Table of Contents

Executive Summary

An aging infrastructure coupled with a tremendous increase in transportation demand has caused highway construction activities to intensify in recent years, adding to work zone congestion, which is one of travelers' chief complaints, according to the 1995 and 2000 national surveys. Initiated by the Transportation Research Board (TRB) and adopted by the Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO), Accelerated Construction Technology Transfer (ACTT) has emerged as a viable tool in addressing issues like excessive construction time and work zone congestion. ACTT is a strategic process that identifies innovative techniques and technologies to reduce construction time on major highway projects while enhancing safety and improving quality.

In December 2003, the Louisiana Department of Transportation and Development (LDOTD) hosted a 2-day workshop that brought together attendees from several States. For its workshop, LDOTD selected a bridge project located on I-20, just south of the original downtown area on a 2.9-km (1.8-mi) section of elevated highway, which includes the spans crossing the Ouachita River in Monroe, LA. The project is to rehabilitate the 40-year-old bridge to restore the superstructure and address structural deficiencies. The biggest challenge the project presents is traffic control during construction for 95,000 vehicles that travel this substandard section (two 3.6 m/12-ft lanes and 8.4/28 ft of clear driving surface in each direction) of I-20. Shifting through traffic onto other highway systems in the area would make for a detour length of 96 km (60 mi) or more.

Opening the workshop on December 15 were two officials representing LDOTD: the Secretary of Operations and the Monroe District Administrator. Following their remarks, Tucker Ferguson, Chief of Construction for the Pennsylvania Department of Transportation (PENNDOT), and Dan Sanayi, C & SP Engineer for FHWA, served as moderators and opened the afternoon session with an overview of the ACTT process. A bus tour of the project location and alternate river crossings and detour routes was taken to familiarize workshop attendees with the site and its restraints. Upon returning to the meeting center, an overview of the project's background, current status, and traffic considerations was presented by the District Construction and Traffic Engineers.

Over the course of the following day, participants broke into three "Skill Set" groups to examine how ACTT methods could be implemented to accelerate various aspects of the project. The Skill Set groups defined by LDOTD prior to the start of the workshop were: Structures/Materials, Traffic Engineering/Safety/ ITS, and Construction.

Over the next day, national and local transportation professionals teamed up to look for methods and measures that would help LDOTD achieve its project goals. Following discussion and skill set intermingling, each group presented a set of final recommendations. As the host agency, LDOTD will examine the recommendations and determine which will be implemented.

CHAPTER 1

ACTT Background & Purpose

In recent years, communities have witnessed a tremendous increase in highway construction activity, addressing the need to preserve or rebuild our highway infrastructure. Although highway construction is unavoidable, unnecessarily long construction time should be avoided because the process is costly, exposes construction workers to traffic, and subjects motorists to substandard conditions. ACTT can help to minimize traffic delays and community disruptions by reducing construction time while improving construction quality and work zone safety.

1.1 BACKGROUND

ACTT is a strategic process that uses innovative technologies and techniques to reduce construction time on major highway projects while improving construction quality and work zone safety. A complete Accelerated Construction approach involves the evaluation of all aspects of highway projects, from planning and development to design and construction, within a highway corridor. Successfully deploying ACTT for the benefit of the traveling public requires a thorough examination of all facets of highway corridors, with the objective of improving safety, optimizing cost effectiveness, and minimizing adverse impacts.

Recommendations outlined in Special Report 249 from the Transportation Research Board (TRB) called for the creation of a forum to promote accelerated construction in the highway infrastructure. Based on this recommendation, TRB Task Force A5T60 was formed in 1999 with the following objectives:

- Remove barriers to innovation.
- Advocate continuous quality improvement and positive change.
- Enhance safety and mobility.
- Encourage the development of beneficial strategies.
- Create a framework for evaluating proposed innovations.

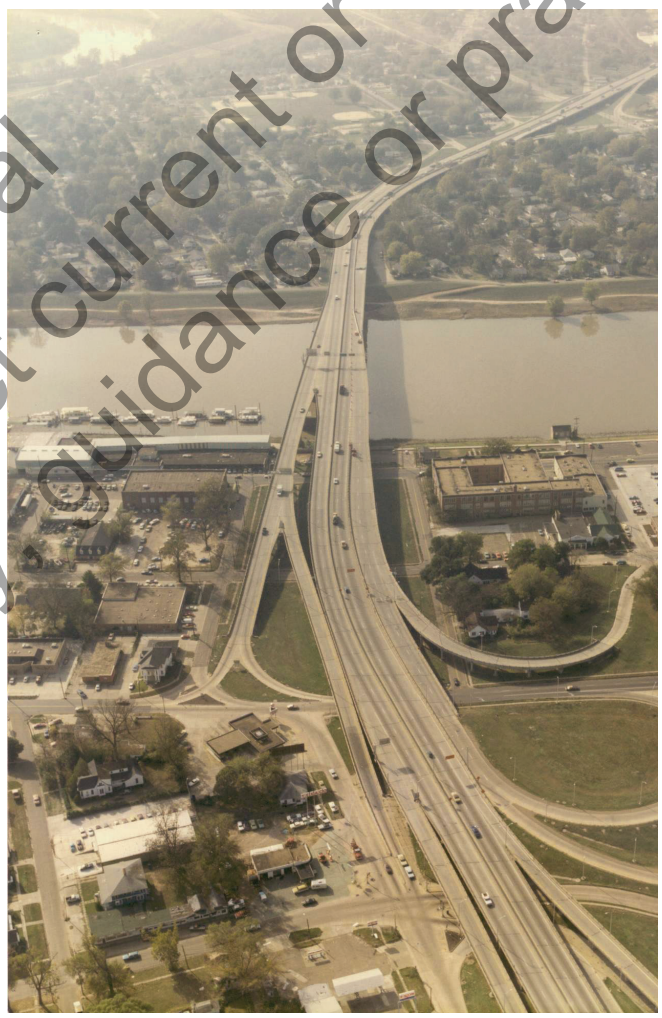
Fully supporting the task force's mission and objectives, the Federal Highway Administration (FHWA) and the Technology Implementation Group (TIG) of the American Association of State Highway and Transportation Officials (AASHTO) joined the task force's outreach effort. This resulted in the formation of a national resource pool known as the "National Skill Sets Council" and completion of two ACTT pilot workshops. With successful completion of the two pilot workshops (one in Indiana and the other in Pennsylvania), A5T60 passed the concept off to TIG and FHWA to continue the effort by conducting all future workshops.

In 2003, the ACTT Management Team, consisting of TIG and FHWA representatives, started implementing the ACTT program by sharing its work plan with State DOTs and soliciting their consideration of the concept on major highway projects by hosting an ACTT workshop. LDOTD selected the I-20 rehabilitation project as the focus of its workshop. The rationales for choosing this particular project, which involves the rehabilitation of a 40-year-old section of I-20 in Monroe, include:

- The route passes through Monroe just south of the original downtown area on a 2.9-km (1.8-mi) section of elevated highway that includes the spans crossing the Ouachita River.
- The elevated section of I-20 has remained in service with routine maintenance and only one major rehabilitation performed since 1965.
- The current traffic volumes and lack of realistic detour routes would create gridlock within the area highway system, including the Interstate, during the planned rehabilitation.
- The project site and required work did not seem compatible with achieving traffic control and construction time goals.

1.2 PURPOSE OF ACTT

The purpose of an ACTT Workshop is to explore innovative ways that highway corridors could be brought to full service more quickly and safely, and with fewer adverse impacts on the traveling public. The Louisiana workshop brought a multidisciplinary national team of transportation professionals together with their local counterparts. The workshop participants explored innovative ways to accelerate the rehabilitation of I-20. The workshop included plenary sessions, breakout sessions, skill set interaction, closing remarks, and a follow-up action plan.



Aerial view of project site: Ouachita River crossing

CHAPTER 2

Project Details

2.1 CORRIDOR DESCRIPTION

The elevated section in Monroe was constructed under four separate contracts; the main Ouachita River bridge span, elevated approach sections on each side of the river, and two contracts linking the ground roadways to bridge approaches. Construction began on these projects in 1958, with final acceptance of the last project being made in 1964. The elevated approach sections of the Interstate consist of the two independent steel girder simple span bridges, erected on portland cement concrete (PCC) caps, columns, and pile supported footings. The typical deck section is an 18-cm (7-in) reinforced PCC slab with a wheel curb barrier rail. The structures are aligned such that the raised section of the barrier on the westbound roadway serves as the common median rail for the eastbound roadway. The western approach and main span roadways are typically 12 m (40 ft, 3 lanes) in width; however, as the route crosses the river into Monroe the typical roadway narrows to 8 m (28 ft, 2 lanes) in each direction.

The elevated section of I-20 has remained in service with routine maintenance and only one major rehabilitation since 1965. The deck sections constructed under the elevated approach contract exhibited surface distresses in the late 1970s. A project to overlay the west approach section was performed in 1980-81. A 600-m (2,000 linear ft) section of the deck structure was scarified and patched, the joints modified, and a 3.8 cm (1.5 in) latex-modified concrete overlay placed over the prepared surface. Traffic was maintained in a single lane while work commenced, with little loss in level of service of traffic flow. Within the past few years, surface repairs and required maintenance performed on the deck have been extensive. The 1980 overlay section has begun to de-bond as it nears a 25-year service life. Maintenance is generally performed on the weekends to minimize disruption of traffic.

As reconstruction or renovation of the Interstate System became a priority to FHWA and LDOTD in the mid 1980s, continued bridge rehabilitation projects fell victim to the need to re-surface pavement sections that experienced an accelerated decline in serviceability. When scoping the I-20 bridge rehabilitation project for initial design, it was realized that current funding levels could not finance a project of the magnitude envisioned. Due to the need for repeated maintenance work over the eastern elevated approach, the District identified the area of greatest need and worked with its Bridge Design office to secure funding for the deck rehabilitation project identified as State Project 451-06-0121. Further investigations for unsound areas confirmed the scope of the current project. The proposed work is to patch structurally deficient areas of the deck, resurface the mainline and associated ramp roadways, and to modify the existing brush curb bridge rails into a more modern barrier design.

2.2 ACTT GOALS

Upon selection of the project for the ACTT Workshop, the District developed the following goals and objectives for the project:

- Reduce construction time.
- Maintain traffic flow with minimal disruption.
- Produce a quality project with minimal long-term maintenance needs.
- Maintain a safe work zone.
- Maintain access to emergency facilities.
- Provide a model for future projects.

2.3 PROJECT CHALLENGES

2.3.1 TRAFFIC

Traffic counts indicate the current average daily traffic (ADT) on the structure to be approximately 95,000 vehicles. Within the Monroe/West Monroe area, only two other river crossings are available: both are located upstream of I-20. The two-lane Desiard Street (Endom) Bridge carries approximately 11,000 vehicles per day and the approach routes are not under the jurisdiction of LDOTD. The four-lane US 80 (Louisville Avenue) bridge has an ADT of 40,000 and is the principal east-west route through Monroe. Both of these bridges are movable spans and must open on demand to river traffic. Neither bridge was considered an alternate route for Interstate traffic. Other river crossings in the region require significant time and mileage to access and are not viable detours.

LDOTD's current guideline for traffic control through construction zones is to limit queue lengths to no more than a 30-minute delay. Analysis by the District Traffic Operations section indicates two through lanes of Interstate traffic must remain in service during daylight hours to avoid significant delay times. As sections of the roadways to be renovated are only two lanes in width, either a detour route or a compressed work time schedule must be utilized to maintain traffic flow. Calypso Street and Layton Avenue, which parallel the structure, may be used as detour routes, subject to limitations. Calypso Street on the north side of I-20 is a city street and can only be closed to local traffic on the weekends. The District worked with FHWA to secure partial funding of the City's current project to reconstruct Calypso Street in return for its use as a detour route during the deck rehabilitation project. Layton Avenue is located south of the bridge and cannot close to cross traffic at the business US-165 intersections. The ramps associated with the project are the entrance and exit ramps to downtown Monroe that access the City Hall/Police complex, the Civic Center, and a major hospital, St. Francis Medical Center.

2.3.2 TIME

Due to the impact of the project on local and Interstate traffic patterns, the District's chief goal is to minimize the amount of time the roadway is under construction. Traffic analysis indicates most work will need to be performed at night or on weekends. As the Calypso Street detour route is only available on weekends, mainline westbound construction may only occur from Friday night to Monday morning. The contractor must restore the two lanes of Interstate traffic to the existing roadway before weekday peak morning traffic.

2.3.3 LIMITED AREA WORK

The existing structure transitions from three lanes (12 m/40 ft width) to two lanes (8 m/28 ft width) through the work area. Ramp entrances and exits compound the problem of space available for maintenance of traffic and the contractor's work area. Use of positive barriers to protect the work zone will limit access for equipment and materials. When working on the median lane, the contractor may have traffic on each side of its work area.

2.3.4 FUNDING

LDOTD's resources for bridge reconstruction/rehabilitation are limited. The scope of this project has been narrowed to a critical portion of the structure, which should not be delayed further. Early construction cost estimates for the project were $6-7 million, but further traffic considerations have escalated this cost to an estimated $8 million.

2.4 PROJECT STATUS

The District Design section has worked for the last year to incorporate elements of the 1980 project and deck overlays undertaken in the Shreveport District to produce preliminary plans. As the impact of the need to prevent area traffic gridlock became apparent, the original drawings have evolved into a traffic control plan with some deck repair details added. The concept of rehabilitation remains the same, but the methods to achieve a quality project must meet the demands and constraints imposed by today's public.

In July 2003, a constructability review of the project was held in Baton Rouge with a team of contractors and DOTD personnel. No major innovations or solutions were determined at the review, but many specific details or options were presented for consideration.

Local officials and the public have been made aware of the proposed project and its potential impacts. The District Administrator has spoken to several groups to keep the area advised of plan development. Similar meetings have been conducted with area law enforcement and other emergency personnel, which will be affected by the project.

CHAPTER 3

Workshop Meeting Details

After the Monroe project was selected for an ACTT Workshop, FHWA officials and LDOTD personnel identified skill sets needed to address project needs. A list of 10 areas of expertise has been utilized by FHWA to evaluate previous major projects; however, due to the limited scope of the Monroe Bridge Rehabilitation, only three skill areas were created: traffic, materials, and construction. After selection of the skill sets, the FHWA workshop coordinators and District LDOTD Headquarters staff developed a participant list comprised of a cross section of LDOTD staff, FHWA personnel, and individuals from various public and private sectors with expertise in each skill set area (Appendix A).

3.1 OPENING SESSION

The Louisiana Workshop was held on December 15-16, 2003, at the West Monroe Convention Center in West Monroe. Participants convened for registration and the opening session on the afternoon of Monday, December 15, 2003. Tucker Ferguson, Chief of Construction for PENNDOT and Dan Sanayi, C & SP Engineer, FHWA, served as moderators and opened the afternoon session with an overview of the ACTT process. After welcoming remarks from Gordon Nelson, Secretary of Operations, LDOTD, and Don Tolar, Monroe District Administrator, LDOTD, participants introduced themselves with a brief technical background.

A bus tour of the project location and alternate river crossings and detour routes was taken to familiarize workshop attendees with the site and its restraints. Upon return to the meeting center, an overview of the project's background, current status, and traffic considerations was presented by the District Construction and Traffic Engineers. Participants were then exposed to a sampling of North Louisiana cuisine at an informal "ice-breaking" reception.

3.2 WORKSHOP PROCESS AND RECOMMENDATIONS

On Tuesday, December 16, 2003, the "working" sessions began with a more in-depth presentation by the moderators on "Why ACTT? Why Now?" The mechanics of how the skill set brainstorming sessions would function were explained, and the participants broke into groups to begin work. Prior to the lunch break, the initial findings of each skill set were presented by the group leader to the entire assembly. For the afternoon session, initial skills set members were encouraged to intermingle with other groups to develop the final recommendations. The spokesman for each skill set presented a list of recommendations with any qualifying remarks. The District Administrator and District Construction Engineer then commented on

individual recommendations and the collective process. The moderators presented brief closing remarks to end the workshop.

3.2.1 TRAFFIC

The primary consideration for traffic was to maintain traffic flow for the mainline Interstate roadway. The Preliminary Ideas are possible alternatives that would accommodate the anticipated traffic volume and allow no more than 30 minutes of motorist delay.

3.2.1.1 PRELIMINARY RECOMMENDATIONS

There were four Preliminary Ideas considered for accommodating the anticipated traffic volumes during the I-20 elevated section repairs while maintaining motorist delays at acceptable levels. The four Preliminary Ideas were as follows:

1. Keep one lane open on the Interstate at night and keep all existing lanes open during the day. Allow I-20 lane closures only from 7:00 p.m. to 6:00 a.m., 7 days/week.
2. Keep one lane open on the Interstate at all times and allow one or two lanes of traffic to detour from I-20 onto Layton Avenue and Calypso Street.

    - Eastbound

      One lane on I-20 open at all times and provide for one lane continuous flow detour from I-20 onto Layton Avenue. Allow I-20 lane closures only from 7:00 p.m. to 6:00 a.m., 7 days/week.

    - Eastbound

      One lane on I-20 open at all times and provide for two lanes continuous flow detour from I-20 onto Layton Avenue. Allow I-20 lane closures 24 hours/day, 7 days/week.

    - Westbound

      One lane on I-20 open at all times and provide for one lane continuous flow detour from I-20 onto Calypso Street. Allow I-20 lane closures only on the weekend, from 8:00 p.m. Friday night to 6:00 a.m. Monday morning, or from 7:00 p.m. to 6:00 a.m., 7 days/week.

3. Completely close the Interstate at night and provide for one lane continuous flow detour from I-20 onto Layton Avenue eastbound and Calypso Street westbound. Allow I-20 lane closures only from 7:00 p.m. to 6:00 a.m., 7 days/week.

4. Completely close the Interstate on weekends and provide for two lanes continuous flow detour from I-20 onto Layton Avenue eastbound and Calypso Street westbound. Allow I-20 lane closures only on the weekend, from 8:00 p.m. Friday night to 6:00 a.m. Monday morning.

Once the Preliminary Ideas had been shared with the ACTT Workshop participants, the construction group indicated that the necessary repairs could be completed if the contractor had 12 continuous hours of work time per day, including the time required to set up and remove traffic control devices. With this

information, the traffic group modified the Preliminary Ideas as necessary to meet the time requirements established by the construction team, while still maintaining motorist delays at 30 minutes or less. In addition, the consensus of the traffic group was that all Interstate traffic detours should be restricted to the roadway network adjacent to the Interstate, and Interstate traffic should not be detoured to other Ouachita River crossings.

Considering the information provided by the construction team and the traffic operation analysis, two acceptable final traffic control alternatives were formulated. These two Final Ideas are as follows:

Option 1
Completely close the Interstate to traffic at night, 6:30 p.m. to 6:30 a.m., and provide for two lanes of continuous flow traffic to detour from I-20 onto Layton Avenue eastbound and Calypso Street westbound. Allow I-20 lane closures only from 6:30 p.m. to 6:30 a.m., 7 days/week.

Option 2
Close one lane on the Interstate at night, 6:30 p.m. to 6:30 a.m., and maintain one lane of traffic on the Interstate. Allow I-20 lane closures only from 6:30 p.m. to 6:30 a.m., 7 days/week.

For both Final Idea options, it is recommended that construction on the Interstate take place in only one direction at a time. In both options, lane closures on the Interstate will only be permitted from 6:30 p.m. to 6:30 a.m., 7 days/week, including the time required to set up and remove traffic control devices from the Interstate. Since the construction team felt that productivity would significantly decline working 7 days/week, it is recommended that the contractor only be required to work 5 days/week. It is also recommended that the LA-34 eastbound on-ramp and the LA-594 westbound on-ramp be closed, and pedestrian access be limited or restricted directly below the work area during these hours. In addition, both options should utilize the following traffic control measures as necessary:

- Employ advance signing and advance notification of the work zone (up to 100 or more miles away) to allow for alternate routes.
- Notify trucking industry.
- Modify traffic signals on other river crossings to allow for dynamic traffic flows.
- Use aggressive incident management practices.
- Employ smart work zones.
- Establish motorist assistance patrols.
- Advance public relations campaign.

3.2.1.2 FINAL RECOMMENDATION - OPTION 1

For Option 1, a local street closure plan will be required. In addition, on-ramps and off-ramps will have to be modified and striping modifications will be necessary to accommodate two lanes of detoured Interstate traffic on Layton Avenue and Calypso Street.

Westbound
Two lanes will exit the Interstate at the US-165 Business (Civic Center) Exit and travel along Calypso Street to the I-20 westbound on-ramp at Catalpa Street. All northbound and southbound traffic on US-165 Business, Hart Street, Hall Street, and Catalpa Street will be prohibited, and only westbound Interstate traffic will be allowed to use Calypso Street. Modifications to the raised concrete island

and traffic signal at the intersection of US-165 Business and the I-20 westbound off-ramp will be required to provide for two lanes of detoured Interstate traffic on Calypso Street. This option will also require temporary geometric modifications of the I-20 westbound on-ramp at Catalpa Street to provide for two lanes of detoured traffic.

Eastbound

Two lanes will exit the Interstate at the Jackson Street Exit and travel along Layton Avenue. The inside lane will stay on the off-ramp to Catalpa/South 2nd Street and then travel along Layton Avenue and re-enter the Interstate at the Hall Street on-ramp. The outside lane will immediately exit onto Layton Avenue and travel along Layton Avenue to US-165 Business. Motorists will then turn south (right) onto US-165 Business and turn east (left) onto the I-20 eastbound on-ramp. Northbound and southbound traffic will be prohibited on Jackson Street, Catalpa/South 2nd Street, 4th Street, and Hart Street. Southbound traffic will be prohibited on US-165 Business. Northbound traffic on US-165 business may be detoured to Stone Avenue.

3.2.1.3 FINAL RECOMMENDATIONS - OPTION 2

Option 2 will only require the use of the Department's Standard Plans for a lane closure on the Interstate.

3.2.1.4 TRAFFIC CONCLUSIONS

Of the two final options, the traffic group consensus was that Option 1 provided the best traffic flow and allowed the contractor to have the entire roadway to perform repairs. Therefore, Option 1 should provide for the fastest means of construction and offer the safest means of protecting the work area. Additionally, if maintaining two lanes of detoured Interstate traffic is unfeasible, the queue analyses showed that one lane of continuous flow detour from I-20 onto Layton Avenue or Calypso Street from 6:30 p.m. to 6:30 a.m., 7 days/week, would result in traffic delays of less than 30 minutes.

3.2.2 STRUCTURES/MATERIALS

The structures/materials group was challenged to examine method and material options that would allow fast-tracking a bridge deck resurfacing operation without sacrificing quality or longevity of the final product.

The participants of this group represented a composite of diverse skills with materials, research, construction, design, structures and specifications experience. The morning session was devoted to identifying types of overlay materials that could be used, the different methods of deck preparation, and means of providing corrosion protection. The levels of anticipated patching and alternate replacement types of barrier rail were also evaluated. The preliminary lists of all elements of construction were displayed as discussion then focused on the probable working times and traffic constraints. The group began to center on available techniques that would provide a durable deck surface within a minimum construction time.

After discussion with members of the Traffic and Construction skills sets, the combinations of surface preparation methods and material selection were further refined into viable options, with the advantages and disadvantages of each being presented. In conjunction with a similar recommendation from the construction group, the structures/materials skill set suggested the limits of the project be extended to include the entire 2.9-km (1.8-mi) structure to perform all needed rehabilitation at one time, thus avoiding

multiple disruptions of traffic over several years and forestalling more serious measures being required to restore the deck surface.

The overlay material of choice for the laminated deck areas was Very Early Strength (Rapid Set) Latex Modified Concrete (LMC-VE). With no "permanent" detour route available for Interstate motorists, the existing deck would have to be reopened daily to through traffic. The use of structural fibers to improve the toughness of the overlay should also be considered. Placement of the overlay while the bridge was closed to traffic was recommended to avoid premature cracking of the mat or strength loss due to vibration.

The group prepared a matrix of surface preparation methods to be used in conjunction with the overlay to be weighed by the advantages or disadvantages of each.

- Hydro-demolition to an 8-cm (3-in) depth presented the best method to ensure removal of poor existing concrete areas and best long-term corrosion protection (Longest life). However, this method requires more construction time, may result in more deck patching, and was deemed the most costly.
- Hydro-demolition to an 3.8-cm (1.5-in) depth required no change in grade to the steel end dam structures as in Method 1, provided there was a good bonding surface, and was less time consuming and less expensive than deep removal. Disadvantages included a possible shorter life cycle due to the thinner overlay or failure to remove all existing laminated material, *any* hydro-demolition could result in isolated total deck section failures, and deep patch removal would require extensive labor (i.e., jack hammer).
- Cold mill 1.27-2.54 cm (0.5-1 in) required the least surface preparation time and avoided potential deck collapse problems. This method was determined to present the overall shortest construction time and least cost. Negative features of this method were all the steel joints would require adjustment to accommodate the change in grade, the bonding characteristics of the milled surface were not as desirable as hydro-demolition, and the additional labor required for deeper patches.

The structures/materials skill set did not promote a defining option, but left the final selection to the judgment of the Department's Design Team.

Line items for the various patch types to be encountered were presented. The use of lightweight concrete barrier rail modification was preferred due to the aesthetics and reduced maintenance costs.

3.2.3 CONSTRUCTION

Members of the construction skill set developed concepts for deck rehabilitation processes, which would provide minimal impact to traffic flow and reduce overall construction time. The construction skill set

group's brainstorming session produced a myriad of ideas to unite into the project. These ideas were generally divided into pre-construction activities and project management items to be incorporated into the plans and specifications. A key element of the pre-construction ideas was an aggressive public relations campaign to ensure the visibility of the project and its impact on the local area. Within the course of the project, methods to maintain traffic flow, despite disruptions such as accidents or stalled vehicles, were explored.

After incorporation of ideas from the material and traffic skill sets, the construction group formulated their preliminary ideas into the following project strategies.

3.2.3.1 PRECONSTRUCTION

- Extend the project limits — The group viewed the overall condition of the elevated section and determined that the best "get in-get out" concept would be to rehabilitate the entire deck structure at one time utilizing a variety of methods.
- Public relations campaign — A broad scope of awareness was needed to prepare through traffic for the work zone. To reach Interstate travelers, posting information at the border Rest Areas and distributing it through the media was recommended. Real time display of the active work in progress on the Department's Internet site, through the Monroe trade area media, and via Dynamic Message Signs (DMS) preceding the work zone was deemed imperative. Pre-construction status presentations by the District would be continued to maintain an open relationship with community government and business leaders.
- Innovative contract methods — To minimize construction time, the project should incorporate elements of incentive/disincentive and work plus time (A + B) bidding, and the contractor should be encouraged to present viable value engineering solutions to hasten the project.
- Optimization of letting date — The group proposed that construction on other high impact traffic projects within the area be completed prior to beginning work on the Interstate. As the materials were very temperature sensitive, a letting date that would allow construction to occur during prime weather conditions was proposed.

3.2.3.2 Project Management

- Utilize full bridge closure as much as possible. To meet anticipated placement rates for the overlay, the group proposed maximum use of night work, when the Interstate could be closed to traffic. By maximizing times proposed by the traffic group, the optimum production time would occur at night. This was especially the case for the westbound roadway, wherein the ground detour was only available on weekends.
- Traffic control measures combined with the public awareness campaign. The immediate work zone warnings and elements were deemed critical to project success. An advanced system utilizing DMS linked to queue sensors was proposed to advance the warning of delays to approaching traffic. The use of law enforcement personnel for traffic control and a Motorist Assistance Program with the capability to immediately remove immobilized vehicles was suggested.
- Complete all preparatory work, identify staging areas and access. Several ramps require rehabilitation prior to use for Interstate traffic. To maintain two lanes of traffic on the

proposed ground routes, modifications to existing intersections, including possible temporary signalization, is required. The plans should also clearly identify where the contractor may store equipment and materials within the project site and how he may access the deck without conflict with traffic.

- Provide for emergency surfacing. Due to the compressed work time available, any delays or unexpected events, such as rainfall or significant deck loss by hydro-demolition, the contractor must be prepared to restore traffic to the Interstate roadway at the time required. It was recommended the Department set the guidelines for the appropriate type of plate, grid, or other suitable temporary material that could be utilized in emergency situations for traffic.

The Construction group also suggested specifications for adequate lighting be developed for nighttime work. All groups agreed that due to the complexity of the traffic control, work should be sequenced to allow construction only in the eastbound or westbound direction until completion.

CHAPTER 4

Next Steps

Since the ACTT workshop, the District has centered on several major concepts presented by the groups:

- Due to the limited funding available for bridge rehabilitation, the ability to extend the project does not appear to be a viable issue. The project identified is of the utmost importance and should not be forestalled. However, the future rehabilitation of the 1980 overlay section could encompass the remaining original areas of the elevated section with varied rehabilitation treatments proposed by the materials group.
- The surrounding projects having an impact on the area will be monitored and allowed to meet completion dates prior to Interstate work. Conflicting projects scheduled during the anticipated Interstate rehabilitation will be delayed until normal traffic patterns are reestablished on the mainline.
- Use of Department guidelines on Incentive/Disincentive will be incorporated into the contract proposal. The use of law enforcement personnel for traffic control and available ITS technology will be integrated into the project.
- Possible detour routing utilizing full bridge closure is being determined by the Design Section. To expedite deck overlay, the use of LMC-VE with 1-1/2 inch hydro-demolition has been selected.

4.1 CLOSING COMMENTARY

The impacts of S.P. 451-06-0121 will be as significant to the Monroe area as other projects selected for an ACTT workshop of perhaps a more grand scale. Loss of the I-20 elevated structure would have national importance, as the detour routing would result in hours of delay to Interstate traffic across the Dallas-Atlanta corridor. Most of the workshop participants had not been introduced to the project's constraints and expectations until Monday afternoon. The Accelerated Construction Technology Transfer Workshop allowed the "observers" to examine the project through the "active" participants' impartial and unbiased analysis. The broad cross section of skills and experience brought into the process exposed materials, methods, and ideas that are not only solutions to the project in focus, but may now be shared by all workshop members with their own organizations. The strategies generated by the workshop validated some original design concepts while providing new direction for others. The District's Design personnel are now at work to produce final plans, which have been enhanced by the ACTT process.

The District thanks Bill Farr with the FHWA Louisiana Division Office for his efforts in securing the ACTT workshop for the I-20 project. Through Farr's coordination and the "hands-on" attention to the details by Don Tolar in the Monroe District, the "mini-workshop" was successful and enjoyable to all participants.

APPENDIX A

Workshop Attendees

Welcome

- Gordon Nelson, LDOTD Assistant Secretary, Operations, (225) 379-1210, gnelson@dotd.state.la.us
- Don Tolar, District Administrator, LDOTD, (318) 342-0101, dtolar@dotd.state.la.us

Moderators

- Dan Sanayi, FHWA, HIAM-20, (202) 493-0551, dan.sanayi@fhwa.dot.gov
- Tucker Ferguson, AASHTO TIG, PENNDOT, (717) 787-7894, hferguson@state.pa.us

Note Keepers

- Amy Giddens, Engineer Intern, District 05, (318) 342-0211, amygiddens@dotd.state.la.us
- Dale Parsons, Assistant District Traffic Engineer, District 05, (318) 342-0109, daleparsons@dotd.state.la.us
- Amy McMellon, District Training Officer, District 05, (318) 342-0181

Materials

- Claude Napier, FHWA - VADIV, (804) 775-3363, claude.napier@fhwa.dot.gov
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- Art Aguire, FHWA, LA Div., (225) 757-7611, art.aguire@fhwa.dot.gov
- Michael M. Sprinkel, Associate Director, Virginia Transportation Research Council, (434) 293-1941, Michael.Sprinkel@VirginiaDOT.org
- Doug Hood, LDOTD Lab Engineer, Section 22, (225) 248-4101, doughood@dotd.state.la.us
- Robert Taylor, Construction Engineer, District 04, (318) 549-8405, bobtaylor@dotd.state.la.us
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APPENDIX B

Skill Set Descriptions

- Innovative financing – Aligning the financing options with the goals of the project by matching anticipated cash flow with project management, while recognizing competing priorities for existing resources. Financing tools could include cost sharing strategies, tolling mechanisms, contractor financing, leveraging techniques, credit assistance, and cost management and containment concepts.
- ROW/utilities/railroad coordination – Right-of-way, utility, and railroad delays seriously impact accelerated operations. More innovative solutions are required for both short and long-term time sensitive construction projects. Right-of-way considerations include State laws and procedures covering acquisition and relocation, numbers and types of businesses and residences that may be impacted, ready availability of additional right-of-way, and sometimes, the number of outdoor advertising structures in the project area. Other items to consider are industry responsiveness, incentive-based utility agreements, corridor approaches to utility agreements, contracting for utility work, and non-destructive methods of utility relocation. When applicable, close railroad coordination is essential for a project for construction access or work having an impact on the railroad lines.
- Geotechnical/Materials/Accelerated Testing – Subsurface conditions and issues should be explored to assess their impacts on the project. Based on the geography of the project, subsurface investigation may be complicated by traffic volume, environmental hazards, utilities, railroad property, and right-of-way. Pursue options to expedite and facilitate turnaround times in material testing for material acceptance and contractor payment. The use of innovative materials should be explored and encouraged on projects to maximize the creative characteristics of the designer and contractor. By identifying project performance goals and objective, the designer and contractor have the maximum freedom to determine the appropriate methodology for constructing the project.
- Traffic Engineering/Safety/ITS – Enhanced safety and improved traffic management by corridor contracting should be considered. Developing and evaluating contract models may illustrate the best use of incentives to enhance safety and improve traffic flow during and after construction. Evaluating both the construction and maintenance work may help assess traffic and safety issues more fully than the conventional project-by-project approach. Better information needs to be communicated to the traveling public and politicians on the relationships among crashes, delays, mobility, total traffic volume, truck traffic volumes, and the need for lane closures during construction. Implement integrated ITS systems to communicate construction information to motorists via radio, Internet, and wireless alerts, along with incident management systems/services.
- Structures (bridges, retaining walls, culverts, miscellaneous) – Accelerating the construction of structures will require deviation from standard practices for design and construction and include early coordination between designers and contractors. A systems approach from the "ground up" will be necessary instead of emphasis on individual components. Prefabrication, preassembly, incremental launching, lift-in, roll-in, etc., are systems or concepts that have a proven contribution to accelerating construction and should be understood and receive priority consideration. Designers have several options in structure types and materials to meet design requirements, but identifying the most accommodating system while minimizing adverse project impacts should be the objective.
- Innovative contracting – Explore the state-of-the art in contracting practices and obtain a better knowledge of how these techniques could be selected, organized, and assembled to match the specific situations needed on this project. Techniques to be considered include performance-related specifications, warranties, design/build, maintain, operate, cost + time, partnering

escalation agreements, lane rental, incentive/disincentives, value engineering, and any other innovative contracting techniques that would apply to the project.

- Roadway/Geometric Design – Highway geometrics can have a great impact on project funds and integrity. Although designers may have several options for meeting design standard requirements, identifying the most accommodating product while minimizing adverse impacts should be the objective.
- Long life pavements/Maintenance – It is feasible to acquire pavement designs approaching 50 to 60 years by telling the contractor what is wanted, rather than how to build the pavement. By identifying and communicating the pavement performance goals and objectives for the pavement, the designer and contractor have the maximum freedom to determine the appropriate methodology. Explore the future maintenance issues on the project including winter services, traffic operations, preventative maintenance, and any other concerns that may have an impact on the operation of the project features.
- Construction (Techniques, Automation, and Constructability) – Accelerated construction may press the contractor to deliver a quality product in confined time frames and areas, while maintaining traffic. Completion milestones and maintenance and protection of traffic are key elements visible to the traveling public. Allowing contractors to have input on design elements that would have an impact on time or quality during construction can improve the effectiveness and efficiency of the overall project completion. The use of automation to enhance construction equipment performance, construction engineering and surveying, data collection and documentation, and contract administration should be explored and implemented.
- Environment – Scope-of-work and construction activities need to reflect environmental concerns to ensure the most accommodating and cost effective product while minimizing natural and socioeconomic impacts.