008.

The first meeting in November of 2007 was attended by approximately 120 interested citizens including elected officials and advocacy groups. The primary purpose of this meeting was to educate, provide information, and to set the stage for public input. An overview with

project goals, constraints, issues and the correlation between thorough up-front work were presented. A slide show followed to provide an overview of the many varieties, types, and styles of pedestrian bridges found in the United States and other countries. Why certain bridges are suitable for a specific site and the criteria that play a role in selection were discussed. The theme of "What makes a certain bridge successful?" was discussed. At the conclusion of the slide show a community participation handout was distributed. This was followed by a one hour open question and answer session. The meeting lasted over two hours and was well received.

The second meeting in April of 2008 was well attended by approximately 100 citizens. A summary of the issues identified from the feedback from the November 2007 meeting was provided. That followed with a presentation of how those issues played a role in the bridge selection process. Topics included: key factors driving design, providing connections, technical issues, design options removed, and viable design options. The viable options presented were: the Prefabricated Truss, Low Profile Arch, and the Cable-stayed Pylon Bridge. Models and 3-D images were displayed and the bridges were discussed in great detail. A question and answer session followed. A handout was provided to solicit feedback. The intent of the handout was to provide specific citizen recommendations for bridge type.

The final meeting was held on September 17, 2008. Prior to the meeting a summary of the public involvement, comparative information and the staff recommendation was sent out prior to the meeting to all who had participated in any of the meetings. Over 90 recommendations for the bridge type were received. The Cable-stayed Pylon Bridge and the Low Profile Arch received the majority of interest in equal numbers. The Prefabricated Truss received little interest. Illustrations of the Cable-stayed Bridge and the Low Profile Arch are attached.

Issues/Analysis

Initial Recommendation

Based primarily on the lower estimated construction cost and the long term maintenance issues, Public Works staff recommended the Low Profile Arch. This recommendation was made with no regard to aesthetics or "signature" status. Details concerning the recommendation are as follows:

Comparison of Cost and Maintenance

The initial construction cost estimates of the Cable-stayed Pylon Bridge is \$1,900,000.00 compared to the Low Profile Arch at \$1,700,000.00. In relative terms, the Low Profile Arch is estimated to cost about 90% the cost of the Cable-stayed Pylon Bridge. In addition, this type of construction is unique in this area and when contractors are not experienced with a certain type of construction the costs can be higher.

With respect to the maintenance issues, the City does not have many bridges and most maintenance is done by contract. This will be the only bridge that crosses an interstate highway that the City owns and maintains. Both bridges have a concrete superstructure which is relatively maintenance free. The Cable-stayed Pylon Bridge would be unique to our area and local firms may not be well versed in maintenance techniques. The Low Profile Arch is a concrete structure that will have maintenance requirements similar to other concrete bridges common to our area.

Low Profile Arch

Except for the middle third of the span, the pathway slab and the arch ribs are not in contact, leaving no obstruction to inspection, cleaning, painting and any remedial actions. Inspectors and maintenance forces can also walk on top of the arch ribs for visual inspections of the ribs and the concrete underdeck. For the most part, inspection and maintenance of the Low-Profile Arch alternative is not much different from a conventional interstate bridge.

Cable-stayed Pylon Bridge

The Cable-stayed Pylon Bridge superstructure is quite shallow from abutment to abutment. Inspection, cleaning and painting of the superstructure without interruption to highway traffic would require a rolling scaffold suspended underneath the superstructure. Such a rolling scaffold will also need maintenance and protection from vandals when not in use. The tower and the upper end to the cable anchors will need periodic inspection, cleaning, and maintenance. A lift will be needed for this activity. Water-tightness of the nested layers of corrosion protection is vital to the longevity of the stay cables. Periodic inspection of the stay cables is important to look for signs of moisture intrusion. This inspection should be performed by trained personnel especially when inspecting the grease protected region of the cable sockets. Recharging of the sockets with the protective grease is often needed. Periodic inspection of the stay cables along their free length and at the point of entry to the lower anchorages is necessary. This would include the removal and replacement of any vandal-protective pipe or jacketing to gain access to the lower anchorages of the stay cables. For major structures, some form of stay cable vibration testing is often done after construction with some degree of monitoring performed intermittently throughout the life of the structure. The need for this maintenance and testing might be unnecessary given the short length of the stay cables on this bridge.

Modified Final Recommendation

Given the comparable pre-bid price of the two bridge types, and the fact that the maintenance requirements of both bridge types is well understood, we are left to comment on the availability of firms to perform maintenance and construction. While we are unaware of any Cable-stayed Pylon Bridges in North Carolina, examples are located in both Virginia and South Carolina. Accordingly, since construction and maintenance activities are to be outsourced in any case, we do not believe that finding qualified contractors will be an issue. Accordingly, aesthetic factors may more appropriately be used to reach a final decision.

Comparison of Signature Status and Aesthetics

Since beauty is indeed in the eye of the beholder, it is a challenge to evaluate with a high degree of certainty the potential of either design to gain "signature" status. Public input from the community meeting process was divided fairly evenly between the two final choices. Further discussion among staff and among other community leaders and design professionals yielded preferences for and against the symmetry of the Low Profile Arch, and for and against the uniqueness and asymmetry of the Cable-stayed Pylon Bridge. In the end, all other issues being reasonably comparable, the proponents of the Cable-stayed Pylon Bridge argued that the distinctive design was more likely to be considered a bold "signature" structure that would create a positive and lasting impression of Durham and its commitment to innovation and uniqueness in architectural expression.

Alternatives

The Administration could select either bridge type. Both bridges will function as required, and both are unique and are viewed differently by different people; however, the Administration

has selected the Cable-stayed Pylon Bridge as the preferred design and will proceed accordingly.

Financial Impact

A cost comparison of the maintenance requirements for the two bridge types suggests that in the early years, routine maintenance will be roughly the same for both structures with one exception. The Cable-stayed Pylon bridge will likely require inspection of the cables at an estimated annual cost of \$5000 to \$10,000 per year.

Funds for this project are budgeted for in the American Tobacco Trail Phase E General Capital Improvements Project Ordinance Fiscal Year 08-09, Ordinance 13632 in the amount of \$6,365,981.00.

SDBE Summary

Goals will be set for the construction phase of this project at the appropriate time.