MICHIGAN ACTT WORKSHOP

SPANNING THE PAST:

THE I-94 REHABILITATION PROJECT

U.S. Department of Transportation

Federal Highway Administration

MDOT

ACTT

ACCELERATED CONSTRUCTION TECHNOLOGY TRANSFER

www.fhwa.dot.gov/construction/accelerated

- ACTT provides a fresh outlook by bringing national experts to your planning table.
- ACTT introduces innovations that have been tested elsewhere.
- 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."
- ACTT saves money: ACTT suggestions enabled New Jersey to reduce its budget for the Route 46 bridge project from $10 million to $7.2 million.
- 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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COVER PHOTO:
Downtown Detroit.

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EXECUTIVE SUMMARY

> Together, the united forces of our communication and transportation systems are dynamic elements in the very name we bear – United States. Without them, we would be a mere alliance of many separate parts.
>
> *– President Dwight D. Eisenhower, February 22, 1955*
>
> Source: "The Quotable Interstate," Federal Highway Administration, U.S. Department of Transportation, http://www.fhwa.dot.gov/interstate/quotable.htm. Accessed June 6, 2007.

Our Nation's ever-changing technology and increasing mobility make President Eisenhower's remarks as applicable today as they were in 1955.

One of the major challenges many departments of transportation (DOTs) now face is keeping these parts – the States' roadways and communications systems – dynamic in light of aging infrastructure, increased congestion and limited transportation dollars.

These are the very issues the Michigan Department of Transportation (MDOT) is dealing with on the I-94 Rehabilitation Project from I-96 to Conner Avenue, Detroit, Michigan.

The $1.2 billion project includes reconstruction of 2 major freeway-to-freeway, multi-level interchanges, 67 bridge structures and 6 railroad overpasses; construction of continuous service roads along the corridor; elimination of all left-hand entrances and exits; and the addition of a number of other features. Because the seven-mile corridor serves as a key artery to Detroit and southeast Michigan, traffic disruptions must be kept to a minimum. Stakeholder buy-in and communication are essential to the project's success.

With this in mind, MDOT approached the Federal Highway Administration (FHWA) about hosting an Accelerated Construction Technology Transfer (ACTT) workshop for the I-94 Rehabilitation Project from I-96 to Conner Avenue, Detroit, Michigan.

Together, FHWA and MDOT identified the following skill sets for the I-94 workshop:

- Innovative Construction.
- Structures.
- Public Relations/Context Sensitive Solutions (CSS).
- Traffic Engineering/Safety/Intelligent Transportation Systems (ITS).
- Innovative Construction Contracting and Financing.
- Utilities/Railroad Coordination.
- Roadway/Geometric Design.
- Geotechnical Engineering/Accelerated Materials Testing.

Each team focused on how the ACTT process applied to their area of expertise. The group as a whole searched for innovative ways to help MDOT fund and accelerate construction of the I-94 project.

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, MDOT will evaluate the various recommendations and decide which ideas should be implemented as part of the project.

1.1. Opening Session

The I-94 Rehabilitation Project from I-96 to Conner Avenue, Detroit, Michigan, ACTT workshop took place April 17-19, 2007, at the Doubletree Hotel in Dearborn, Michigan.

FHWA Construction & System Preservation Engineer Chris Schneider and Pavement Management Engineer Joe Huerta, the workshop moderators, welcomed the group. MDOT Bureau Director for Highway Development John Polasek gave a presentation entitled *Building on Success.* MDOT Metro Region Engineer Greg Johnson and FHWA Michigan Division Administrator James Steele greeted the attendees, and the participants introduced themselves. Mt. Pleasant Transportation Service Center Manager Terry Stepanski provided a project overview, and the group departed on a tour of the project corridor.

1.2. Workshop Process

The MDOT workshop followed the traditional ACTT process. On Wednesday morning, the ACTT management team discussed the brainstorming process with workshop attendees. The skill sets then broke apart to discuss the project and brainstorm preliminary ideas, reconvening before lunch to share initial thoughts. After lunch, the skill sets continued their work, intermingling with other teams to ask questions and share ideas. The teams spent the remainder of the afternoon preparing final recommendations for presentation to the group on Thursday morning.

1.3. Skill Set Goals

Participants in each skill set had an established group of goals that was unique to their subject area:

Innovative Construction

- Address construction sequencing.
- Identify contractor staging and material storage areas.
- Maintain safety of construction workers and the traveling public.
- Recommend innovative construction methods and materials that will minimize cost and the construction timeframe.
- Maintain traffic flow at target miles per hour (mph).
- Provide access throughout the construction zone.
- Provide reasonable project length for the contractor to complete work in a compressed timeframe.
- Minimize environmental impacts.
- Minimize traffic impacts, lane closures, ramp closures and local street closures.

- Consider various demolition and construction methods/ procedures.
- Recommend methods to reduce turn-around time and personnel requirements.

Structures

- Design to minimize future maintenance of the bridge decks.
- Recommend bridge types and construction methods that will minimize the timeframe for replacement of the existing bridge decks, where applicable.
- Evaluate construction staging to optimize traffic flow.
- Use high-performance materials such as very high early-strength concrete, where practical.
- Integrate connections to existing roadways.
- Utilize precast and prefabricated sections to reduce the construction timeframe.
- Reduce the cost of structures.
- Recommend environmentally friendly construction methods.
- Investigate rehabilitation and reconstruction options for bridges over the Interstate, for Interstate bridges over other roads and for curved structures (ramp bridges).
- Make recommendations for retaining walls (tall walls on small sites).
- Evaluate the proximity of foundations to major utilities, buildings to remain, etc.

Public Relations/CSS

- Gain acceptance of the community for accelerated construction.
- Develop a plan of engagement for the community to communicate how acceleration will work and how it will benefit the public.
- Minimize community impacts.
- Collaborate on emergency response and incident management with the community.
- Collaborate with the media on traffic mitigation.
- Develop a strategic marketing plan to ease congestion during construction.
- Minimize secondary road usage.
- Engage key communities prior to/throughout construction, i.e., downtown employers, community development centers (CDCs), media, etc.
- Manage the changing political environment; there are new administrations at all levels of government.

Traffic Engineering/Safety/ITS

- Implement an incident management system, ITS and/or freeway service patrols.
- Consider parallel/alternative detour routes and low-cost improvements to facilitate traffic movement.
- Reduce congestion during peak hours and consider methods to mitigate congestion.
- Establish traffic patterns that are clear and well-signed.
- Ensure contractor and motorist safety.
- Enhance travel and accessibility to the surrounding areas, major employment areas, medical facilities and local activity centers.
- Maintain mobility through and around work zone.
- Consider truck traffic options.
- Consider other area projects and traffic detours.
- Evaluate the potential trade-offs for not meeting current design standards.
- Consider the effects of lane closures.
- Address pedestrian movements throughout the corridor.

Innovative Construction Contracting and Financing

- Evaluate multiple contracts versus one large contract.
- Consider A-plus-B and A-plus-B-plus-C bidding opportunities.
- Discuss alternate funding mechanisms.
- Consider advance construction contracts.
- Evaluate design-build (D-B) options.
- Determine the cash flow necessary to accelerate the construction schedule.
- Identify inflation factors, potential funding sources and budget risks.
- Discuss contract incentives to promote safety.

Utilities/Railroad Coordination

- Identify utility relocation opportunities (public/private).
- Define ideas to maintain railroad traffic.
- Coordinate placement of fiber-optic utilities within the railroad right-of-way (ROW).
- Identify issues with "exotic" utilities.

Roadway/Geometric Design

- Evaluate the key design geometric elements of the value engineering (VE) study.
- Evaluate the recommended geometrics for the freeway-to-freeway interchanges.
- Evaluate the balance of access versus operation.
- Evaluate the balance needed between geometrics, safety and access.

Geotechnical Engineering/Accelerated Materials Testing

- Investigate options for accelerating pavement construction (when, where and how).
- Evaluate the need for special materials testing and approval procedures, i.e., performance-based specifications, warranties, quality assurance/quality control (QA/QC) provisions, etc.
- Evaluate potential applications of innovative materials such as geotextiles and geofoams.
- Investigate noise-/vibration-sensitive designs and materials.
- Use high-performance materials such as very high early-strength concrete, where practical.

2.1. Project Overview

The seven-mile project includes reconstruction of the existing roadway and the addition of continuous service drives on both sides of the road. A vital component of the project is the reconstruction of two major freeway-to-freeway, multi-level interchanges. Additional features include the reconstruction of 67 bridge structures and 6 railroad overpasses. All left-hand entrances and exits will be eliminated; adequate acceleration and deceleration lanes will be added; and the M-10 and I-75 interchanges will be redesigned. Pedestrian crossings, sidewalks and a state-of-the-art drainage system are also part of the proposed package.

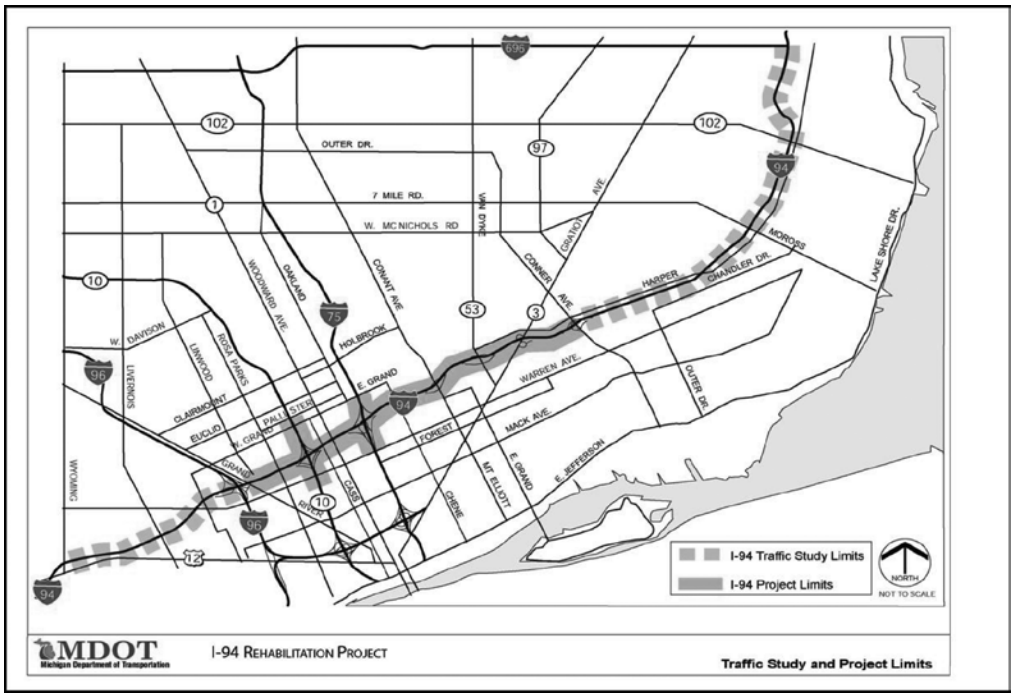

Figure 1. *Project limits for the I-94 Rehabilitation Project from I-96 to Conner Avenue, Detroit, Michigan.*

2.2. Project History and Development

Photo 1. *I-94 in its early days.*

Development of the Detroit Industrial Expressway (DIE) began in the 1940s, with work on the project area commencing in 1947 as an extension to the DIE. I-94 as Detroit knows it today was built in five successive phases, the last of which was completed in 1958. Approximately 1,770 parcels were purchased for the I-94 project. The total project cost was $110,000,000.

Fifty years later, the pavement and bridge structures are failing, and the roadway lacks the capacity needed for the 160,000 vehicles that traverse it daily. Congestion has become a major concern: motorists' average speed is less than 30 mph during peak periods.

In order to provide the best possible solution to these concerns, MDOT has worked extensively with the City of Detroit and the greater Detroit area to develop the I-94 Rehabilitation Project from I-96 to Conner Avenue. Specifically, the DOT has held over 50 meetings with the City, over 100 public information meetings with local residents and over 30 meetings with the Interagency Coordination Committee (ICC).

2.3. Project Purpose

The purpose of the I-94 Rehabilitation Project from I-96 to Conner Avenue is twofold:

1. To improve the capacity and condition of the existing I-94 roadway and interchanges; and
2. To support the mobility needs of local and Interstate commerce as well as National and civil defense.

As planned, the project will also enhance local traffic circulation by separating local traffic from I-94 traffic via continuous service drives.

2.4. Project Challenges

The condition and capacity problems of the existing facility have resulted in this section of I-94 being recognized in Statewide and regional plans as the Michigan roadway section most needing action. Due to the central location of the project area and its role as a key artery to Detroit and southeast Michigan, it is crucial that, once construction begins on a particular segment, it is completed as quickly as possible to minimize the impacts to the traveling public as well as to adjacent neighborhoods and businesses.

2.5. Project Status

The Final Environmental Impact Statement (FEIS) has been completed, and the FHWA signed the Record of Decision (ROD) in 2005. MDOT has conducted a three-week VE Study and will soon have a consultant on board to complete an engineering report.

The project is on the governor's "deferred project" list for design and construction, which means that no funding is available for these activities. MDOT has approximately $10 million available for the remaining preliminary engineering activities.

3.1. Innovative Construction

The innovative construction skill set offered the following recommendations:

Staging

- Coordinate all utility work before beginning construction.
  - Incorporate utility work into the construction contract.
- Begin utility relocation and railroad work first.
- Construct service drives and bridges.
- Sequence the bridge closures to maintain access.
  - Use a construction planner.
- Close the freeway in stages.
  - Utilize closures between the major interchanges.
  - Base limits on traffic considerations.
- Utilize detour routes for through traffic.
- Maintain local traffic on service drives.

Contracting

- Utilize constructability reviews.
- Consider partnering.
- Provide incentives/disincentives.
- Consider D-B (one contract).
  Pros
  - Makes contractor responsible for utilities, coordination, etc., and on-time delivery.
  - Allows contractor to optimize scheduling.
  - Reduces procurement time.
  - Lowers the risk for MDOT.
  - Shortens contract duration.
  - Has lower administration costs and one mobilization cost.

  Cons
  - Is counter to MDOT's D-B experience.
  - Will lose control of project at MDOT.
  - Have no D-B firms in Michigan. MDOT would have a small pool of bidders, which could increase the cost.
  - Faces lack of political support.
  - May not be able to get an Act 51 match from the City of Detroit.
  - May encounter D-B claims.
- Consider design-bid-build (multiple contracts).
  Pros
  - Falls within MDOT's comfort zone.
  - Has the potential to attract more bidders, particularly more local bidders. More bidders means lower bid prices.

- ❖ Requires a smaller initial-dollar commitment.
- ❖ Faces greater political buy-in.

Cons

- ❖ Allows less innovation.
- ❖ Will likely take more time and more coordination.
- ❖ Will likely have to address multiple claims under multiple contracts.

Materials

- ♦ Utilize alternate pavement designs. Address State law constraints with regard to life-cycle cost analysis.
- ♦ Pre-purchase materials with long lead times.
- ♦ Pre-coordinate suppliers.
- ♦ Establish automated material certification.
- ♦ Utilize innovative materials, such as:
  - ❖ Fiber reinforced polymer (FRP).
  - ❖ Precast bridge deck panels, walls, sub-structures and beams.
  - ❖ High-performance pavement.
  - ❖ High-strength steel or concrete beams.

Mobility

- ♦ Maintain local access.
- ♦ Use buses to shuttle local motorists.
- ♦ Provide “bridge bucks” – incentives for commuters to stay away from the construction area.
- ♦ Establish evacuation routes and routes for emergency vehicles, special events and incident management activities.

Additional Recommendations

- ♦ Purchase/lease staging areas for the contractor.
- ♦ Hire local labor. Hire local organizations to recruit and train staff (environmental justice, or EJ).
- ♦ Allow no design exceptions.
- ♦ Provide a contingency to accommodate delays.
- ♦ Ensure maintenance coordination.
- ♦ Identify contaminated materials and relocation areas early.
- ♦ Validate the location of utilities prior to construction. Utilize subsurface utility engineering (SUE).
- ♦ Have an SUE coordinator on board during design and construction.
- ♦ Coordinate railroad work:
  - ❖ Temporary bridges.
  - ❖ Railroad flagging.
  - ❖ Train schedule.

- ❖ Work planned by railroad.
- ♦ Utilize innovative demolition methods.

3.2. Structures

The structures team offered the following recommendations:

Shallow Structure Types

- ♦ Consider shallow structure types, such as:
  - ❖ Channel bridge.
  - ❖ Cable-stayed bridge with slab superstructure.
  - ❖ Tied-arch bridge with slab superstructure.
  - ❖ Conventional beam bridge with integral supports.
  - ❖ Segmental voided slab.

Prefabrication

- ♦ Utilize prefabrication as much as possible:
  - ❖ Segmental concrete superstructure.
  - ❖ Precast piers.
  - ❖ Precast abutments.
  - ❖ Precast deck panels.
  - ❖ Precast bridge barrier.

  Temporary bridges (Bailey/Acrow).

High-performance Materials

- ♦ Use high-performance materials, such as:
  - ❖ Polymer asphalt.
  - ❖ High-performance concrete (HPC).
  - ❖ High-performance steel (HPS).
  - ❖ Self-consolidated concrete (SCC).
  - ❖ High strength concrete.
  - ❖ Initial overlays.

Retaining Walls

- ♦ Remove retaining walls, purchase additional ROW and lay slope back at 3:1.
- ♦ Install soldier pile, soil nailed or secant walls.

Service Drive Expansion

- ♦ Expand the service drive over the slope near the Wayne State University (WSU) parking garage.
- ♦ Consider cantilever construction over the mainline.

Foundations for Interchanges

- Utilize single/mono shaft foundations.
- Consider large diameter foundations closed in steel pipe pile.
- Use a post grouted shaft.

Railway Crossings

- Construct temporary railroad bridges as necessary.
- Divert rail traffic onto one bridge in areas with multiple tracks.
- Roll in a prefabricated bridge during a short closure.
- Use an edge girder floor beam system.

Interchange Construction Staging

- Build new ramps before eliminating movements.
- Use a construction planner to manage the construction sequence for the whole interchange.
- Consider segmental box or steel box/plate ramp bridges.
- Utilize temporary structures to move traffic.

Advanced Contracting

- Identify bridges for early construction/replacement due to poor condition.
- Let an advance contract for relocation of utilities.

Minimizing Future Maintenance

- Design to minimize future maintenance:
  - Eliminate expansion joints.
  - Design for continuity.
  - Minimize the number of bearings.

Erection Methods

- Use innovative erections methods, such as:
  - Self-propelled modular transporters (SPMTs).
  - Roll in.
  - High-capacity cranes.
  - Erection gantry.

3.3. Public Relations/CSS

The public relations/CSS crew offered the slogan “Getting More Out of I-94!” and centered their recommendations on the “Identify, Involve, Inform” model:

- Identify:
  - The “community.”
  - Project vision, challenges and potential conflicts.
  - Key messages.
  - Stakeholders, customers and partners.
  - Work force.
  - Funding options.
  - Political ramifications.
  - Policy issues.
  - Integrated transportation needs.
- Inform:
  - Develop a marketing plan to share the project vision.
  - Utilize extensive public outreach efforts.
  - Discuss project funding.
  - Use a communications toolbox.
  - Develop a “face” for the project.
  - Establish rapport with the media.
  - Share all mitigation plans.
  - Manage the public’s expectations.
- Involve:
  - Invite public participation.
  - Show commitment, trust and continuity.
  - Seek out and support CSS.
  - Empower stakeholders – build a sense of ownership in the project.
  - Embrace innovation.
  - Ensure that MDOT’s actions are consistent with its words.

3.4. Traffic Engineering/Safety/ITS

The traffic engineering/safety/ITS skill set defined the group’s assumptions before offering their recommendations:

- MDOT is focused on accelerated construction techniques.
- Consider closure during construction.
- MDOT will phase construction, with a minimum of three phases and three to six years for construction.
- The continuous service drive will not be available for use.
- Local roads may be designated as alternate routes.

ITS

Preconstruction

- Improve ITS on all non-freeway systems.
- Install permanent changeable message signs at major decision points.
- Evaluate the use of probe data for travel times.
- Coordinate ITS with Ontario, Ohio, the Detroit International Bridge Company (DIBC), other MDOT regions, etc.

During Construction

- Set up temporary work zone ITS.
  - Track and report alternate route travel times.
  - Provide queue detection and warning at key locations.
  - Supplement the permanent system.
  - Integrate video and data into the permanent system.

Traffic Operations

Preconstruction

- Retime the signals on the alternate routes.
- Make safety/capacity improvements on alternate routes.
- Provide signal priority for public transit.
- Conduct an extensive public information campaign.

During Construction

- Monitor and evaluate alternate routes.
- Coordinate special events.
- Maintain continuous communication with media outlets.

Access Management

Preconstruction

- Work with the City of Detroit and local businesses to control access along alternate trunk line routes and service drives.
- Work with stakeholders to ensure access to businesses and institutions.

During Construction

- Use barrels/barriers to limit the number of local access driveways to the service drive.

Incident Management

Preconstruction and During Construction

- Establish a traffic incident management task force (IMTF) during the design phase.
  - Identify geometric requirements for incident management.
  - Push quick clearance legislation and technologies.
- Solicit input by emergency service stakeholders during the design and construction processes.

- Expand the freeway courtesy patrol for the life of the project.
- Identify field equipment and other incident management resources needed for the construction zones.

Travel Demand Management (TDM)

Preconstruction

- Use model information to develop detour routes/construction staging.
- Work with businesses to promote telecommuting and alternate work hours.
- Explore the use of incentives for public transportation.

During Construction

- Establish a traffic management coordinator.

Transit and Other Modes of Transportation

Preconstruction

- Identify alternate bus routes.
- Establish Ann Arbor to Detroit rail.
- Coordinate with the Detroit Department of Transportation (DDOT) and Suburban Mobility Authority for Regional Transportation (SMART).
- Work with the private sector on vanpooling during construction.

During Construction

- Provide signal priority for public transit.
- Use established vanpooling.

Work Zone Mobility

Preconstruction

- Utilize process improvement intervention during the design phase to test and modify different traffic schemes.
- Implement recommendations of the IMTF.
- Update emergency response plans and routes.

During Construction

- Maintain operations on alternate and detour routes.
- Hold bi-weekly incident management review meetings.

3.5. Innovative Construction Contracting and Financing

The innovative construction contracting and financing team discussed the State's funding situation before exploring innovative financing options for the project:

- MDOT's current annual road and bridge program is $1.3 billion.
- The cost for the I-94 project is estimated to be $1.2 billion in 2004 dollars.
- The I-94 project is one of several high-cost projects in the planning phase.
- State/Federal dollars are inadequate to meet condition goals.

Design-Bid-Build

- Offers a traditional contracting method.
- Provides a pay-as-you-go process.
- Allows MDOT to contract design and construction separately.
- Can award one or multiple construction contracts separately, concurrently or over time.
- Make the selection based on low bid.
- Use MDOT's capital.

A-plus-B-plus-C Contracting

- Offers a traditional contracting method (A-plus-B).
- Rely on contractor to provide bid for cost and schedule.
- Make the selection based on low bid.
- Can include performance options pertaining to traffic capacity, safety during construction and/or the present value of maintenance costs.
- Use MDOT's capital.

D-B

- Let one contract for design and construction.
- Can utilize one or more D-B contract(s).
- Make selection based on best value.
- Use MDOT's capital.

Design-Bid-Build-Operate-Maintain

- Is similar to D-B.
- Make contractor responsible for long-term maintenance and/or operations.
- Shifts responsibility of maintenance to contractor.
- Make selection based on best value.
- Use MDOT's capital.
- Define contract specifics and ongoing performance requirements in the request for proposals (RFPs).

Public-Private Partnerships (PPP)

- Seek private capital investment in exchange for future revenue.
- Contract between public and private entities to lessen the public entity's involvement.
  - Shifts the risk for future profit from the public entity to the private entity.
- Secure a long-term lease agreement.
- Make selection based on best value.
- Use the private vendors' capital.

Innovative Construction Contracting and Financing

- Consider the following options:
  - Existing revenues, i.e., State user fees, Federal revenue (advanced construction), bonds/notes, local matches, economic development funds.
  - Grant Anticipation Revenue Vehicle (GARVEE) Bonds.
    - Utilize to leverage Federal-aid.
    - Pay bond debt with future Federal dollars.
  - Revenue bonds.
    - Pay bond debt with future State dollars.
  - Private Activity Bonds (PABs) – private entities utilizing tax exempt bonds.
    - Must be Title 23 eligible.
    - Note: The current Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) authorization is for $15 billion.
  - Transportation Infrastructure Finance Innovation Act (TIFIA) financing, a USDOT financing program.
    - Can use for both public and private entities.
    - Finance one-third of the project cost with a subordinate lien position. This results in a lower interest rate for the primary loan.
    - Provides a new source of revenue.
    - Pay back over 35 years, with first payment due in 5 years.
  - Tolling.
    - Have user pay for the concept.
    - Creates a revenue stream.
    - Is applicable with added capacity or congestion pricing.
    - Consider pilot program with FHWA to toll for rehabilitation of existing Interstates.
    - Consider a pilot program with FHWA for an express lane demonstration program.
  - State Infrastructure Bank (SIB), Rail Infrastructure Bank (RIB) or Section 129 loans.

Non-user Revenues

- Utilize economic development funds.
- Consider local option taxes.
- Work with regional authorities.

Financial Plan

- Develop a financial plan that is a working document. It needs to be updated as the project changes.
- Note that this plan is subject to FHWA approval.

Final Recommendations

- Change State law.
- Conduct a toll feasibility study.
- Consider private participation.
- Increase user fees.
- Tap non-user revenues.
- Consider a single D-B contract.
  - Provides access to innovation.
  - Offers single-point coordination.
  - Advances the project schedule.

3.6. Utilities/Railroad Coordination

The utilities/railroad coordination crew offered the following recommendations:

Utilities Coordinator

- Designate a full-time MDOT utilities coordinator to oversee all aspects of utility coordination, communication and cooperation during design and construction.
- Will act as “go to” person for MDOT, utilities and vendors.

SUE

- Update current SUE data.
- Have SUE provider available during design and construction.
- Utilize SUE deliverables effectively with stakeholders.
- Utilize SUE to expedite conflict resolution.

Municipal Utility Issues

- Establish early and frequent communication with municipal utilities.
- Identify potential “show stoppers” early on.
- Identify all relocation work and proposed work.
- Coordinate with stakeholders.

Public/Private Utility Issues

- Establish early and frequent communication with public/private utilities.
- Identify potential “show stoppers” early on.
- Identify all relocation work and proposed work.
- Identify reimbursable relocations.
- Consider advance utility relocations.
- Coordinate with stakeholders.
- Participate in preliminary engineering costs for public/private utilities.
  - Provides incentive to public/private utilities to cooperate in a timely manner.
  - Increases cooperation during design phase.

Railroads

- Form a steering committee consisting of officials from MDOT and the railroads.
  - Give the committee the authority to make high-level decisions.
  - Expedite railroad decision-making, i.e., trackage rights, union work rules, etc.
- Form a design engineering committee.
  - Establish early and frequent communication with railroads.
  - Identify design constraints early on.
  - Identify potential “show stoppers” early on.
- Provide adequate time in the MDOT process for railroad coordination.
  - Need a two-year minimum coordination time. Coordination time begins with MDOT’s submittal of preliminary plans to the railroad.
- Contract with qualified vendor to perform railroad coordination.
  - Ensure that vendor is knowledgeable in railroad operations and effective in obtaining railroad approvals.
  - Involve MDOT railroad experts in vendor selection process.

At-grade Crossings

- Coordinate at-grade crossings with service roads.
- Hold the diagnostic team review meeting well in advance of construction, if required.

Maintenance of Railroad Traffic

- Establish early and frequent communication with railroad.
- Construct temporary runaround/“shoo-fly” tracks.
- Consider part-width bridge construction.
- Roll in/lift in the superstructure.
- Build the new (permanent) bridges parallel to the existing railroad structures.
- Establish trackage rights agreements between the railroads during construction.
- Consider eliminating two railroad structures over I-75. This will require the railroad’s approval.

3.7. Roadway/Geometric Design

The roadway/geometric design group reviewed the VE study completed in May 2004 and concluded that the proposals presented are valid design items, noting that they do not appear to accelerate construction or significantly reduce costs. The team then offered the following recommendations:

Freeway-to-Freeway Interchanges

- Establish the design speed of the reconstructed freeway.
- Consider a posted speed limit increase to 70 mph with a design speed of 75 mph.
  - Note that a design speed of 75 mph was not used to complete the preliminary engineering work. This may impact proposed design and ROW requirements.
- Incorporate the new geometric design guides that are awaiting approval. (The design is based on the old design guides.) This may increase the ROW footprint of each interchange.
- Maintain lane configurations and traveling speeds along the ramps within the interchanges. This will reduce broken back curves and unexpected lane drops.
  - Ensure that ramp speeds adhere to current AASHTO policy.
  - Note that this may increase the ROW footprint of each interchange.

Balancing Access versus Operation

- Re-examine the proposed access points (entrance and exit ramps) to address I-94 capacity and operational issues. Changes to the current design may re-open the ROD.

Balancing Geometrics, Safety and Access

- Review the proposed geometry at the Packard curve and other constrained locations.

- Avoid design exceptions.
- Maintain continuous pedestrian access (sidewalks) along the service drives, through the M-10 and I-75 interchanges and over the Dequindre Yards area.
  - Note: Americans with Disabilities Act (ADA) standards and Non-Motorized Guidelines will have to be followed, which may have impacts throughout the corridor.

Items Outside of Listed Goals

- Consider cantilevering the service drives over the mainline to minimize ROW needs, costs and community impacts. Since there are soil stability concerns, further study is recommended.
- Use retaining walls versus 1:3 slopes.
  - Needs to be investigated due to ROW, constructability and soil stability concerns.
- Address drainage issues by keeping the construction site dry.
- Evaluate whether the proposed design should consider a longer planning and operational horizon.
- Name the resident engineer early. He or she needs to provide input on constructability issues during design.

3.8. Geotechnical Engineering/Accelerated Materials Testing

The geotechnical engineering/accelerated materials testing skill set discussed the strength of the clay and the potential instability of various slopes along I-94 before offering their recommendations:

Stability Approaches

- Reduce the depth of the excavation. Consider a slender bridge beam.
- Acquire the ROW needed for flatter slopes and raised structures.
- Utilize mitigation measures to prevent instability, such as:
  - Geofoam/lightweight fill.
  - Ground improvements.
  - Tie backs/soil nails.
  - Internal bracing at the railroads.
  - Chemical stabilization of the subgrade.

Slopes

- Use slopes instead of retaining walls where possible.
- Flatten slopes, i.e., 1:3.

Retaining Walls

- Provide mitigation as necessary to ensure adequate stability.
- Consider the following wall concepts:
  - Concrete cantilever.
  - Mechanically stabilized earth (MSE).
  - Soil nail.
  - Tieback.

Other Recommendations

- Retain a local geotechnical consultant.
- Review existing subsurface information.
- Perform a feasibility study of the project retaining walls/slopes.
- Conduct an early stability analysis to size the wall and mitigation components.

4.1. Next Steps

Now that the workshop is complete, MDOT is evaluating the recommendations to determine which items will be implemented as part of the I-96 to Conner Avenue, Detroit, Michigan, project.

As this report shows, local and National transportation experts came together to brainstorm innovative techniques for financing and delivering a much-needed project on a major urban corridor. 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
AB	Aggregate Base
ACC	Acid Copper Chromate
ACTT	Accelerated Construction Technology Transfer
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AEP	American Electric Power
AGC	Associated General Contractors of America
ASCE	American Society of Civil Engineers
ASR	Alkali-Silica Reaction
ATB	Asphalt-Treated Base
ATCs	Alternative Technical Concepts
ATMS	Advanced Traffic Management System
BANs	Bond Anticipation Notes
BIMRS	Bridge Incident Management and Response System
BMPs	Best Management Practices
CAD	Computer-Aided Design
CB	Citizen Band
CCTV	Closed Circuit Television
C-D	Collector-Distributor
CDC	Community Development Center
CE	Categorical Exclusion
CIP	Cast-in-Place
CM at Risk	Construction Manager at Risk
CMAQ	Congestion Mitigation and Air Quality
CMP	Congestion Mitigation Plan
CPI	Consumer Price Index
CPM	Critical Path Method
CRC/CRCP	Continuously Reinforced Concrete Pavement
CSO	Combined Sewer Overflow
CSS	Context Sensitive Solutions
CTB	Cement-Treated Base
D-B	Design-Build
D-B-B	Design-Bid-Build
DBE	Disadvantaged Business Enterprise

DDOT	Detroit Department of Transportation
DEIS	Draft Environmental Impact Statement
DIBC	Detroit International Bridge Company
DIE	Detroit Industrial Expressway
DMS	Dynamic Message Sign
DOT	Department of Transportation
DRB	Dispute Review Board
EA	Environmental Assessment
EJ	Environmental Justice
EMS	Emergency Management System
EPS	Expanded Polystyrene
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEIS	Final Environmental Impact Statement
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
FMS	Freeway Management System
FONSI	Finding of No Significant Impacts
FRP	Fiber Reinforced Polymer
GARVEE	Grant Anticipation Revenue Vehicle
GIS	Geographic Information System
GISIGOSO	Get In, Stay In, Get Out, Stay Out
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
ICC	Interagency Coordination Committee
IM	Incident Management
IMTF	Incident Management Task Force
IT/ITS	Intelligent Transportation/Intelligent Transportation Systems

JPCP	Jointed Plain Concrete Pavement
LOS	Level of Service
MDOT	Michigan Department of Transportation
MIS	Major Investment Study
MOA	Memorandum of Agreement
MOT	Maintenance of Traffic
MOU	Memorandum of Understanding
MPH	Miles per Hour
MPO	Metropolitan Planning Organization
MSE	Mechanically Stabilized Earth
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
PS&E	Plan Specification & Estimate
PSI	Pounds per Square Inch
QA/QC	Quality Assurance/Quality Control
RAP	Reclaimed Asphalt Pavements
RFP	Request for Proposal
RFQ	Request for Qualifications
RIB	Rail Infrastructure Bank
ROD	Record of Decision
ROW	Right-of-Way
RPMs	Raised Pavement Markers/Markings
RSCH	Repeated Shear at Constant Height
RSS	Reinforced Soil Slopes
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
SH	State Highway
SIB	State Infrastructure Bank
SIP	State Implementation Plan
SIP Forms	Stay-in-place Forms
SMA	Stone Matrix Asphalt
SMART	Suburban Mobility Authority for Regional Transportation
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
TMC	Traffic Management Center
TMP	Traffic Management Plan
TRAC	Transportation Review Advisory Committee
TRB	Transportation Research Board
TS&L	Type, Size & Location
TSA	Transportation Security Administration
TSM	Transportation System Management
TSP	Thrift Savings Plan
VE	Value Engineering
VMS	Variable Message Sign
VPD	Vehicles per Day
VPPP	Value Pricing Pilot Program
WiFi	Wireless Fidelity
WSU	Wayne State University

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SKILLS SET RECORDING FORMS

- **Innovative Construction**
- **Structures**
- **Public Relations/CSS**
- **Traffic Engineering/Safety/ITS**
- **Innovative Construction Contracting and Financing**
- **Utilities/Railroad Coordination**
- **Roadway/Geometric Design**
- **Geotechnical Engineering/Accelerated Materials Testing**

APPENDIX C.

Innovative Construction Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Service drives	Build service drives first and maintain traffic on them while shutting down the freeway. Revise access to the plant to be from one end or the other rather than in the center of the bridges. Stage construction so these bridges aren't under construction at the same time. While working on freeway, stage the closures or close the whole length of the project at the same time. May want to establish segments from one interchange to another.	May need to keep some areas open to maintain access. Consider incentives for having them open at specific times. Plant access will be important – should get traffic counts. Is Harper Road a main access to the plant? (GM Poletown) Funding will be a barrier to constructing the entire freeway at once. Availability of materials may be an issue.
Staging areas	Identify staging areas ahead of time. There may be parcels available along the route that can be provided ahead of time – purchase burned-out/condemned buildings. May be best to have contractor responsible for this so they can negotiate details.	Is not MDOT's standard practice.
Detour routes	Need to be aware of future projects. Don't have other major construction underway at the same time. Close down segments; this will improve the safety of workers and motorists. Use a network simulation model to evaluate possible scenarios.	

Innovative Construction Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Evacuation routes	Ensure that stakeholders like the GM plant have evacuation routes available throughout construction. Need evacuation routes for emergency vehicles as well.	
D-B	Consider D-B.	Have negative past experience.
Vertical clearance	Improve vertical clearance and meet minimum requirements. Improve storm sewer to a state-of-the-art system. Consider low-impact development of the drainage system. Utilize precast deck panels. Use high-stress concrete or other similar materials to reduce beam size.	Need to lower grade of existing freeway in plans.
No design exceptions	Set a goal of no design exceptions. This includes acceleration and deceleration ramps and vertical clearances.	
Innovative materials/techniques	Utilize innovative materials or techniques to minimize construction time, i.e., lay 12 inches of concrete and put asphalt over it immediately. The long-term maintenance will be on the asphalt. Asphalt can also be quieter than concrete. Make contractor responsible for all testing. Automate material certification submittals to speed up construction. Use high early-strength concrete to accelerate opening the roadway to traffic. Utilize precast items as much as possible. Consider CRCP. Consider fiber reinforced polymer (FRP) for low-volume structures.	Need to perform life-cycle cost analysis. State law is a constraint for pavement material.

Innovative Construction Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Sound barrier	If sound barrier is to be built, will affect design of retaining wall.	
Accelerated work schedules	Use incentives.	May cause worker burn-out, reduced work quality and/or higher accident rates. Capability and availability of contractors/workforce is a concern, as is availability of materials.
Demolition	Saw-cut and remove large panels of the structures at one time, and haul away in large pieces. Reduces impact of noise, etc. Demolish entire bridge at one time; close it to traffic, and knock it down overnight.	Address noise concerns. Large volumes of concrete will need to be disposed of or recycled.
Staging	Must accommodate delays in the overall project. Must have a contingency plan. If funding is not available for the next phase, need to be able to accommodate that without large disruptions. Identify and have a plan to take care of contaminated soil and hazardous material so it's not being disputed during construction. Develop a staging plan for the bridges – may want to rebuild the important ones first and use them to maintain traffic.	
Advance contracts	Consider doing portions of the work ahead of time, i.e., the railroad bridges. Make the contractor responsible for paying the railroad. Determine if the trains can use an alternate route for part of the time.	

Innovative Construction Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Utility issues	Address all utility issues ahead of time, including railroads. Use test pits throughout the project area to make sure the DOT knows know what's there and where.	
Partnering ahead of time	Develop agreements with the contractor. Conduct constructability reviews, etc., with the contractor's input. Use contractors who are not likely to bid on the project; consider paying them to participate.	
Advancing purchasing	Purchase items with long lead times in advance, i.e., tower lighting, beams, etc. Spell this out in the project specifications.	
Bridges	Build bridges first, then pavement.	
Incentives	Provide incentives for early completion. If using A-plus-B, lane rentals and/or incentives, make sure the amounts are sufficient to have an impact on the contractor.	
Escalating costs	Provide for cost escalation in contract specifications.	

Innovative Construction Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
"Bridge Buck"	Pay motorists to use other modes of transportation – FHWA will participate in the cost. Provide shuttles for people to park and use the shuttle. Need to locate space for a Park and Ride lot. Hire a PR company to advertise the program. Promote use by comparing project duration under complete closures vs. maintaining traffic for the life of the project. (Note: Cross roads will have to be maintained at some level.) Can't do this with trucks supplying GM plant. Also need to consider special events.	
Reversible lanes	Utilize reversible lanes during peak periods.	Not enough lane width; already over capacity. Look at the difficulty of reversing lanes twice per day.
Winter work	Optimize staging to do some winter work such as demolition, excavation, etc.	
Wayne County winter maintenance	Work with Wayne County to revise winter maintenance plans – they are a maintenance county, and routes, patterns, supply areas, etc., may change. Location of maintenance facilities may need to be closer during construction. Make the contractor responsible for winter (and other) maintenance of any open lanes in order to eliminate coordination issues between the contractor and Wayne County. Need to consider purchase of materials – MDOT prices are probably better due to quantity purchases.	

Innovative Construction Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Environmental permits	Ensure all permits are in place prior to construction, i.e., local agency, DEQ, etc.	
Alternative materials contract	Consider an alternative materials contract; is low cost and requires the least time.	
Community involvement	Get the community involved. Hire local people to help with security. Set up a business office in the area to recruit workers/provide ownership of the project. Address environmental justice (EJ) issues.	

Structures Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Shallow structure types	Consider shallow structure types, such as: ❖ Channel bridge. ❖ Cable-stayed bridge with slab superstructure. ❖ Tied-arch bridge with slab superstructure. ❖ Conventional beam bridge with integral supports. ❖ Segmental voided slab.	**Advantages:** Minimizes lowering of I-94 profile, raising cross street grades. Provides opportunity to replace structures in poor condition prior to main construction. Provides opportunity for improved aesthetics. Deck can be post-tensioned in two directions. **Disadvantages:** Has higher initial cost than conventional bridge construction. There's a lack of local contractor experience. Deck isn't replaceable (needs overlay). Can't widen the bridge.
Prefabrication	Consider a segmental concrete superstructure. Precast the piers, abutments, deck panels and bridge barrier. Consider temporary bridges, i.e., Bailey/ Acrow.	**Advantages:** Speeds up construction. Eliminates falsework. Has no seasonal limitations. Improves quality control and worker/driver safety; there's less on-site activity. Has less impact on traffic and the environment. **Disadvantages:** May be an issue with fabrication availability. Need to establish a casting yard. Increases construction oversight. Requires specialized expertise and specialized testing/monitoring post-construction.

Structures Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
High-performance materials	Consider using polymer asphalt, HPC, HPS, SCC, high-strength concrete and/or initial overlays.	***Polymer Asphalt*** **Advantages:** Acts as a water barrier. Is similar to asphalt construction. Provides a cost advantage over concrete overlays. Speeds construction. **Disadvantages:** Has a limited performance history. Is more expensive than traditional asphalt. ***HPC*** **Advantages:** Has increased durability and decreased permeability. Improves the life-cycle cost for the roadway. **Disadvantages:** Has a higher initial cost. May be issues with manufacturer familiarity. Requires additional quality control. ***HPS*** **Advantages:** Is a more economical design. Improves fatigue performance. **Disadvantages:** May be an issue with availability. Provides thinner, less robust sections with a higher potential for corrosion. ***SCC*** **Advantages:** Eliminates vibration requirements. Saves on labor. Is good for rebar congestion areas and for drilled shafts. **Disadvantages:** Has a higher initial cost. May encounter a lack of local experience. Requires non-standard testing. ***High-strength Concrete*** **Advantages:** Provides a more efficient design and a thinner superstructure. **Disadvantages:** Has a higher initial cost. Will likely encounter a lack of local experience. Requires non-standard testing. ***Initial Overlays (Concrete)*** **Advantages:** Improves long-term performance. **Disadvantages:** Has a higher initial cost and a longer cure time.

Structures Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Retaining Walls	Remove retaining walls. Purchase additional ROW. Lay the slope back at 3:1. Install soldier pile, soil nailed or secant walls.	***Remove Retaining Walls*** **Advantages:** Increases soil stability, slope implementation and aesthetics. Provides a potential cost savings. Provides CSS opportunities. **Disadvantages:** Requires additional maintenance. Need to redo Environmental Impact Statement (EIS), purchase ROW and expand service drives. ***Soldier Pile, Soil Nailed or Secant Walls*** **Advantages:** Costs less. Reduces excessive excavation. Improves soil stability. **Disadvantages:** Requires specialized equipment.
Service drive expansion	Expand the service drive over the slope near the WSU parking garage.	**Advantages:** Saves on ROW and improves accessibility to campus parking. **Disadvantages:** Requires more maintenance. Change in design and construction is significant. May be vertical clearance issues.
Interchange foundations	Consider single/mono shaft, large diameter closed in steel pipe pile and/or post grouted shaft.	**Advantages:** Eliminates large footing (smaller footprint). Improves maintenance of traffic (MOT). Decreases noise and vibration. Speeds construction – faster than conventional footings on piles. **Disadvantages:** Requires special equipment. Provides less redundancy. Need to mitigate environmental hazards.

Structures Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Railway crossings	Construct temporary railroad bridges as necessary. Diverge rail traffic onto one bridge in areas with multiple tracks. Roll in a prefabricated bridge over short closure period. Use an edge girder floor beam system.	**Advantages:** Limits the impact to rail operations and provides construction savings. Using an edge girder floor beam system reduces the structure depth. **Disadvantages:** May require increased prep work on abutments while the rail track is still in service.
Interchange construction staging	Build the interchanges first and shift over. Utilize temporary structures to move traffic. Sequence construction for the whole interchange.	**Advantages:** Minimizes impacts and maintains mobility. **Disadvantages:** May have higher costs and extends the construction timeframe.
Advance contracts	Identify the bridges that are candidates for early construction/replacement due to poor condition. Allow advance relocation of utilities.	**Advantages:** Reconstructs the bridges in poor condition prior to construction on the mainline. May not be adequate contractor/DOT experience with unique superstructure thickness. Removes structures and utilities from the critical path. **Disadvantages:** Need temporary tie-ins to existing interchanges and service drives.
Erection methods	Consider SPMTs, roll in, high capacity cranes and/or erection gantry.	**Advantages:** Provides for quicker erection. Can also be used for demolition. **Disadvantages:** Costs more. Requires significant staging and access areas.
Minimizing future maintenance	Design to minimize future maintenance. Eliminate expansion joints and minimize the number of bearings. Design for continuity.	**Advantages:** Improves durability.

Public Relations/CSS Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Identify	Identify the following: ❖ Funding needed to complete phased implementation. ❖ Key messages. ❖ Customers, stakeholders and partners. ❖ Changing political environment. ❖ Community issues and vision. ❖ Positive branding of the project, i.e., *"Getting more with I-94."* ❖ A holistic approach to integrated transportation and land use master planning. ❖ Economic development revitalization efforts. ❖ MDOT's commitment to policy alignment/supporting the community vision for the project. ❖ Project phases that will minimize or reduce community impacts and provide short-term benefits to stakeholders/ community. ❖ Possible conflicts within an accelerated schedule/work force/Disadvantaged Business Enterprise (DBE). ❖ Challenges associated with the D-B option and the CSS process. ❖ What is non-negotiable and why.	**Implementation Details:** ❖ Validate the current list of customers, stakeholders and partners. ❖ Validate the current data on community issues and vision and respond to any new issues. ❖ Promote construction workforce development. ❖ Develop a broad understanding of the best practices and tools for public participation. Resource: International Association of Public Participation. ❖ Develop ideas for possible slogans. ❖ Define the purpose and need for project, i.e., short- and long-term benefits. **Barriers:** ❖ Customers, stakeholders and partner representatives have changed. ❖ Public is dissatisfied with the lack of progress ("crying wolf" syndrome). ❖ Financial resources are lacking. **Skill Sets Involved:** ❖ Public Relations/CSS. ❖ Innovative Construction. ❖ Innovative Contracting and Financing. ❖ Geometrics/Design.

Public Relations/CSS Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Inform	❖ Communicate the vision from prior project studies and workshops. ❖ Communicate key messages for each phase of the project to the media and others. ❖ Establish a project information office. ❖ Put a "face" on the project. ❖ Create traffic mitigation, emergency response, incident management and crisis communication plans with project partners.	**Implementation Details:** ❖ Create a marketing and communications outreach plan for each phase of the project. ❖ Create a communications toolbox (website, project hotline, printed materials, etc.). ❖ Don't over-promise in order to move in a positive direction. ❖ Dedicate an ombudsman for the project; may not be the project manager. **Barriers:** ❖ Project managers come and go; need to re-establish partners and repair/build relationships each time there's a change. ❖ Internal communication "fell off" following the EIS. ❖ There's a lack of continuity and access to project information. **Skill Sets Involved:** ❖ Public Relations/CSS. ❖ Traffic Engineering/Safety/ITS.

Public Relations/CSS Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Involve	❖ Establish trust, commitment, continuity and partnership within the community. This includes local agencies, the business community, local service providers, educational institutions, community organizations and the media. ❖ Connect and empower the community; create a sense of ownership in the project. ❖ Develop internal policy alignment. ❖ Maintain a meaningful CSS process.	**Implementation Details:** ❖ Create and implement a comprehensive public participation plan by phase. ❖ Facilitate actions to address neighborhood short-term needs so constituents see timely results; i.e., street rehabilitation, sewer improvements, lighting, safety and security. ❖ Re-engage neighborhoods. ❖ Promote coalition building. **Barriers:** ❖ Neighborhoods are disenfranchised with government. ❖ There are a number of budgeting constraints/ deferred projects. **Skill Sets Involved:** ❖ Public Relations/CSS. ❖ Innovative Contracting and Financing.

Traffic Engineering/Safety/ITS Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
ITS	Utilize temporary work zone ITS during construction. Consider standalone as an option (JAM LOGIC). Integrate as possible. Measure delay time in the work zone. Provide travel time information for other routes. Utilize for incident management. Install new permanent message boards at major decision points west and south of this project. (Key decision points need to consider Canada, Ohio and the Bridge Company.) Tie to satellite radio; the State has signs posted with this information. If any detour routes include non-freeways, will need information on those roadways. Implement wireless technology as much as possible. Investigate probe vehicle data collection options. Consider a dynamic merge system and queue detection warning.	Begin coordination discussions with the Ministry of Transportation in Ontario, the Ohio DOT, the Bridge Company and Detroit. Design and install permanent changeable message signs at key decision points for the corridor prior to beginning construction. Implement traffic signal system communications along signalized corridors. Evaluate the viability of system-wide probe vehicle data collection methodologies. Develop plans for temporary ITS deployment specific to construction activities.
Detour routes	Develop detours on non-freeway routes. Determine if there's adequate width to provide two-way traffic. Sign detour routes for non-locals. Coordinate with construction staging.	Consider non-trunkline roadways for detour and alternate routes. Will require additional funding and possible agreements, i.e., East Grand Boulevard.
Congestion mitigation	Utilize TDM. Look at different modes for mobility. Coordinate with SMART and DDOT. Run busses on shoulders. Need to review bus routes. Provide money for adding runs and routes. Implement Ann Arbor to Detroit rail system. Promote private van pools.	Request work centers to stagger hours. Educate the public on minimizing the demand on the system by reducing the volumes. Take people off the network.

Traffic Engineering/Safety/ITS Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Contractor/motorist safety	Provide the contractor with one side of the roadway. Use concrete barrier separations and intrusion detection. Coordinate with construction staging.	
Accessibility	Use temporary barriers to block local access/ maintain traffic flow on the service drives during construction. Work on access management with major employers/traffic generators.	Evaluate the potential to implement temporary barriers/access management. Determine if it's realistic to transition to permanent measures.
Work zone mobility	Work on process improvement and intervention – modify and test different traffic schemes on demand/before implementation. Establish one contact for traffic management. Maintain operations on detour routes. If there's no full closure, have the State police in the work zone at all times, add screening to prevent rubber-necking, and designate one lane for HOV/HOT and emergency vehicles. Require the contractor to maintain mobility through the work zone. Establish performance-based measurements for the contractor in the construction contract.	Improve coordination between the project manager and traffic modeling. Increase courtesy patrols – develop a special provision for on-site towing. Add these services for arterial routes and other regions. Develop turnouts or pull-off areas for incident investigation. Be sure to advertise these and educate the driving public.
Truck traffic	Work with trucking associations to incorporate their ideas. Look at fleets. Consider load restrictions on the local systems. For waste management, coordinate with peak periods.	Talk with them early and often.
Other area projects	Coordinate with other area projects and special events!	Work early and often with Cities, railroads, townships, etc. Develop a task force.

Traffic Engineering/Safety/ITS Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Lane closures	Provide access to hospital(s). Review this during the design process. Manage ramp traffic outside the project area. Coordinate with local businesses as well.	
Pedestrians	Provide extra width for emergency access on pedestrian bridges.	Coordinate and stage pedestrian bridge replacements. Maintain cross-freeway access. Consider temporary pedestrian bridges, or keep the road bridges for pedestrian access only.
Process	Provide regional coordination with the City. Conduct origin-destination studies, where from and where to. Customize alternate routes or transit based on the origin-destination studies. Establish an incident management task force during the design process to identify ideas earlier. Provide dedicated funding for the team. Develop and implement a calling tree. Address emergency access considerations. Keep the model development flexible during the design process.	
Network improvements	Construct the new service drives first. Consider alternate routes – make sure those corridors can accommodate the increase in traffic. Need to find the logical cut-off points for traffic. Remember to take the alternate routes into consideration! Coordinate with construction staging.	
Construction staging	Cross-reference with the construction staging team. Coordinate with construction staging on detour routes, safety, etc.	

Innovative Construction Contracting and Financing Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Design-bid-build	Offers a traditional contracting method. Provides a pay-as-you-go process. Allows MDOT to contract design and construction separately. Can award one or multiple construction contracts separately, concurrently or over time. Make the selection based on low bid. Use MDOT's capital.	MDOT is most experienced in this method. It has the lowest initial cost. It takes significant administrative oversight for contracting and limits innovation. Availability of funding dictates construction schedule. It has a longer timeframe, no concurrent phasing.
A-plus-B-plus-C (Cost plus schedule plus performance)	Offers a traditional contracting method (A-plus-B). Rely on contractor to provide bid for cost and schedule. Make the selection based on low bid. Can include performance options pertaining to traffic capacity, safety during construction and/or the present value of maintenance costs. Use MDOT's capital.	Gives MDOT control over the results of different construction factors. (MDOT is familiar with A-plus-B contracting.) There's no concurrent phasing. May require policy decisions; MDOT does not use A-plus-B-plus-C contracting.
D-B	Let one contract for design and construction. Can utilize one or more D-B contract(s). Make selection based on best value. Use MDOT's capital.	Consider stipends; they may encourage more better-quality proposals. D-B offers a number of advantages: it shifts project management and transfers financial risk to the design-builder. It provides flexibility for the design-builder and produces time savings due to concurrent phasing. Need to include allowances for schedule and budget for CSS/community engagement. Note that MDOT has less experience with this method and that stipends may add to the cost of the project.

Innovative Construction Contracting and Financing Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Design-build-operate-maintain	Is similar to D-B. Make the contractor responsible for long-term maintenance and/or operations. (Shifts responsibility of maintenance to contractor.) Make selection based on best value. Use MDOT's capital. Define contract specifics and ongoing performance requirements in the RFPs.	Shifts the risk to the design-builder. Encourages innovation and quality in design and construction. Requires less MDOT contract oversight. Allows for some concurrent phasing. Need to include allowances for schedule and budget for CSS/ community engagement. May require legislation and/or policy decisions. Note: MDOT has no experience with this contracting method.
PPP (concession contract)	Seek private capital investment in exchange for future revenue. Contract between public and private entities to lessen the public entity's involvement. (Shifts the risk for future profit from the public entity to the private entity.) Secure a long-term lease agreement. Make selection based on best value. Use the private vendors' capital.	Can include revenue sharing. Brings experience in innovation. Provides capital for the project. Transfers large amounts of risk to the private entity. Need to include allowances for schedule and budget for CSS/ community engagement. Will require legislation. Note: MDOT has no experience with this contracting method.

Utilities/Railroad Coordination Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
MDOT utilities coordinator	Designate a full-time MDOT utilities coordinator to oversee all aspects of utility coordination, communication and cooperation during design and construction. This person should act as the "go to" person for MDOT, the utilities and vendors.	Need experienced personnel and recognition of the benefits of the position. May need additional resources for support (vendors).
SUE	Have an SUE provider available during the design and construction phases. Update current SUE data. Utilize SUE deliverables effectively with all stakeholders. Use to expedite conflict resolution.	Address responsibility of providing data and cost concerns. Elicit cooperation from the utilities. Secure an experienced SUE provider.
Municipal utility issues	Identify and resolve municipal utility issues early. Seek early and regular communication with the municipal utilities. Identify potential "show stoppers" early on. Identify all relocation and proposed new work. Coordinate with other stakeholders.	Elicit the cooperation of the municipal utilities. Provide adequate lead time in acquiring unique materials. Maintain municipality standards. Deal with unidentified utilities.
Public-private utility issues	Identify and resolve public-private utility issues early. Seek early and regular communication with the municipal utilities. Identify potential "show stoppers" early on. Identify all relocation and proposed new work. Identify reimbursable relocations. Consider advance utility relocations. Coordinate with all stakeholders.	Address ROW concerns and relocation timeframes. Provide adequate lead time for acquiring unique materials. Deal with continuous change in utility personnel. Address design changes. Deal with unidentified utilities. Determine utilities' ability to perform relocation work with their own forces or contract employees in a timely manner.

Utilities/Railroad Coordination Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Preliminary engineering costs	Participate in preliminary engineering costs for public/private utilities. Provide an incentive to public/private utilities for cooperating in a timely manner. Seek increased cooperation during the design phase.	Make this a pilot project. Recognize incentive benefits. Address cost concerns.
Steering committee	Form a steering committee comprised of officials from MDOT and the railroads. Provide committee with the authority to make high-level decisions. Expedite railroad decision-making (i.e., trackage rights, union work rules, etc.). Improve communication between the railroads and MDOT.	Determine the availability of key railroad personnel. Evaluate the location of the railroad office in relation to the project.
Design engineering committee	Form a design engineering committee consisting of MDOT, railroad and vendor personnel. Seek early and frequent communication with the railroads. Identify design constraints and potential "show stoppers" early.	Determine the availability of key railroad personnel. Evaluate the location of the railroad office in relation to the project. Look at the communication time between the railroad and its vendor, if applicable, Seek timely railroad approval of plans and agreements.
Railroad coordination	Provide adequate time for railroad coordination in the MDOT process.	Design the railroad bridges earlier in the process to allow additional time for railroad coordination.
Vendor for railroad coordination	Contract with qualified vendor to perform railroad coordination. Must be knowledgeable in railroad operations and effective in obtaining railroad approvals. Involve MDOT railroad experts in the vendor selection process.	Evaluate cost concerns and availability of expert personnel.

Utilities/Railroad Coordination Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
At-grade crossings	Coordinate at-grade crossings with service roads. Hold a diagnostic team review meeting well in advance of construction, if required.	May take 18 to 24 months to complete work resulting from the diagnostic team review meeting. Replace all at-grade crossings on service drives with grade separation structures.
Maintenance of railroad traffic	Seek early and frequent communication with the railroads. Construct temporary runaround "shoo-fly" tracks. Consider part-width bridge construction. Roll in or lift in the superstructure. Build the new permanent bridges parallel to the existing railroad. Develop trackage rights agreements with the railroad during construction.	Note: Dealing with competing railroad, which increases the difficulty in obtaining operational agreements. Solution must be agreeable to both railroad and the State.
Elimination of two railroad structures over I-75	Consider eliminating two railroad structures over I-75. Requires railroad approval.	If approval is not obtained then existing structures will have to be replaced.

Roadway/Geometric Design Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
VE study	Believe that the proposals presented are valid design items. They do not appear to accelerate construction or significantly reduce construction costs. See Final Value Engineering Report, May 2004, for validations (5) and proposals (12).	Coordinate with Construction/Pavement, Structures, Public Relations/CSS, Traffic Engineering/Safety/ITS, Utilities/Railroad Coordination and Geotechnical/ Testing.
Freeway-to-freeway interchanges	Establish the design speed of the reconstructed freeway. Consider a posted speed limit increase to 70 mph with a design speed of 75 mph. Incorporate the new geometric design guides that are awaiting approval. (The design is based on the old design guides.) This may increase the ROW footprint of each interchange. Maintain lane configurations and traveling speeds along the ramps within the interchanges. This will reduce broken back curves and unexpected lane drops. Ensure that ramp speeds adhere to current AASHTO policy. Note that this may increase the ROW footprint of each interchange.	Note that a design speed of 75 mph was not used to complete the preliminary engineering work. This may impact proposed design and ROW requirements.
Balancing access versus operation	Re-examine the proposed access points (entrance and exit ramps) to address I-94 capacity and operational issues.	Note that changes to the current design may require the re-opening of the ROD.

Roadway/Geometric Design Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
Balancing vehicular and non-motorized geometrics, safety and access	Review the proposed geometry at the Packard curve and other constrained locations. Maintain continuous pedestrian access (sidewalks) along the service drives, through the system-to-system interchanges and over the Dequindre Yards area.	Avoid the need for design exceptions. Note that current ADA standards and Non-Motorized Guidelines will have to be followed, which may have impacts throughout the corridor.
Items outside of listed goals	Consider cantilevering the service drives over the mainline to minimize ROW needs, costs and community impacts. Use retaining walls versus 1:3 slopes. Determine whether the proposed design should consider a longer planning and operational horizon.	Note: May be an issue due to soil stability concerns. (Further study is recommended. Needs to be investigated due to ROW, constructability and soil stability issues.) Note that changes to the current design may require the re-opening of the ROD.

Geotechnical Engineering/Accelerated Materials Testing Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
GEOLOGY		
Soft ground conditions	Evaluate the soft ground conditions during preliminary engineering. The stiff surface crust is underlain by extensive deposits of soft clay.	Retain local geotechnical consultant to 1) review all existing subsurface information and supplement as necessary, and 2) perform a feasibility study of the project retaining walls/slopes. Requires early geotechnical stability analysis to size wall and mitigation components.
SLOPE		
Cut slopes	Consider replacing the retaining walls with cut slopes. Replicate the original design with 1V:3H slopes where possible. The slope will be flatter since the excavation is deeper and into softer clay.	**Advantages:** Will provide global stability, which is marginal now (no ground improvements needed). Flatter slopes will provide maintenance benefits as well as significant cost and time savings and a lower risk of construction overruns. Conventional earthwork. **Disadvantages:** Political difficulties in acquisition of ROW and potential impacts to housing.
RETAINING WALL		
Concrete cantilever	Mitigation to include one or more of the following: batter pile foundations, lightweight fill (geofoam/lightweight slag) and/or deep ground improvement.	**Advantages:** Is a relatively conventional wall. Should be able to use slag for lightweight fill. **Disadvantages:** Requires larger excavation, more ROW and disposal of material. There's potential for contaminated soils. Need to relocate utilities – may not be feasible. Is a slower form of construction because of concrete forming. Requires specialty contractor for deep soil mixing.

Geotechnical Engineering/Accelerated Materials Testing Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
MSE	Mitigation to include one or more of the following: deep ground improvement and/or lightweight fill (geofoam/lightweight slag).	**Advantages:** Provides quick wall construction. Is a relatively conventional wall. Should be able to use slag for lightweight fill. **Disadvantages:** Requires larger excavation, more ROW and disposal of material. There's potential for contaminated soils. Need to relocate utilities – may not be feasible. Requires specialty contractor for deep soil mixing.
Soil nail wall	Mitigation to include an in-place buttress by deep soil mixing followed by top-down soil nail wall construction.	**Advantages:** Needs minimal excavation. Would be little utility disturbance. Can use service drive ROW for soil nails. **Disadvantages:** Requires specialty contractor for deep soil mixing and soil nailing. Utility relocation is in wall prism.
Tie back	Mitigation may require in-place buttress by deep soil mixing followed by top-down tie back wall construction.	**Advantages:** Needs minimal excavation. Would be little utility disturbance. Can use service drive ROW for soil nails. Might provide global stability. **Disadvantages:** May need easements if the tie backs are long. Requires specialty contractor for deep soil mixing and soil nailing. Utility relocation is in wall prism.
DRAINAGE		
Sub-drainage systems	Need drainage systems in pavement sections, behind retaining walls and in cut slopes.	**Advantages:** Can replicate existing designs. **Disadvantages:** May require a lower outlet and excavation into softer soils.

Geotechnical Engineering/Accelerated Materials Testing Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skills set coordination, etc.)
PAVEMENT		
Subgrade preparation	Anticipate corrective measures, either cut-and-fill or stabilization measures.	**Advantages:** Provides adequate support for the pavement and construction of pavement. **Disadvantages:** Will be excavating into softer soils, which makes stability issues more pronounced.
UTILITIES		
Protection of significant or large utilities	Consider the following techniques to minimize vibrations and movement: load distribution platform, deep soil mixing and underpinning. May need instrumentation. Design road alignment to avoid significant utilities.	
Relocation of utilities	Relocate utilities whenever feasible – this is standard practice.	

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, with several more pending in 2007.

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

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