

NORTH CAROLINA

ACTT

WORKSHOP

PARTNERING FOR INNOVATION

US 421/I-40 BUSINESS IN WINSTON-SALEM



U.S. Department of Transportation
Federal Highway Administration



ACTT

ACCELERATED CONSTRUCTION TECHNOLOGY TRANSFER
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- ACTT provides a fresh outlook by bringing national experts to your planning table.
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- ACTT saves time: according to FHWA's *ACTT II* report, published in March 2005, "most agencies have found ways to slice construction time by 30 percent or more."
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- ACTT works for you and your customer!

How do I ACTT?

- Select a corridor: ACTT is most helpful when applied during the project development phase.
- Make a workshop proposal to ACTT team members, and submit a copy of your proposal to the FHWA Division Office. Include details on the project corridor, timeline and goals.
- Hold a pre-workshop meeting with the ACTT management team.
- Select a meeting site, and coordinate workshop details with the FHWA Division Office.
- Host the workshop.
- Draft a report for submittal to FHWA.
- Incorporate ACTT into project operations.

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In the transportation community, meeting expectations means knowing and understanding customers and stakeholders.

Tom Sorel, "Great Expectations," Public Roads, July/August 2004, vol. 68, no. 1, <http://www.tfhr.gov/pubrds/04jul/02.htm>

Understanding customers and stakeholders is a key component of the US 421/I-40 Business in Winston-Salem project under study by the North Carolina Department of Transportation (NCDOT).

NCDOT's customers and stakeholders comprise a diverse group of people, including local businesses, commuters, emergency responders, hospitals, educational institutions and participants of the International Home Furnishings Market, the single largest contributor to the Piedmont Triad's economy.

Knowing this, NCDOT approached the Federal Highway Administration (FHWA) about hosting an Accelerated Construction Technology Transfer (ACTT) workshop for the US 421/I-40 Business corridor. A key goal is to reduce the projected six-year construction timeframe to two years.

Together, the planning team identified the following skill sets for the US 421/I-40 Business in Winston-Salem workshop:

- ◆ Utilities/Railroad/Right-of-Way (ROW)/3rd Party Constraints.
- ◆ Historic Properties/Human Environment/Public Involvement.
- ◆ Traffic Engineering/Safety/Intelligent Transportation Systems (ITS).
- ◆ Geometric/Hydraulic Design.
- ◆ Structures.
- ◆ Long Life Pavements/Maintenance.
- ◆ Construction.
- ◆ Geotechnical/Materials/Accelerated Testing.
- ◆ Public Information.

Each team focused on how the ACTT process applied to their area of expertise. The group as a whole searched for methods and measures to help NCDOT achieve its goal of delivering a major rehabilitation project to the public in two years.

As the workshop progressed, each team summarized their thoughts and narrowed them down to a list of priority recommendations. On the final day, each skill set presented their suggestions to the conference attendees. Now that the workshop is complete, NCDOT will evaluate the various recommendations and decide which ideas should be implemented as part of the project.

1.1. Opening Session

Participants convened for registration and the opening session of the US 421/I-40 Business in Winston-Salem ACTT workshop on the afternoon of April 24, 2006.

Following opening remarks from FHWA Construction and System Preservation Engineer Chris Schneider and NCDOT Director of Construction Steve DeWitt, workshop attendees introduced themselves. NCDOT Board Member Nancy Dunn and NCDOT Division Engineer Pat Ivey provided an overview of the project corridor, discussing project issues, constraints and key stakeholders.

North Carolina FHWA Division Administrator John Sullivan illustrated the ACTT process with a “Why ACTT, Why Now” presentation, after which Chris Schneider and FHWA Resource Center Pavement Management Engineer Joe Huerta wrapped up the day with an overview of the brainstorming process and overall workshop format.

1.2. Workshop Process

The NCDOT workshop followed the traditional ACTT process. On Tuesday morning, the skill sets met individually to discuss the project and brainstorm preliminary ideas, reconvening as a group before lunch to share their initial thoughts. After lunch, the skill sets continued their work, intermingling with other teams to ask questions and convey ideas. They spent the remainder of the afternoon preparing final recommendations for presentation to the group on Wednesday morning.

1.3. Skill Set Goals

The project team shared a number of corridor goals with workshop attendees:

- ◆ Deliver the project at a reasonable cost and with the least amount of inconvenience to NCDOT customers. Utilize innovation in design, letting and construction methods to achieve these goals.
- ◆ Replace deficient structures and provide the requisite vertical clearance.
- ◆ Improve the rideability of the roadway to current NCDOT standards.
- ◆ Improve the existing roadway condition.
- ◆ Construct the project with the least possible interruption to businesses, commuters, residents and events.
- ◆ Reduce impacts to traffic.
- ◆ Minimize overall construction time.

In addition, participants in each skill set had an established group of goals that was unique to their subject area:

Utilities/Railroad/ROW/3rd Party Constraints

- ◆ Determine utility corridors.
- ◆ Identify environmental issues.
- ◆ Eliminate and/or avoid utility conflicts prior to construction.
- ◆ Coordinate scheduling.

Historic Properties/Human Environment/Public Involvement

- ◆ Clearly define and convey the project purpose and need.
- ◆ Work with other skill sets to formulate solutions that meet the purpose/need with minimal impact on the human environment.

Traffic Engineering/Safety/ITS

- ◆ Maintain continuity, both during and after construction, for all traffic, including bike and pedestrian traffic.
- ◆ Get the word out and manage traveler expectations.
- ◆ Clarify the function of the roadways, i.e., I-40 Business for local traffic and I-40 for through traffic.
- ◆ Increase safety by providing better access management.
- ◆ Utilize smart work zones/ITS.

Geometric/Hydraulic Design

- ◆ Ensure that the project meets current design standards.
- ◆ Identify the most accommodating product while minimizing adverse impacts.

Structures

- ◆ Improve Y-line vertical clearances.
- ◆ Minimize noise and vibrations.
- ◆ Utilize advance construction techniques to accelerate the project.
- ◆ Consider options that will accommodate frontage roads and avoid historic properties.
- ◆ Employ accelerated construction techniques.

Long Life Pavements/Maintenance

- ◆ Design and construct a 50-year pavement.
- ◆ Ensure that paving is done in a continuous operation.
- ◆ Discuss ramps and viable detour options.
- ◆ Consider drainage options and constraints.
- ◆ Consider recycling old roadway and bridge materials.
- ◆ Incorporate beautification items.
- ◆ Consider ITS and other maintenance items.

Construction

- ◆ Maximum accommodation of traffic.
- ◆ Limit the duration of total mainline closures.
- ◆ Determine viable locations for access and staging areas.
- ◆ Provide for efficient contract administration.
- ◆ Obtain commitment from all levels on quick decision-making, submittal turnaround and continued public information outreach on construction activities.

Geotechnical/Materials/Accelerated Testing

- ◆ Explore the potential impact of subsurface conditions on the project.
- ◆ Expedite turnaround times for material acceptance and contractor payment.
- ◆ Use innovative materials to maximize the creativity of the designer and the contractor.

Public Information

- ◆ Understand customer expectations.
- ◆ Maintain trust, credibility and responsibility.
- ◆ Provide a cohesive program, with public information and public involvement working together.

2.1. Project Overview

The I-40 Business/US 421 corridor is vital to the Winston-Salem area, serving as a catalyst for the redevelopment of the historic downtown area; an artery that links higher education facilities such as Wake Forest University, Salem College and Winston-Salem State University; and a primary factor in the development of the Piedmont Triad Research Park. While most agree that I-40 Business is in dire need of repair and modernization, there is great concern over potential disruptions to the citizenry and the business community that rely on this corridor on a daily basis.

2.2. Project History and Development

Winston-Salem's East-West Expressway opened in 1958. The roadway has undergone two name changes, becoming I-40 and then I-40 Business when the "new" I-40 south of Winston-Salem opened in 1992.

In 1992, rehabilitation of I-40 Business from US 421 to Linville Road began. The project under discussion at the ACTT workshop is the section of US 421/I-40 Business from west of Fourth Street to east of Church Street that is still in need of major rehabilitation.

Originally, NCDOT envisioned the US 421/I-40 Business in Winston-Salem project as a pavement rehabilitation effort. However, as the project evolved, NCDOT realized that minor rehabilitation would not address the safety and mobility improvements needed throughout the corridor. Thus, NCDOT incorporated design improvements into the project scope.

2.3. Project Purpose

The purpose of the project is to improve safety and address roadway deficiencies on US 421/I-40 Business from west of Fourth Street to east of Church Street.

Numerous bridges throughout the project corridor have substandard design features, including horizontal and vertical alignment issues and ramp configurations, that do not meet AASHTO recommendations – and that contribute to the congestion and high accident rates experienced at several locations within the project limits. What's more, NCDOT expects that driving conditions will continue to deteriorate as traffic volumes rise.



Photo 1. The Broad Street Bridge over US 421 is just one of the many structures needing rehabilitation. The construction skill set recommended replacing the Broad Street Bridge in order to improve vehicle and pedestrian capacity.

2.4. Project Challenges

The challenges facing NCDOT are numerous. The existing concrete pavement is in poor condition and must be replaced to support an average daily traffic forecast of 92,000 vehicles per day in the year 2025. Existing structures along the corridor must be replaced, along with the majority of the overpass structures. In addition, the vertical alignment must be altered and/or non-standard superstructures employed in order to improve the vertical clearance for all structures along I-40 Business through downtown Winston-Salem.

A key challenge facing NCDOT is the narrow project corridor, which provides no room to shift traffic in order to maintain the existing lanes during construction.

Furthermore, there is an urgent need to accelerate construction and limit traffic impacts; long-term construction is undesirable, as it may affect numerous businesses, commuters, emergency responders, hospitals, educational institutions and the International Home Furnishings Market, the largest single contributor to the Piedmont Triad's economy.

Other Challenges/Issues

The skill sets identified a host of additional issues with the US 421/I-40 Business project. They include coordination with a number of local entities, including Duke Energy, Bell South, Time Warner, NCDOT ITS, Piedmont Natural Gas, the City of Winston-Salem (for water, sewer and signals/lights) and existing historic districts. Environmental agency involvement is a vital factor, as is addressing staging/lay down area requirements. NCDOT may need to consider splicing moratoriums, seasonal restrictions and budget considerations when planning the project, and an active public relations (PR) program will be key in disseminating this information.

Other challenges and issues are as follows:

- ◆ Replacement of the lighting system – the 440-volt system is beyond maintenance.
- ◆ Replacement of the 72-inch brick drainage culvert near Brookstown Avenue.
- ◆ Keeping utilities in the existing space. The skill sets noted special concerns at the following locations:
 - ❖ Fourth Street Bridge. The six-inch water line attachment and four-inch plastic gas line attachment may need to be eliminated.
 - ❖ Peters Creek Parkway Bridge. Consider eliminating some sewer lines up to the ramp on the east side. This will provide space to relocate other utilities.
 - ❖ Cherry Street Bridge. Address the historic property at this location and the Duke Energy riser to the downtown underground feed.
 - ❖ Liberty Street Bridge/Area. Discuss the parking under the bridge, the Bell South conduit system, the 16-inch water main, the 18-inch sanitary sewer and the brick culvert.
 - ❖ Church Street Bridge. Look at the water line and the potential pedestrian/bike bridge at this location.
- ◆ Conducting public involvement early to determine the need for an Environmental Impact Statement (EIS).
- ◆ Maintaining a comprehensive partnership throughout project development and construction.
- ◆ Enhancing the visual and aesthetic features of the corridor.
- ◆ Considering diverse viewpoints on connectivity needs.
- ◆ Maintaining access to important community facilities and services.
- ◆ Projecting impacts on travelers, including pedestrians and bikers.
- ◆ Meeting project purpose and need while limiting the potential for decreased livability.
- ◆ Completing other projects and network improvements prior to beginning construction on the US 421/I-40 Business in Winston-Salem project.

2.5. Project Status

Project development and National Environmental Policy Act (NEPA) compliance has begun, and the associated public involvement efforts will begin within the next few months. Per the 2007-2013 Draft Transportation Improvement Plan (TIP), construction is slated to begin in Federal Fiscal Year 2013.

Because the project is in the early planning phase, no cost estimates are in place.

3.1. Utilities/Railroad/ROW/3rd Party Constraints

The utilities/railroad/ROW/3rd party constraints team offered the following recommendations:

- ◆ Let multiple early contracts for bridge removal (i.e., for Green Street, Spruce Street and Church Street), utility relocation and pedestrian/bike bridge construction.
- ◆ Coordinate between ROW acquisition and utility relocations.
- ◆ Identify environmental permitting issues regarding utility relocations early in the process.
- ◆ Address potential railroad permitting/agreement issues.
- ◆ Determine existing ROW limits.
- ◆ Define any limitations on additional ROW acquisition (i.e., historic properties or high-cost properties).
- ◆ Explore public-private partnerships (PPP).
- ◆ Eliminate the Green Street Bridge. This will provide a corridor for overhead utilities.
- ◆ Build the pedestrian/bike bridge at the Broad Street Bridge prior to letting project U-2728B.

The team noted no major utility issues at Brookstown Avenue and High Street, Poplar Street, the Spruce Street Bridge, the Marshall Street Bridge or the Main Street Bridge.

3.2. Historic Properties/Human Environment/ Public Involvement

The historic properties/human environment/public involvement skill set brainstormed the following ideas:

- ◆ Re-examine design speed. Is a “business” designation needed?
- ◆ Re-examine access points.
- ◆ Investigate possible staging areas.
- ◆ Research noise, visual and vibration impacts.
- ◆ Closely examine the impact of possible detour routes and of collector-distributor (C-D)/frontage roads on historic properties.
- ◆ Involve commuters from the outlying areas; they are just one of many key stakeholders.
- ◆ Implement several methods to communicate construction activities.
- ◆ Clearly communicate project schedules.
- ◆ Reach out to low-literacy and Environmental Justice (EJ) populations.
- ◆ Develop an aesthetics master plan (gateways, entrances or other identifiers of community) that considers the view for the traveler and area neighborhoods.

- ◆ Look at how changes in horizontal and vertical alignments will affect adjacent communities.
- ◆ Define connectivity in order to address issues such as location of sidewalks, bike lanes, tunnels, culverts, etc.
- ◆ Develop a “business survival guide.”
- ◆ Provide a “route planner” on the web site to deal with detours.
- ◆ Have businesses sponsor aesthetic details in the project to provide goodwill.
- ◆ Provide multiple detour routes to disperse detoured traffic to desired community destinations.
- ◆ Develop a vibration plan for historic properties.
- ◆ Provide for temporary noise attenuation during construction.
- ◆ Coordinate with other construction projects to minimize disruptions to the traveling public.
- ◆ Work with hospitals, emergency service providers and other major civic institutions (i.e., the courthouse) to develop detours and maintain access.
- ◆ Work with local colleges on special event issues.
- ◆ Look at Park and Ride opportunities for special events, large employers, etc.
- ◆ Conduct a detailed study of potential detour routes following origin/destination survey results.
- ◆ Coordinate with the street car project.
- ◆ Maintain consistency with City bike/pedestrian plans.
- ◆ Preserve existing strollways.

3.3. Traffic Engineering/Safety/ITS

The traffic engineering/safety/ITS group suggested the following:

- ◆ Do required network improvements prior to this project, i.e., interim improvements to US 52, construction of the Salem Creek Connector, extension of MLK Jr. Drive, upgrading of the signal system, modification of network signing, and construction of Silas Creek Parkway at Yorkshire Road (highly recommended).
- ◆ Complete Peters Creek Parkway prior to beginning construction on I-40 Business.
- ◆ Maintain eastbound access from Main Street to I-40 Business for the life of the project.
- ◆ Complete the Main Street ramp to Cherry Street prior to beginning construction on I-40 Business.
- ◆ Maintain ramp from Main Street to Cherry Street for the life of the project.
- ◆ Provide contractor motivation; incentives and disincentives are essential to reducing the duration of the project.

- ◆ Consider the reversible lane concept at Broad Street.
- ◆ Develop a formal transportation management plan.
- ◆ Enhance transit capabilities.
- ◆ Utilize law enforcement as appropriate.
- ◆ Provide a project web site and media connection to Traffic Management Center (TMC) cameras.
- ◆ Provide regional and real-time coordination.
- ◆ Utilize highway advisory radio (HAR) and a citizen band (CB) radio wizard.
- ◆ Incorporate permanent ITS into the project.
- ◆ Utilize/coordinate with 511.
- ◆ Coordinate among neighboring states, divisions and locals, particularly in regard to construction and maintenance schedules (along I-77, I-40, US 52, etc.).
- ◆ Establish a project office.
- ◆ Make special events coordination a priority.
- ◆ Consider eliminating bridges and/or ramps.
- ◆ Minimize weaving.
- ◆ Obtain full shoulders.
- ◆ Make worker safety a priority.
- ◆ Increase law enforcement patrol.
- ◆ Plan for the possible closure of both I-40 and I-40 Business.
- ◆ Require a towing contract.
- ◆ Ensure mobility of responders.
- ◆ Ensure public access to medical/emergency facilities.
- ◆ Consider greenway connections for bike and pedestrian traffic, and coordinate with existing and developing plans.
- ◆ Remove the I-40 Business designation, and use branding to reduce confusion.

3.4. Geometric/Hydraulic Design

The geometric/hydraulic design team offered the following recommendations:

- ◆ Eliminate the access at Broad Street, and move it to the Peters Creek Parkway interchange. Extend the proposed construction limits of Peters Creek Parkway to First Street in conjunction with future urban redevelopment plans.
- ◆ Manage access by developing the two proposed interchanges to replace the current four.
- ◆ Lower the mainline profile to improve sight distance only in the vicinity of Marshall Street/Cherry Street.
- ◆ Consider a split diamond interchange with one-way C-D roads.
 - ❖ Construct a C-D from Marshall Street to Main Street, with access provided to Marshall Street, Cherry Street, Liberty Street and Main Street.

- ❖ Cantilever or box I-40 Business from Marshall Street to Cherry Street.
- ❖ Replace the Liberty Street mainline viaduct with a walled section or split diamond to Marshall Street and Cherry Street. There's no need for a C-D road and/or access to Main Street.
- ◆ Relocate the Liberty Street to Main Street alignment.
- ◆ Prohibit vehicle access at Fourth Street, Green Street and Spruce Street.
- ◆ Consider bike and pedestrian enhancements, i.e., wider bridges.
- ◆ Add access lanes in each direction.
- ◆ Utilize a 14- to 18-month total closure.

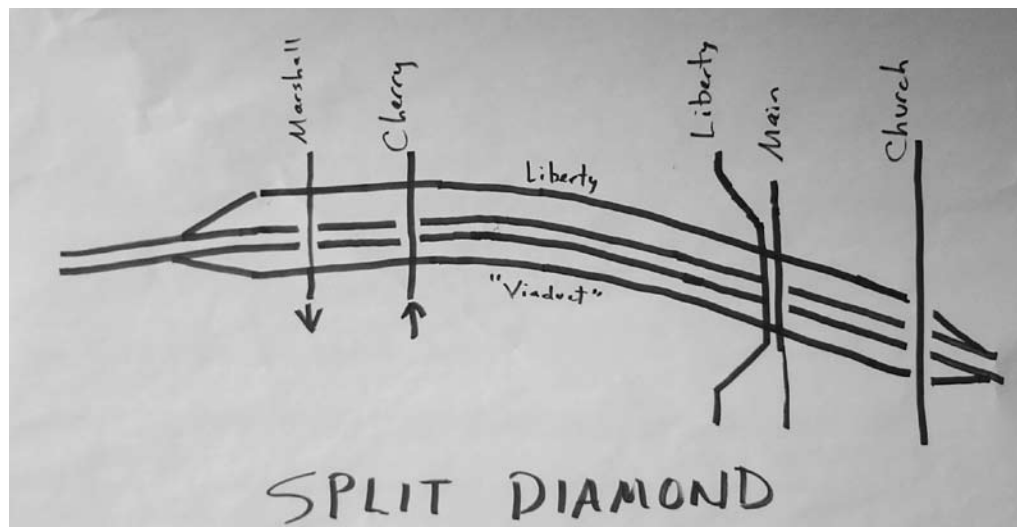


Figure 1. The geometric/hydraulic design team sketched their concept for the split diamond interchange with one-way C-D roads.

3.5. Structures

The structures crew offered numerous suggestions:

- ◆ Consider Y-line closures where feasible, i.e., at Fourth Street, Green Street and Spruce Street.
- ◆ Shorten the L-line bridges. Use parallel mechanically stabilized earth (MSE) walls with fill and precast, three-sided culvert or prefabricated arch-type structures when spanning Liberty Street, the Strolling Path and Brookstown Avenue.
- ◆ Employ strategies to improve vertical clearance at the Y-line bridges. Use non-conventional bridge types with shallow superstructures, i.e., tied arch, C channel, etc. Eliminate the median pier, and use prefabrication and launching where appropriate.

- ◆ Reconfigure the project end regions at Peters Creek Parkway and Main/Church Street. Let separate projects to complete the work up-front. Conventional interchange structures, staged as necessary, may be adequate.
- ◆ Employ frontage roads in the central region where feasible, depending on ROW and roadway design issues. Construct the frontage roads prior to commencing work on I-40 Business; this will minimize the effect on local and through traffic.
- ◆ Incorporate one or more distinct Y-line structures in the central region that differ from those outside the central region, which would all be similar in type.
- ◆ Minimize noise and vibrations by limiting pile driving. Consider alternative foundation types, such as drilled shafts, slurry walls and micropiles.

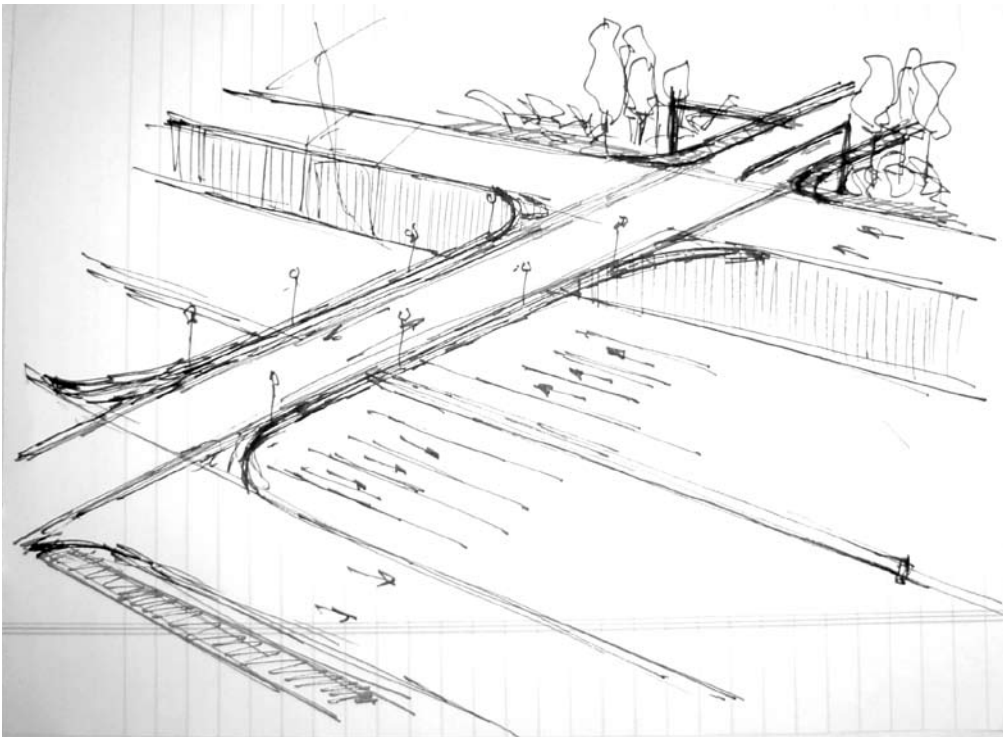


Figure 2. The structures group sketched a possible concept for a distinct structure in the central region.

3.6. Long Life Pavements/Maintenance

The long life pavements/maintenance skill set discussed a series of innovative ideas:

- ◆ Consider continuously reinforced concrete pavement (CRCP), traditional jointed concrete and/or composite pavement.
- ◆ Remember that a small increase in thickness yields a large increase in service life.
- ◆ Obtain realistic traffic estimates.

- ◆ Construct a regular lane with a tied, full-depth concrete shoulder.
- ◆ Consider widened lanes with asphalt shoulders.
- ◆ Provide for cement stabilization.
- ◆ Select appropriate materials.
- ◆ Address unique surface characteristics.
- ◆ Shut down the road so paving can be done in a continuous operation.
- ◆ Shut down one direction at a time.
- ◆ Build under traffic.
- ◆ Consider concrete ramps.
- ◆ Connect the under drain/shoulder drain to drainage structures.
- ◆ Replace all storm drainage; consider legal and illegal encroachments; and use storm drainage best management practices (BMPs).
- ◆ Encase utilities in a precast vault (under or outside the shoulder) to avoid future damage to the pavement. Share the cost with fiber companies.
- ◆ Consider various uses for old roadway and bridge concrete. They include subgrade stabilization, fill, aggregate base (if needed), crush-in-place, use for maintenance operations (for driveways, shoulder stabilization, etc.), staging material at urban redevelopment sites, etc.
- ◆ Incorporate beautification elements such as concrete imprints and colorings; retaining wall/noise wall décor; white cement median barriers; and low-maintenance landscaping.
- ◆ Utilize ITS technologies, including cameras and message boards.
- ◆ Address issues such as barrier rail and glare screens, lighting, and pavement markers and markings.
- ◆ Eliminate guardrail as much as possible, and consider using epoxy steel in the pavement.
- ◆ Obtain public buy-in to the project by creating a comprehensive communications plan.

3.7. Construction

The construction team offered the following recommendations:

- ◆ Phase the project to facilitate construction for the interior portions of the corridor.
 - ❖ Perform improvements to the Main Street exit and Peters Creek Parkway interchange first, and include US 52 ramp improvements to better accommodate traffic.
 - ❖ Consider three-phase construction: 1) Peters Creek Parkway, 2) all remaining structures, and 3) the mainline and connectors/ramps.

- ❖ Utilize phased bridge construction at the Peters Creek Parkway interchange. Construct in two phases, and maintain traffic on the existing bridge during the first phase.
- ❖ Add capacity for the eastbound loop to Peters Creek Parkway.
- ❖ Limit the duration of the mainline closure through the use of incentives, land rentals, critical path methods (CPM), etc. NCDOT should generate CPM prior to issuing the request for proposal (RFP).
- ❖ Maintain one north-south route with access to I-40 Business at all times, and clearly define these parameters in the RFP.
- ◆ Promote traffic mobility.
 - ❖ Replace the Broad Street structure and improve pedestrian capacity in lieu of eliminating the Green Street, Fourth Street and Spruce Street bridges.
- ◆ Minimize rock excavation.
 - ❖ Evaluate profiles throughout the corridor to see if and where rock excavation is needed.
 - ❖ Require qualification criteria for the contractor for any blasting or other forms of rock excavation.
 - ❖ Address potential noise and damage issues related to blasting.
 - ❖ Raise the grade on Y-lines to avoid excavation on the mainline.
 - ❖ Evaluate using existing retaining walls; minimize symmetrical widening (ROW takes).
- ◆ Select appropriate pavements.
 - ❖ Utilize concrete for long-term maintenance. Minimize fast-track paving; there are durability concerns.
 - ❖ Avoid multiple mobilizations of concrete paving equipment (Peters Creek Parkway, Phase I construction, etc.).
 - ❖ Utilize a single saw-cut on concrete pavement with no seal.
 - ❖ Consider a composite pavement design; this will reduce noise and maintenance concerns.
 - ❖ Survey existing soil conditions to determine the best subgrade construction.
 - ❖ Recycle existing concrete pavement.
- ◆ Accommodate pedestrian traffic.
 - ❖ Provide viable alternatives where existing structures will be eliminated.
 - ❖ Account for and enhance the strollway between Second Street and Liberty Street.
- ◆ Utilize accelerated construction methods.
 - ❖ Use fill sections or retaining walls to reduce the length of the mainline bridge over Liberty Street. Confirm parking arrangement and details beneath the existing bridge prior to construction.

- ❖ Incorporate standardized precast structure components, where feasible, to expedite Y-line construction. Confirm storage and casting areas for the precast units.
- ❖ Verify utility relocation requirements, and prioritize the order to coincide with construction phasing.
- ❖ Utilize 3-D design (maybe even 4-D), with transferable data files for construction.
- ◆ Plan for access and staging areas.
 - ❖ Coordinate with the City to find potential sites to store materials and equipment, i.e., the quadrants at Peters Creek Parkway and east of Church Street.
- ◆ Promote effective contract administration.
 - ❖ Obtain a commitment from all levels to ensure quick decision-making, submittal turnaround and up-to-date information on construction activities. Key partners include NCDOT, the City of Winston-Salem, the contractor(s) and resource agencies.
 - ❖ Encourage design-build (D-B) or an arrangement for continued design services during construction.
 - ❖ Establish an on-site office for project personnel.
- ◆ Address disposal of existing materials.
 - ❖ Address red lead, asbestos, concrete pavement and bridge demolition.
 - ❖ Identify potential on-site waste areas.

3.8. Geotechnical/Materials/Accelerated Testing

The geotechnical/materials/accelerated testing group offered recommendations in the areas of structures, roadway, geotechnical and pavement:

Structures

- ◆ Use clear-span structures.
- ◆ Phase construction of all foundations and walls.
- ◆ Eliminate the structures at Fourth Street, Green Street and Spruce Street.
- ◆ Utilize tangent, drilled-shaft retaining walls, texture and color to complement the existing architecture.
- ◆ Consider precast units for both the substructure and the superstructure.
- ◆ Widen structures to create pedestrian-friendly areas and improve aesthetics, i.e., pedestrian bridges.

Roadway

- ◆ Utilize geofoam blocks to accelerate embankment construction. They cost more, require steeper side slopes and involve potential settlement issues, but their use will reduce ROW needs.

Geotechnical

- ◆ Acquire geotechnical information early; accurate data is critical.
 - ❖ Define conditions at the walls, foundations and roadway.
 - ❖ Identify blasting requirements.
 - ❖ Estimate subgrade stabilization needs.
- ◆ Incorporate vibration monitoring, utilizing preconstruction surveys and public education. This will aid in the protection of historic structures.
- ◆ Utilize intelligent compaction techniques. Include continuous monitoring of embankments and comprehensive stiffness information. The benefits include quicker compaction and a reduction in compaction testing.

Pavement

- ◆ Utilize an unbonded overlay where possible. Reduce the stabilization/undercut.
- ◆ Consider precast panels for the pavement.
- ◆ Use maturity meters to:
 - ❖ Estimate in-place strengths.
 - ❖ Provide for early traffic entry.
 - ❖ Reduce the need for testing.
- ◆ Utilize recycled materials such as rubblized asphalt (provides a stable platform for flexible pavement) and concrete.
 - ❖ Reduces waste.
 - ❖ Provides an onsite backfill material.
 - ❖ Provides a base course alternative.
 - ❖ Can grade for specific uses.

3.9. Public Information

The public information skill set discussed everything from a project brand to a comprehensive community relations plan. Their recommendations are as follows:

- ◆ Identify current facility deficiencies and corrective measures.
- ◆ Brand the project, beginning with US 52 improvements. “Branding” includes developing a logo and slogan and naming the corridor with citizen participation, i.e., “Getting There Together.”
- ◆ Form a community relations committee.

- ◆ Develop a community relations plan.
- ◆ Provide seamless communication, remembering that individual groups may need to step outside of their normal roles.
- ◆ Identify and involve all stakeholders and partners. They include the City of Winston-Salem, various metropolitan planning organizations (MPOs), residents, downtown business partners, the medical community and so forth.
- ◆ Identify traditional and nontraditional communication tools, including:
 - ❖ Project web site.
 - ❖ 511.
 - ❖ News releases/advisories.
 - ❖ Strong media relations.
 - ❖ Project tabloid.
 - ❖ The “face” of the project.
 - ❖ Project hotline.
- ◆ Include public information in the construction matrix for milestones.
- ◆ Utilize the latest technologies.
- ◆ Develop both a media kit and a business tool kit, the latter focusing on “How to Survive.”
- ◆ Provide and continue media training for project personnel throughout the life of the project.
 - ❖ Require customer service training for all project staff.
 - ❖ Incorporate cultural outreach (multi-generational involvement in art projects for things such as logo design, a calendar and so forth). Involve the NC School of the Arts, universities, seniors and neighborhoods.
 - ❖ Sponsor a contest to name “the signature corridor.”
 - ❖ Consider the aesthetics of all design elements.
 - ❖ Consider charrettes (meetings to solve a problem or issue) for bridges within the project area.
 - ❖ Hold community meetings.
- ◆ Maintain credibility.
 - ❖ Be truthful about the impacts to commuters, residents and businesses.
 - ❖ Honor schedule commitments and deadlines.
 - ❖ Tout innovative techniques that offer time or monetary savings or show tax money being spent wisely.

4.1. Next Steps

Now that the workshop is complete, NCDOT is evaluating the recommendations to determine which items will be implemented in developing the project.

NCDOT's goal is to deliver a project to the public that 1) reduces work zone congestion and excessive construction time, and 2) offers a final product that is safe and cost-effective. NCDOT believes that a proactive approach and innovative construction techniques are essential to meeting this goal. How the NCDOT views partnering among project stakeholders is also a critical component of this effort. The ACTT Workshop for the US 421/I-40 Business project played a vital role in this process by bringing key players to the planning table.

By working together, local and national transportation experts brainstormed innovative construction techniques to help deliver a much-needed project to the public. Once again, ACTT has proven to be a valuable tool in project planning and success.

GLOSSARY OF FREQUENTLY USED TRANSPORTATION ACRONYMS

ACRONYM	FULL NAME
AASHTO	American Association of State Highway and Transportation Officials
ACC	Acid Copper Chromate
ACTT	Accelerated Construction Technology Transfer
ADT	Average Daily Traffic
AGC	Associated General Contractors of America
ASCE	American Society of Civil Engineers
ASR	Alkali-Silica Reaction
ATCs	Alternative Technical Concepts
BIMRS	Bridge Incident Management and Response System
BMPs	Best Management Practices
CAD	Computer-Aided Design
CATV	Community Antenna Television
CB	Citizen Band
CCTV	Closed Circuit Television
C-D	Collector-Distributor
CDC	Community Development Center
CE	Categorical Exclusion
CM at Risk	Construction Manager at Risk
CMAQ	Congestion Mitigation and Air Quality
CMP	Congestion Mitigation Plan
COA	Control of Access
CPM	Critical Path Method
CRCP	Continuously Reinforced Concrete Pavement
CSO	Combined Sewer Overflow
CSS	Context Sensitive Solutions
D-B	Design-Build
D-B-B	Design-Bid-Build
DEIS	Draft Environmental Impact Statement
DMS	Dynamic Message Sign
DOT	Department of Transportation
DRB	Dispute Review Board
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMS	Emergency Management System
EPS	Expanded Polystyrene
ESA	Endangered Species Act
FAA	Federal Aviation Administration

ACRONYM	FULL NAME
FCC	Federal Communications Commission
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impacts
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
GARVEE	Grant Anticipation Revenue Vehicle
GPS	Global Positioning System
GRS	Geosynthetic Reinforced Soil
HAR	Highway Advisory Radio
HfL	Highways for LIFE
HMA	Hot Mix Asphalt
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
HPC	High-Performance Concrete
HPS	High-Performance Steel
IM	Incident Management
IMAP	Incident Management Assistance Patrols
IT/ITS	Intelligent Transportation/Intelligent Transportation Systems
LOS	Level of Service
MIS	Major Investment Study
MOA	Memorandum of Agreement
MOT	Maintenance of Traffic
MPH	Miles per Hour
MPO	Metropolitan Planning Organization
MSE	Mechanically Stabilized Earth
NCDOT	North Carolina Department of Transportation
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NHI	National Highway Institute
NPDES	National Pollutant Discharge Elimination System
NS	Norfolk Southern
PAB	Private Activity Bond
PCC	Portland Cement Concrete
PCMS	Portable Changeable Message Signs
PIO	Public Information Officer
PMT	Project Management Team
PPP	Public-Private Partnerships
PR	Public Relations
PSI	Pounds per Square Inch
PUE	Permanent Utility Easement
QA/QC	Quality Assurance/Quality Control

ACRONYM	FULL NAME
RAP	Reclaimed Asphalt Pavements
RFP	Request for Proposal
RFQ	Request for Qualifications
ROD	Record of Decision
ROW	Right-of-Way
RPMs	Raised Pavement Markers/Markings
RR	Railroad
RSCH	Repeated Shear at Constant Height
RTA	Regional Transit Authority
RWIS	Roadway Weather Information System
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SCC	Self-Consolidated Concrete
SEP	Special Experimental Project
SIP	State Implementation Plan
SIP Forms	Stay-in-Place Forms
SMA	Stone Matrix Asphalt
SPMTs	Self-Propelled Modular Transporters
SUE	Subsurface Utility Engineering
TDM	Traffic Demand Management
TIF	Tax Incremental Financing
TIFIA	Transportation Infrastructure Finance and Innovation Act
TIG	Technology Implementation Group
TIP	Transportation Improvement Program
TMC	Traffic Management Center
TMP	Traffic Management Plan
TRAC	Transportation Review Advisory Committee
TRB	Transportation Research Board
TSA	Transportation Security Administration
TSP	Thrift Savings Plan
VE	Value Engineering
VMS	Variable Message Sign
VPPP	Value Pricing Pilot Program
WiFi	Wireless Fidelity

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SKILL SET RECORDING FORMS

- Utilities/Railroad/ROW/3rd Party Constraints
- Historic Properties/Human Environment/Public Involvement
- Traffic Engineering/Safety/ITS
- Geometric/Hydraulic Design
- Structures
- Long Life Pavements/Maintenance
- Construction
- Geotechnical/Materials/Accelerated Testing
- Public Information

Utilities/Railroad/ROW/3rd Party Constraints Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Project limits	Extend project limits to the east to include the US 52 interchange (including RR).	Need time to secure permits/agreements from RR. Must address the 24-inch water main and eight-inch sewer line along Salem Ave.
Fourth Street Bridge utilities	Eliminate six-inch water line attachment and four-inch plastic gas line attachment. Relocate overhead CATV and telephone lines.	Look at the following potential barriers: <ul style="list-style-type: none"> ➢ Back feed water line from either end of the bridge(s). ➢ Limited ROW to relocate existing telephone and CATV. ➢ Maintaining required water pressure on existing lines.
Fourth Street Bridge ROW	May require additional ROW.	Address possible historic property issues, including the close proximity of historic properties to existing project ROW.
Peters Creek Parkway bridge utilities	Address underground six-, eight-, and 12-inch sewer lines. May be able to eliminate some sewer lines up to the ramp on the east side. Have room to relocate other utilities.	Discuss how existing grade and future ballpark could affect utility services in this area. By expanding the interchange, can reduce ROW needed for utility relocation.
Peters Creek Parkway ROW	May need to relocate businesses and residences due to widening and ramp improvements.	Requires extended time to relocate businesses. Increases project cost. May increase negative PR. Need to coordinate any ROW acquisition and all utilities with baseball park/urban development.
Green Street Bridge utilities	Look at existing six-inch water line attachment; the gas mains are abandoned or dead. Eliminate bridge structure to provide corridor for overhead utilities (expand capacity). Recommend immediate removal of Green Street Bridge and use of crossing as an overhead utility corridor to include relocated overhead facilities from Broad Street.	Need six months to engineer and relocate transmission facilities. Make decision regarding burial or attachment of transmission line to pedestrian/bicycle bridge. Look at cost of making the aerial transmission crossing part of the pedestrian/bicycle bridge work.

Utilities/Railroad/ROW/3rd Party Constraints Skill Set

<p>IDEA (Short Name)</p>	<p>IDEA (Detailed Description)</p>	<p>Implementation Details (Barriers, Skill Set Coordination, etc.)</p>
<p>Broad Street Bridge utilities</p>	<p>Eliminate 12-way duct conduit system (Bell South); this is possible if the Liberty Street duct bank is not disturbed. Relocate the existing six-inch water line off the Broad Street Bridge, possibly onto a designated pedestrian/bicycle bridge further east. Build pedestrian/bicycle bridge before the project begins, and relocate utilities before U-2827B is let.</p>	<p>Look at limited ROW for relocating utilities. Test for possible contaminated soils. Must relocate the six-inch water line attached to the bridge; it cannot be eliminated. Minimize steep cut banks. Obtain information from City/County planning boards regarding pedestrian/bicycle bridge. Need detailed subsurface investigation on whether the steep grade from the bridge deck elevation to I-40 will preclude a directional bore.</p>
<p>Bridge over Brookstown Avenue utilities</p>	<p>No major utility conflicts identified at this bridge.</p>	<p>Look at existing deep brick culvert; potential permit commitments will be required if work is performed on the brick culvert.</p>
<p>Spruce Street Bridge utilities</p>	<p>No major utility issues identified at this location. (There is an underground six-inch water line, an underground six-inch sewer line and an underground two-inch plastic gas main.) If bridge is eliminated, remove it prior to letting the project.</p>	<p>Consider elimination of the water line crossing and Spruce Street Bridge.</p>
<p>Marshall Street Bridge utilities</p>	<p>Note underground six-inch sewer and four-inch plastic gas lines as well as overhead distribution power lines. No major utility issues at this location.</p>	
<p>Cherry Street Bridge utilities</p>	<p>Note six-inch water line attached to bridge. There are overhead distribution lines as well as telephone and CATV cables.</p>	<p>Look at Duke Power riser to the downtown underground feed and the historic Conrad-Starbuck house.</p>
<p>Bridge over Liberty Street and greenway utilities</p>	<p>Features two underground lines – eight-inch sewer and 16-inch water. There is also a two-inch plastic gas main and an 18-inch sewer pipe with telephone and power located overhead. Substructure is in poor condition.</p>	<p>Look at Bell South major conduit location: it runs parallel to Liberty Street under the I-40 structure. Analyze the foundation location with regard to the sixteen-inch water line. Remember that parking under the structure is dictated by legislation. Must determine how it can be maintained during demolition and construction. Consider demolishing the I-40 bridge over Liberty/greenway/parking lot: this will allow utility corridor and connectivity between the north and south sides. Allow 24 months to engineer and relocate the Bell South conduit system.</p>

Utilities/Railroad/ROW/3rd Party Constraints Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Main Street Bridge utilities	Note three underground lines: a six-inch water line, an eight-inch sewer line and a two-inch plastic gas main.	
Church Street Bridge utilities	Features an attached 16-inch water line with telephone and CATV overhead. If the bridge is eliminated, remove it prior to letting the project.	Address steep grades. Must provide for no interruption of service on the 16-inch water line. Further water system study is required.
Future encroachments	Coordinate future utility encroachment requests and approvals. Should be processed through the State utility agent.	Address lack of project information at the time of the utility encroachment request. Need City buy-in on encroachment approvals relative to close-proximity private projects.
Subsurface Utility Engineering (SUE)	Collect and depict existing subsurface utility data in accordance with ASCE Standard 38-02. Obtain this information prior to design. Educate designers on the use of this information to avoid/mitigate utility relocations.	Address potential improper use or non-utilization of SUE information by designers; need to ensure that SUE data is utilized to the fullest extent possible. Also need to analyze the quality of SUE data.
ROW	Delineate ROW that is potentially acquirable – determine what NCDOT can take based on ROW restrictions. Determine PUE requirements. Look at potential dedicated property from developer of baseball complex.	Look at constraints based on historical classification or identification as a “do not disturb” site, remembering that the design might not require any additional ROW. Provide for project staging and lay down area requirements.
Time required for ROW/utility relocations	Allow 36 months for advanced ROW acquisition and completion of utility relocation. Need early involvement and buy-in from utility companies/owners.	Requires timely delivery of utility construction plans and demolition of bridges that will not be replaced.
Optional considerations	Consider multiple early contracts to design/construct utility relocations and pedestrian/bicycle bridges. Involve environmental agencies in decision-making processes with respect to ROW acquisitions and utility relocations.	Brainstorm possible environmental impacts that could affect utility relocations.
Moratoriums	Consider moratoriums for splicing of fiber optic and copper lines serving customers in downtown area.	May increase construction time and costs.

Historic Properties/Human Environment/Public Involvement/Skill Set

<i>IDEA</i> (Short Name)	<i>IDEA</i> (Detailed Description)	<i>Implementation Details</i> (Barriers, Skill Set Coordination, etc.)
Purpose and function of road	Determine the purpose of the road.	Develop a clear and consistent message concerning the purpose of the project. Re-examine design speed. Re-examine access points. Maintain Interstate Business designation? Consider potential unknown growth.
Historic properties	Examine numerous historic properties and districts in the project study area.	Look at staging areas. Look at noise, visual and vibration impacts. Consider the impact of detour routes. Evaluate 4(f), Section 106 and COA challenges. Limit potential of decreasing livability. If C-D/frontage roads are proposed, investigate their impact on historic resources.
Public involvement	Develop an inclusive public involvement plan.	Address all issues listed in this recording form. Push for early determination of potential controversy necessitating an EIS. Provide outreach to commuters in outlying areas. Provide various methods of communicating information on construction activities. Reach out to low-literacy, foreign-language and EJ populations. Clearly communicate project schedules.
City/DOT/business/neighborhood partnership	Maintain a comprehensive partnership throughout project development and construction.	Consider integrated land use (based on purpose and need).
Aesthetics	Address aesthetics of lighting, signage, art, landscape, bridges and retaining walls.	Discuss gateways and entrances – how the bridges can help identify their communities. Develop an aesthetics master plan. Look at horizontal and vertical clearances to see how they affect the community. Look at bridges from both the driver viewpoint and the neighborhood viewpoint.
Community cohesion and connectivity	Acknowledge that existing route divides the City.	Define connectivity (sidewalks, bike lanes, tunnels, culverts, etc.). Consider a covered plaza, park or overpass. Have integrated land use. Even if ramps are closed, look at maintaining the bridges for connectivity. Recognize diverse viewpoints on the need for connectivity.

Historic Properties/Human Environment/Public Involvement Skill Set

<p><i>IDEA</i> (Short Name)</p>	<p><i>IDEA</i> (Detailed Description)</p>	<p>Implementation Details (Barriers, Skill Set Coordination, etc.)</p>
<p>Effects on business and communities</p>	<p>Consider the effects of detours on business and communities both in and out of the study area.</p>	<p>Keep communities/businesses constantly involved and informed. Put together a "Business Survival Guide." Tailor signage to guide people to businesses. Consider staging traffic during the day, with full closures at night. Have a "route planner" on the web site to deal with detours.</p> <p>Have businesses "sponsor" (no funding involved) aesthetic details of the project to provide goodwill. Provide multiple detour routes to disperse the detoured traffic.</p>
<p>Construction impacts</p>	<p>Consider the impacts of noise, staging areas and nighttime construction. Look at how vibration will affect migratory birds and others.</p>	<p>Determine if nighttime construction will be allowed. Provide ongoing communication; continue public involvement through construction. Give away free plants and shrubs. Recycle construction debris for art. Coordinate with other construction projects. Develop a vibration plan for historic properties. Minimize dust. Provide for temporary noise attenuation during construction. Develop a construction staging area plan that considers historic properties, EJ, improvements and so forth. Monitor and maintain seasonal migratory bird habitats. Identify noise-sensitive land uses.</p>
<p>Noise and vibration post-construction</p>	<p>Minimize the effects of noise during and after construction.</p>	<p>Require that design include measures to minimize noise and vibration. Initiate a public involvement process addressing potential noise issues.</p>
<p>Access</p>	<p>Ensure access throughout construction.</p>	<p>Work with hospital and emergency services to develop detours. Must also network with other regional providers. Address access issues with jail/courthouses. Work with local colleges for special events. Look at Park and Ride opportunities (at local colleges and so forth). Make sure other projects and network improvements are completed prior to project (i.e., other TIP projects and traffic signal systems).</p>

Historic Properties/Human Environment/Public Involvement/Skill Set

<p><i>IDEA</i> (Short Name)</p>	<p><i>IDEA</i> (Detailed Description)</p>	<p><i>Implementation Details</i> (Barriers, Skill Set Coordination, etc.)</p>
<p>Bus/school bus/transit issues</p>	<p>Maintain/enhance the use of the current and future transit system, and be aware of the effects on school bus routes.</p>	<p>Promote Park and Ride and/or shuttle services for large employers and special events. Study potential detour routes. Determine the potential for enhancement or acceleration of the streetcar project.</p>
<p>Bicycle and pedestrian issues</p>	<p>Accommodate and encourage bicycle and pedestrian facilities.</p>	<p>Maintain consistency with City plans. Preserve the existing strollway. Maintain and/or improve access and connectivity. Inventory existing facilities. Look for preconstruction opportunities to improve existing bike/pedestrian facilities. Define connectivity (sidewalks, bike lanes, tunnels, culverts, etc.). Consider a covered plaza, park or overpass.</p>
<p>Mitigation opportunities</p>	<p>Look for mitigation opportunities during project development.</p>	<p>Look for mitigation opportunities during project development in all aspects of the human and natural environment.</p>

Traffic Engineering/Safety/ITS Skill Set

<i>IDEA</i> (Short Name)	<i>IDEA</i> (Detailed Description)	Implementation Details <i>(Barriers, Skill Set Coordination, etc.)</i>
Network improvements (based on origin-destination study)	Consider the following network improvements: interim improvements to US 52; construction of the Salem Creek Connector; extension of MLK Jr. Drive; a signal system upgrade; modification of network signing, i.e., remove Business I-40 designation and sign as US 421 only; and intersection improvements to Silas Creek at Yorkshire (highly recommended).	
Smart work zones/ITS	Provide media (TV and radio) connection to TMC cameras. Provide regional coordination. Utilize real-time information systems (i.e., at the I-40 bypass – can be temporary). Utilize a CB wizard/HAR. Incorporate permanent ITS into the project, i.e., cameras and detectors. Utilize 511.	Work with neighboring states and districts, particularly in regard to construction and maintenance schedules (i.e., on I-77, I-40, US 52, etc.). Establish a project office and temporary command center. Provide for special events coordination.
Transit	Promote Park and Ride.	Work with major employers.
Traffic management strategies	Complete Peters Creek Parkway prior to closing I-40 Business. Maintain eastbound access to I-40 Business from downtown throughout the project. Complete the Main Street to Cherry Street ramp first. Maintain the ramp from Main to Cherry throughout the life of the project. Provide contractor incentives and disincentives; they are essential for reducing the duration of the project. Consider the reversible lane concept for Broad Street. Develop a formal TMP.	
Safety	Consider eliminating bridges and/or ramps. Minimize weaving. Promote worker safety. Obtain full shoulders. Push back retaining walls.	

Traffic Engineering/Safety/ITS Skill Set

<i>IDEA (Short Name)</i>	<i>IDEA (Detailed Description)</i>	<i>Implementation Details (Barriers, Skill Set Coordination, etc.)</i>
Bike and pedestrian traffic	Maintain continuity during and after construction. Provide greenway connections to the ballpark. Coordinate with existing and developing plans.	
Incident management and emergency response	Increase Incident Management Assistance Patrols (IMAP) and law enforcement presence; equip with push bumpers. Update plan for the event in which both I-40 and I-40 Business are closed. Coordinate with division seven. Let a towing contract. Ensure mobility of responders and public access to medical emergency facilities.	Provide adequate signing. Coordinate with all emergency responders, and form an emergency services provider team.
Public information	Promote I-40 Business as open to local traffic only. Manage expectations. Plan for special events.	Provide appropriate signing.

Geometric/Hydraulic Design Skill Set		
IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Broad Street	Eliminate access at Broad Street. Move access to Peters Creek Parkway interchange. Extend Peters Creek to First Street as part of the ballpark redevelopment.	
Access	Manage access; develop two good interchanges to replace the current four.	Close vehicle access at 4th Street, Green Street and Spruce Street.
Sight distance	Lower the mainline profile only in the vicinity of Marshall/Cherry to improve sight distance and view the corridor.	
Split diamond	<p>Consider the following options:</p> <ol style="list-style-type: none"> Construct a split diamond with one-way C-D roads from Marshall to Main Street. This option provides access to Marshall, Cherry, Liberty and Main Street. <ul style="list-style-type: none"> ➤ Cantilever or box I-40 Business from Marshall to Cherry. ➤ Replace Liberty mainline viaduct with a walled section. Construct a split diamond to Marshall and Cherry. <ul style="list-style-type: none"> ➤ No need for C-D roads. ➤ No access at Main St. 	
Liberty Street	Relocate Liberty to Main Street alignment.	
Enhancements	Consider pedestrian/bicycle enhancements and wider bridges.	
Additional capacity	Add flexibility of access lane in each direction.	
Total closure	Recommend total closure for 14 to 18 months, not for entire construction period.	

Structures Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Reduction of bridge construction	Remove bridges at Fourth, Green and Spruce. Combine Main and Church. Shorten the bridge, lower the grade and provide arch-type single span structures at Liberty. Consider strolling path and parking lot access at Liberty as well. Shorten the bridge, lower the grade and provide arch-type single span structures at Brookstown. Retain existing abutment walls, as feasible, for permanent or temporary use.	
Vertical clearance	Consider non-standard bridge types. Lower the grade on the I-40 Business roadway. Look at abutment walls. Consider single span bridges, eliminating median piers where possible. This is feasible everywhere except Peters Creek.	Consider a concrete channel bridge, a shallow structure that can be precast and launched or cast-in-place depending on accessibility below. The edge beam section doubles as the bridge barrier rail, giving it a nice, slender appearance. Construct a tied-steel-arch bridge utilizing cable stayed technology, either at a central location or on one end of the project as a signature-type bridge.
Aesthetics	Minimize visual impacts. Select functional/unique bridge location for signature bridge(s). Construct slender superstructures. Consider form liners for walls. Utilize decorative rails. Provide architectural lighting.	Avoid noise walls.
Staging of work	Look at project termini – Peters Creek and Main/Church Street areas – as well as the central portion of the project.	Complete conventional-type bridges and interchanges as separate project prior to beginning the main I-40 closure project. Construct the central portion of the project (incorporating frontage roads) first; this will provide better access to downtown during construction of I-40 Business.
Foundations	Minimize pile driving due to noise and vibrations. Complete the eastbound foundation work in advance to accelerate bridge construction. May require paving over at frontage roads and uncovering at a later stage.	Use alternate foundations such as spread footings, drilled piers, micro piles, slurry walls, etc.

Structures Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Utility attachments	Avoid utility attachments on all non-standard bridges.	
Other	Consider the frontage road concept and the "cut and tunnel" (false tunnel) concept.	Provides for zoned construction, the ability to work around existing ramps and coordinated closures while promoting traffic flow. Provides distinct locations for landscaping and/or monuments and also improves the final access to downtown. If historic properties or other issues conflict with the frontage roads in the Spruce, Marshall and Cherry blocks, then consider the false tunnel concept to allow the frontage road alignment described above to overlap I-40 Business.

Long Life Pavements/Maintenance Skill Set

<p><i>IDEA</i> (Short Name)</p>	<p><i>IDEA</i> (Detailed Description)</p>	<p><i>Implementation Details</i> (Barriers, Skill Set Coordination, etc.)</p>
<p>Fifty-year pavement life</p>	<p>Design/construct pavement to last 50 to 60 years. Utilize CRCP. Can use precast/pre-stressed concrete for bridge areas and ramps. Traditional jointed concrete is also an option. Composite pavement (about four inches of asphalt over the CRCP) may provide the longest life; the asphalt will protect the concrete and can be milled and replaced. Bridge clearance is a serious issue with an unbonded overlay.</p>	<p>Allow for asphalt overlay (bridge clearance, barrier rail). Will last a very long time if well-designed; previous configurations were not well designed. Need to provide training for designers and inspectors. There's not much truck traffic, so precast/pre-stressed concrete should perform well. Note that hard aggregate in the concrete has led to skidding problems in the past.</p>
<p>Pavement design</p>	<p>Provide a small increase in thickness for a large increase in service life. Need realistic traffic estimates; they're difficult to obtain, especially truck traffic volume and weights.</p> <p>Consider a regular lane with tied full-depth concrete shoulder. This is the preferred design. It provides a breakdown lane and an avenue for temporary traffic and is low maintenance. Can consider widened lanes with asphalt shoulder, but they face significant maintenance issues.</p> <p>Must provide for lime/cement stabilization; because the soil type varies, must use a combination, which makes the process time-consuming.</p>	
<p>Material selection</p>	<p>Provide for appropriate material selection.</p>	<p>Consider durability issues, ASR, freeze-thaw cycles, etc.</p>
<p>Surface characteristics</p>	<p>Look at surface characteristics such as friction, splash and spray, grooving, open graded pavement and noise issues. Need to minimize residential impacts.</p>	

Long Life Pavements/Maintenance Skill Set

<p><i>IDEA</i> (Short Name)</p>	<p><i>IDEA</i> (Detailed Description)</p>	<p><i>Implementation Details</i> (Barriers, Skill Set Coordination, etc.)</p>
<p>Construction options</p>	<p>Shut down the road so paving can be done in a continuous operation. Will need a batch plant/staging area. Other, more time-consuming options include shutting down one direction at a time, building under traffic or shutting down interchange to interchange. Note: the structures may drive traffic control.</p>	
<p>Ramp alignment and construction</p>	<p>Recommend concrete ramps, not asphalt. Utilize high early-strength concrete. Evaluate potential application of precast ramps; NCDOT is inexperienced in this area. Consider eliminating some ramps/C-D lanes. Improve Y-line geometrics.</p>	<p>Note that asphalt ramps may shove/rut due to short ramps with tight curves. Need to secure local input on ramp closures.</p>
<p>Detour route improvements</p>	<p>Conduct a risk assessment. Consider removing on-street parking during detours. Coordinate signals/ITS devices.</p>	<p>Assess life of existing pavement; may need to reconstruct at some point, either before or after detour period. Coordinate ITS with TMCs.</p>
<p>Drainage issues</p>	<p>Connect underdrain/shoulder drain to drainage boxes. Replace storm drainage. Consider outfall constraints. Define legal and illegal encroachment. Utilize storm drainage BMPs.</p>	<p>Note that drainage is critical to long-term performance. Need to address brick culverts at Peters Creek, where the water runs the wrong way. Address unidentified creeks. Work with ROW on constraints and encroachment issues.</p>
<p>Utilities</p>	<p>Put utilities in precast vault (under or outside of shoulder) to avoid future damage to pavement. Share cost with fiber companies. Let an advance contract to locate and move utilities.</p>	<p>Need to plan this for the corridor and provide for long-term utility access. Note that unidentified utilities may exist, that nothing is parallel at this point and that utilities like to do this themselves.</p>
<p>Recycling concrete</p>	<p>Recycle old bridge and roadway concrete for use in subgrade stabilization, fill material and as crush for aggregate base, if needed. Consider crush-in-place. Can use as stage materials at the future baseball stadium or Research Park. Can use in new concrete or reuse for maintenance operations.</p>	<p>Look at landfill capacity and locations. Can't use in streams. Not feasible for this job.</p>

Long Life Pavements/Maintenance Skill Set		
IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Other maintenance	Look at barrier rail, glare screen, lighting, and pavement markers and markings. Eliminate guard rail as much as possible.	Ensure full-height barrier rail design; a higher rail prevents rubbernecking. Look at durability of pavement markings. Use Jersey barrier and other design features.
ITS	Utilize cameras and message boards at ends.	Requires TMC coordination.
Beautification	Consider concrete imprints. Look at retaining wall/noise wall décor, concrete coloring (existing 52 South shoulders), median barriers (white cement), plantings that are low-maintenance (i.e., ivy, mulch), crosswalks at ramps and granite curbs in historic areas.	Need long-term, low-maintenance solutions. Requires community involvement, perhaps even an aesthetic design contest. Look at things such as stamped concrete or asphalt, durability issues and maintenance agreements.
Winter maintenance	Utilize epoxy steel in pavement. Incorporate bridge anti-icing systems.	Plan for typical weather of four to eight inches of snow with sleet and ice and freeze-thaw cycles. Utilize anti-icing systems along the full length of the project.
Other issues	Obtain public buy-in for the project by creating a comprehensive communications plan that is consistent and touts the benefits of the project, i.e., safety, quality, etc. Investigate the restrictions on the RFP; is this a feasible D-B project? May restrict or not encourage innovation.	

Construction Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Project phasing	Utilize project phasing to facilitate construction for interior portions of project. Make improvements at Main Street exit and Peter's Creek Parkway interchange first. Include US 52 ramp improvements to better accommodate traffic. Utilize sequential closing of Y-lines; control which Y-lines can be closed at any one time during the project.	Limit duration of complete closure of mainline – use incentives, lane rentals, CPMs, etc. (NCDOT will generate CPM prior to RFP.) Utilize three-phase construction: Peter's Creek Parkway, all remaining structures, and then the mainline and connectors. Maintain one north-south directional route with access to I-40 Business at all times. Clearly define these parameters in the RFP. Remember that more restrictions add to the cost and duration of the project.
Peter's Creek Parkway	Construct the bridge in two phases, and maintain traffic on the existing bridge during the first phase. Add capacity to the eastbound loop at Peter's Creek Parkway to better accommodate traffic during complete mainline closure.	Note that a single-point interchange does not appear to be feasible at Peter's Creek Parkway interchange due to community impacts.
Traffic mobility concerns	Consider a single-span bridge at Broad Street early in the project; the center piers of the existing bridge prohibit any traffic shifts. Eliminate the Church Street Bridge to improve the alignment of the ramps to and from Liberty and Main Street.	Replace the Broad Street structure to increase vehicle and pedestrian capacity (in consideration of eliminating Green, 4th and Spruce Street bridges).
Rock excavation	Address potential issues with lowering the grade; the existing bridge footings are not far beneath the roadway grade. Raise the grade for Y-lines to avoid having to excavate deeper on the L-line and drainage features. Look at maintaining the current retaining walls. Evaluate potential noise and damage from blasting. Note increase in production time with less rock excavation.	Evaluate profiles throughout the corridor to see if and where rock excavation is needed. Require contractor qualification criteria for any blasting or other forms of rock excavation.
Pavement type	Recommend concrete; maintenance needs are less for the short-term (20 years). Asphalt would facilitate better traffic shifts. May want to use asphalt at some interchanges to avoid multiple mobilizations of concrete paving equipment.	Survey existing soil conditions to determine the best sub-grade construction. Investigate recycling existing concrete pavement to use in new pavement structure. Minimize mobilizations of concrete paving equipment. Utilize asphalt paving on the mainline and ramps at Peter's Creek Parkway to facilitate the first phase of construction.

Construction Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Pedestrian traffic	Consider widening bridges to increase capacity of foot traffic. Detour and enhance the existing strollway between 2nd Street and Liberty Street.	Accommodate pedestrian traffic during bridge construction, and provide viable alternatives at the locations where existing structures will be eliminated. Account for and enhance the strollway between 2nd Street and Liberty Street.
Accelerated construction options	Use fill sections or retaining walls to reduce the length of the mainline bridge over Liberty Street, and eliminate the westbound entrance ramp from Liberty Street. Use precast structure components, where feasible, to expedite the re-opening of Y-line closures. Temporarily relocate conflicting utilities prior to the project let; this will expedite initial construction. Reduce cure periods during construction to expedite paving.	Confirm utility relocation requirements, and prioritize their order to coincide with construction phasing/CPM. Confirm parking arrangements beneath the bridge over Liberty Street. Confirm storage capacity for precast units/ensure their feasibility. Utilize 3-D design (and possibly 4-D to include schedule) with transferable data files for construction.
Access and staging areas	Provide limited areas to store supplies and equipment.	Coordinate with the City of Winston-Salem to find potential development sites for storing materials and equipment.
Pavement constructability issues	Consider subgrade alternatives – plan to minimize the need for fast-track paving, as there are durability concerns. Evaluate the potential for a single saw cut of the concrete pavement with no seal. Consider a composite pavement design.	Identify and coordinate subgrade alternatives with the materials and tests unit. Evaluate current test projects to determine if a single saw cut is viable.
Contract administration	Address submittal turnaround time. Utilize responsive and experienced administration staff to address issues at the project level. Give administration staff the authority to make quick decisions at the project level.	Requires commitment from all levels to ensure quick decision-making and submittal turnaround – and to keep all necessary parties informed of construction activities and their impacts (NCDOT, City of Winston-Salem, contractor, resource agencies, etc). Need an on-site office for project personnel. Encourage the D-B alternative; if it's used, ensure continued design service from the engineer of record after award. NCDOT will pay for this service.
Disposal/recycling of materials	Address red lead, asbestos, concrete pavement and bridge demolition.	Identify potential on-site waste areas.

Geotechnical/Materials/Accelerated Testing Skill Set		
<i>IDEA</i> (Short Name)	<i>IDEA</i> (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Structures		
Precast units	Maximize precast units.	Address storage, staging areas, limited field adjustments, quality control for installation. Coordinate with materials, construction, structures.
Clear span structures		Investigate span lengths, vertical clearance issues, safety improvements, improved access for construction, aesthetics. Coordinate with structures, construction, traffic, roadway, hydraulics.
SPUI at Church – Main Street		Combines bridges into one interchange – not pedestrian friendly. Less congestion, better ramp alignments. Coordinate with structures, traffic, roadway, water.
Double-decker arrangements	Install flyovers for auxiliary lanes.	Creates traffic at bedroom level; can't see downtown from the bottom; gain capacity. Coordinate with roadway, structures, traffic, hydraulics.
Foundations	Build foundations for Liberty greenway and others while maintaining traffic on I-40 Business.	Look at spatial constraints, impacts to traffic, short-term impacts to side streets, utility conflicts. Coordinate with roadway, structures, traffic, geometric.
Number of structures	Eliminate structures.	Opens aesthetics for downtown; eliminates ramp configurations; changes traffic patterns; eliminates future maintenance; divides neighborhoods. Coordinate with structures, roadway, traffic.
Contracting	Break out structure work from the rest of the pavement rehabilitation (first phase).	Reduces impacts to traffic; allows for quicker construction of the pavement; keeps mainline open longer; provides additional staging areas for different subs. Coordinate with traffic, structures, roadway.
Pedestrians and aesthetic concerns	Widen structures to create pedestrian-friendly areas and improve aesthetics. Add more pedestrian bridges. Must address drainage issues.	Maintains connections between communities while reducing vehicle traffic. Creates more greenspace. Coordinate with roadway, structures, geometric.

Geotechnical/Materials/Accelerated Testing Skill Set		
IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Retaining walls	Match texture and color to existing architecture. Consider tangent drilled shaft walls. Put in walls before the roadway grade is cut.	Reduces ROW needs, increases horizontal clearance, provides better utilization of space, expedites excavation for mainline. Less vibration, no pile driving, aesthetic improvement for corridor.
Roadway		
Vertical alignments	Increase vertical clearance for truck traffic. Increase abutment heights and subgrade treatments. Evaluate whether blasting is necessary.	Coordinate with roadway, hydraulic, construction, traffic.
Geofoam block	Use as a fill material that can be quickly installed.	Reduces need for testing, borrow. Allows for steeper slopes by reducing lateral forces. Must be protected from UV rays/hydrocarbon/oil spills. Settlement may occur within the first year.
Horizontal alignment	Look at horizontal alignment and ramp alignments. Eliminate ramp accesses. Improve turning radii.	Will increase capacity and safety; ease motorist confusion; allow for better mass transit use. Must address ROW, historical properties, limited commercial access. Coordinate with roadway, traffic, ROW.
Detours	Make necessary service street improvements. Look at dual-direction streets and signal coordination. Clear utilities out of the way early.	Prepare for detour traffic during construction; increase traffic flow and business access. Decreased on-street parking may be an issue.
Geotechnical		
Vibration monitoring	Conduct preconstruction surveys. Promote public involvement and education. Evaluate blasting options.	
Geotechnical information	Better define the subsurface conditions, i.e., rock and undercut and nature of soils. Determine the amount of blasting required as well as the amount and type of stabilization necessary. Get complete and accurate information early in the process.	
Intelligent compaction for density	Know the stiffness of the entire embankment. Evaluate potential quicker consolidation as the project is being constructed; look for any reduction in need for compaction testing.	

Geotechnical/Materials/Accelerated Testing Skill Set

<i>IDEA</i> (Short Name)	<i>IDEA</i> (Detailed Description)	<i>Implementation Details</i> (Barriers, Skill Set Coordination, etc.)
Pavement		
Unbonded overlays	Utilize the existing pavement as a structural layer; this will reduce the need to treat variable subgrade conditions. The existing structures will have to be raised.	
Precast panels	Accelerates pavement placement without sacrificing durability. Saves time lost to curing.	
Maturity meters	Provide the quickest access to the pavement and reduce overall need for testing during construction.	
Traffic Issues		
Park and Ride	Utilize to reduce congestion during construction.	
Closure of I-40 Business	Shut down I-40 Business completely or one section at a time.	Provides access to the entire worksite and produces a safer work zone. Eliminates alternate route during emergency; forces motorists to utilize alternate routes. Eliminates the need for temporary pavement structure.
Reversible lanes/median crossovers	Utilize to maintain one direction throughout construction.	Requires temporary construction.
Construction access	Address delivery of materials to worksite, weaving in and out of traffic, hauling restrictions, locations for staging areas, etc.	
Signage	Utilize signage to encourage motorists to take different routes.	May cause driver confusion. Must provide for maintenance of detour signs. Public information campaign is necessary.
Recycling of Existing Materials		
Rubblization of pavement	Use as base material.	Provides a stable platform for a flexible pavement structure. Must dispose of fines before incorporating back into concrete; must grade properly for specific use. Look at potential economic benefits.

Public Information Skill Set

<p><i>IDEA</i> (Short Name)</p>	<p><i>IDEA</i> (Detailed Description)</p>	<p><i>Implementation Details</i> (Barriers, Skill Set Coordination, etc.)</p>
<p>Project brand</p>	<p>Understand customer expectations. Establish a name for I-40 Business. Establish the "brand" by July 2006 (logo, slogan, etc.). Package projects (US 52, Salem Creek Parkway, Beltway) as one brand under one name, leading up to the I-40 Business project.</p> <p>Identify target audiences. Use project(s) to unite community. Initiate intergenerational outreach efforts. Highlight history of Winston and Salem along with history of transportation. (This was NC's first Interstate.)</p> <p>Find out early on what the public expects of the project. Establish pros and cons of the project. Redefine NCDOT's image; address credibility issues. Establish consistent message and ensure thorough and consistent dissemination of this message. Provide "kits" to businesses, media, etc.</p>	<p><i>Implementation Details:</i></p> <p>Partner closely with public involvement. Tailor outreach to specific audiences. Establish long-term benefits. Increase corridor efficiency. Improve safety.</p> <p>Utilize visualizations; produce a 3-D model of the project, renderings, computerizations, interactive programs, etc.</p> <p><i>Barriers:</i></p> <p>Knowledge that construction will not necessarily increase capacity but should increase efficiency; public dissatisfaction with length of closure; impacts to traffic (rerouting, neighborhood traffic, etc.).</p> <p><i>Skill Set Coordination:</i></p> <p>Public involvement.</p>
<p>Dedicated project web site</p>	<p>Provide regular project updates – progress, schedule, etc. Use a subscriber list. Promote safety messages. Publicize detour routes. Make the web site a proactive, interactive information source featuring real-time information, DOT and construction cameras and so forth.</p>	<p><i>Implementation Details:</i></p> <p>Identify audience preferences (for key updates, etc.). Make sure the updates are consistent and "in English."</p>
<p>Project hotline</p>	<p>Utilize to provide project information. Can coordinate with community center.</p>	<p><i>Barriers:</i></p> <p>Note that branding of projects as a package will affect ability to establish project-specific hotline. May need to use a customer service line to service individual projects until work on I-40 Business begins.</p>

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<p>Technological advances</p>	<p>Consider using the following: a specific link to 511; traffic information management systems; real-time web cameras and/or portable construction cameras; and construction and traffic updates via cell phone (via subscriber lists). Consider technology advancements at time of construction.</p>	<p><i>Barriers:</i> Hard to foresee available technology.</p>
<p>Community center/project office</p>	<p>Hire a dedicated, full-time communications officer to work in the community and be the “face” of the project. Have project information available at the center/office. Set up 3-D models. Partner with project offices so they are the “hub of the project.” Implement a project hotline early in the process.</p>	<p><i>Implementation Details:</i> Look at potential locations. Consider utilizing division office as the community center for individual projects until work on I-40 Business begins. Utilize project offices to facilitate ongoing community involvement.</p> <p><i>Skill Set Coordination:</i> Construction, public involvement.</p>

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<p>Partnerships with local agencies</p>	<p>Partner with the following:</p> <ul style="list-style-type: none"> ➤ City. ➤ Schools. ➤ Transit (City and regional). ➤ WSSU. ➤ WFU. ➤ NC School of the Arts. ➤ CVB. ➤ Baptist Hospital. ➤ Salem College. ➤ Old Salem. ➤ Arts Councils. ➤ Research Park. ➤ Downtown WS Partnership. ➤ Utility companies. ➤ PTIA/Smith Reynolds Airport. ➤ Court System (State and Federal). ➤ Forsyth County Government. ➤ Community associations. ➤ Regional emergency services. ➤ Outlying counties (especially medical agencies). ➤ Trucking associations. ➤ Large employers. ➤ Media. 	<p><i>Implementation Details:</i></p> <p>Utilize joint notification efforts, web sites, intranets, etc.</p> <p><i>Skill Set Coordination:</i></p> <p>Construction, public involvement.</p>
<p>Coordination with local service providers</p>	<p>Coordinate with local service providers to avoid service interruptions:</p> <ul style="list-style-type: none"> ➤ Garbage pick-up. ➤ EMS. ➤ Fire. ➤ Police. ➤ North Carolina Tourism Association. 	<p><i>Skill Set Coordination:</i></p> <p>Utilities, construction, public involvement.</p>

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Media relationships	Utilize comprehensive, project-specific media kits to educate media representatives. Provide appropriate contact information. Provide media training for field personnel. Focus on message development; NCDOT can control the message by acting proactively. Utilize the community center for public information – as a location to stage interviews, live shots, etc.	<i>Implementation Details:</i> Address safety concerns regarding media visits to projects. <i>Barriers:</i> Time involved. <i>Skill Set Coordination:</i> All.
Other impacts on traffic	Look at other construction projects (i.e., on side streets, detour routes, etc.). Plan for events such as street festivals, special events and so forth.	<i>Implementation Details:</i> Need to work with other transportation entities and stay abreast of upcoming events. <i>Barriers:</i> Need to stay up-to-date on upcoming projects and special events. <i>Skill Set Coordination:</i> Traffic Engineering, public involvement.
Promoting project through local communities	Promote “signature” parts of the project. Promote the opportunity to bring the community together. Ask local agencies to “attach” themselves to the project. Partner with MPOs to include the project in their local TIP.	<i>Implementation Details;</i> Requires significant public involvement. Work on context sensitive designs; have the public involved in selection of style, finishes, etc. Involve arts schools. <i>Barriers:</i> Need to get support of locals. <i>Skill Set Coordination:</i> Public involvement.

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<p>Project schedule</p>	<p>Commit to – and follow – the project schedule. Need to establish and maintain credibility.</p>	<p><i>Implementation Details:</i> Put “teeth” in project contracts to enforce schedule.</p> <p><i>Barriers:</i> Funding Issues (DOT, City, MPO).</p> <p><i>Skill Set Coordination:</i> Construction.</p>
<p>Economic benefit and redevelopment</p>	<p>Promote economic benefits. Address economic concerns.</p>	<p><i>Implementation Details:</i> Develop a business “survival guide.”</p> <p><i>Skill Set Coordination:</i> Public involvement.</p>

Innovative Financing. The team’s primary goals are to align potential financing options with project goals; match anticipated cash flow with project management; and provide options for managing competing priorities for existing resources.

ROW/Utilities/Railroad Coordination. The ROW group’s primary role is to ensure that ROW, utilities and railroad work comply with state laws and procedures. They must also consider the numbers and types of businesses and residences impacted by a project and evaluate the ready availability of additional right-of-way.

Geotechnical/Materials/Accelerated Testing. The geotechnical team explores subsurface conditions to determine their impact on the project; pursues options for expediting materials acceptance and contractor payment; and evaluates the use of innovative materials in accordance with project performance goals and objectives.

Traffic Engineering/Safety/ITS. The traffic engineering team strives to enhance safety; improve traffic management; and explore technologies, including ITS systems, that will communicate real-time construction information to the public.

Structures (Bridges, Retaining Walls, Culverts, Miscellaneous). The structures skill set focuses on accelerating the construction of structures. Their task is to identify the most accommodating types of structures and materials that will meet design requirements and minimize adverse project impacts.

Innovative Contracting. The innovative contracting group explores state-of-the-art contracting practices and strives to match them with the specific needs of the project.

Roadway/Geometric Design. The roadway team evaluates proposed geometrics and identifies the most accommodating product with the minimum number of adverse impacts.

Long Life Pavements/Maintenance. The maintenance skill set identifies pavement performance goals and objectives and explores future maintenance issues for the project corridor, including winter service, traffic operations and preventative maintenance.

Construction (Techniques, Automation and Constructability). The construction crew explores techniques that will encourage the contractor to deliver a quality product within a specific timeframe while maintaining traffic.

Environment. The environment team ensures that the scope of work and construction activities reflect local environmental concerns. Their goal is to provide the most accommodating and cost effective product while minimizing natural and socio-economic impacts.

Public Relations. The public relations skill set discusses ways to partner with local entities and effectively inform both local communities and the traveling public about the project before, during and after construction. Their role is to put a positive spin on the project.

Background of ACTT

ACTT is a process that brings together public- and private-sector experts from across the country in a setting that encourages flexibility and innovation. The goal is to recommend technologies that will accelerate construction time while reducing user delay and community disruption. This necessitates a thorough examination of all facets of a highway corridor with the objective of improving safety and cost effectiveness while minimizing adverse impacts to the traveling public.

The ACTT concept was originated by the Transportation Research Board (TRB) in conjunction with FHWA and the Technology Implementation Group (TIG) of the American Association of State Highway and Transportation Officials (AASHTO). Following the completion of two pilot workshops, one in Indiana and one in Pennsylvania, the originating task force, A5T60, passed the concept off to FHWA and TIG to continue the effort. They have done so by coordinating a series of ACTT workshops around the country.

More information on the ACTT program is available online at <http://www.fhwa.dot.gov/construction/accelerated/index.cfm>.