

COLUMBUS, OHIO

ACTT

WORKSHOP

ENHANCING MOBILITY:

THE I-70/I-71 SOUTH INNERBELT CORRIDOR



U.S. Department of Transportation
Federal Highway Administration



ACTT

ACCELERATED CONSTRUCTION TECHNOLOGY TRANSFER
www.fhwa.dot.gov/construction/accelerated

WHY ACTT?

- 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:

South leg of the I-70/71 Innerbelt Corridor in Columbus, Ohio.



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In 2003, over 62,800 kilometers (39,000 miles) of highways in the United States had peak period congestion, and of these, over 10,900 kilometers (6,800 miles) were in rural areas.

Source: "Focus on Congestion: Traffic Congestion Factoids," Federal Highway Administration, U.S. Department of Transportation, <http://www.fhwa.dot.gov/congestion/factoids.htm>. Accessed March 24, 2007.

As the number of lanes miles traveled in the United States each year escalates, the issue of roadway congestion continues to gain prominence as a driving factor in transportation asset management.

This issue is of paramount importance to the Ohio Department of Transportation (ODOT) as it completes the Columbus Crossroads – I-70/I-71 South Innerbelt Corridor Study.

The I-70/I-71 South Innerbelt Corridor in downtown Columbus, known locally as the "downtown split," is one of the busiest and most vital sections of highway in the region. Built in the 1960s, the roadway lacks the capacity for the 170,000 vehicles that traverse it daily; hourly traffic volume trends indicate that the number of vehicles on the freeway system peaks at around 7 a.m. and continues at near peak volume until 7 p.m.

Knowing this, ODOT approached the Federal Highway Administration (FHWA) about hosting an Accelerated Construction Technology Transfer (ACTT) workshop for the I-70/I-71 South Innerbelt Corridor. A key goal is to find innovative funding solutions for the \$850 million project.

Together, the planning team identified the following skill sets for the I-70/I-71 South Innerbelt Corridor workshop:

- ◆ Construction/Maintenance of Traffic (MOT).
- ◆ Innovative Contracting and Financing.
- ◆ Traffic Engineering/Intelligent Transportation Systems (ITS).
- ◆ Structures (Major Bridges).
- ◆ Retaining Walls/Geotech.
- ◆ Roadway/Geometric Design.
- ◆ Right-of-Way (ROW)/Utilities/Railroad Coordination.
- ◆ Environmental.

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 ODOT achieve its goal of delivering a major rehabilitation project to the public beginning in 2010.

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

1.1. Opening Session

The Columbus Crossroads – I-70/I-71 South Innerbelt Corridor Study ACTT workshop took place January 9-11, 2007, at the Marriott North Columbus Hotel in Columbus, Ohio.

The workshop opened with remarks from ODOT Value Engineering (VE)/ACTT Coordinator Jeanne Braxton, followed by comments from FHWA ACTT Coordinator/Workshop Moderator Jerry Blanding. FHWA Ohio Division Assistant Administrator Patrick Bauer, ODOT District 6 Deputy Director Jack Marchbanks and Director of Public Service, City of Columbus Henry Guzman each shared their vision for the workshop. Following that, the participants introduced themselves. The day ended with an orientation to the project and introductions amongst skill set members.

1.2. Workshop Process

The ODOT 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.

Discussions continued during lunch, with attendees sharing some of their brainstorming ideas and other issues regarding the project. After lunch, the skill sets continued their work, intermingling with other teams to ask questions and share ideas. (The synergy created during these discussions is the heart of the process.) The teams spent the remainder of the afternoon preparing final recommendations for presentation to the group on Thursday morning.

1.3. Skill Set Goals

The project management team established the following goals for the Columbus Crossroads workshop:

- ◆ Sequence the work to minimize traffic and utility disruption.
- ◆ Provide practical schemes for traffic diversion.
- ◆ Reduce or control noise impacts during and after construction.
- ◆ Provide better connections across the freeway for vehicles and pedestrians.
- ◆ Maintain or improve emergency services response times during and after construction.
- ◆ Provide structure and retaining wall options that work within ROW and utility constraints.
- ◆ Refine horizontal and vertical geometry to simplify construction while still avoiding sensitive sites.

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

Construction/MOT

- ◆ Identify viable sequencing and packaging options.
- ◆ Refine possible innovations to accelerate construction.

Innovative Contracting and Financing

- ◆ Consider innovative financing methods, including project packaging, that will enable ODOT to accelerate construction.

Traffic Engineering/ITS

- ◆ Identify risk areas.
- ◆ Identify options to minimize disruption times in a cost-effective manner.
- ◆ Identify appropriate technologies and methodologies to be considered.

Structures (Major Bridges)

- ◆ Review structure selection, cut/fill, drainage and future cap options.
- ◆ Assess constructability of proposed design.

Retaining Walls/Geotech

- ◆ Recommend the type of retaining walls most appropriate to the project corridor.
- ◆ Address project drainage issues.
- ◆ Ensure subgrade stabilization.

Roadway/Geometric Design

- ◆ Shift/move ramps to avoid Africentric School property.
- ◆ Improve access at Miranova.
- ◆ Reduce visual and noise impacts.
- ◆ Suggest alternatives to the proposed scissor intersection configuration, i.e., Parsons/Town Streets.
- ◆ Resolve geometric conflicts within the I-670/I-71 interchange.

ROW/Utilities/Railroad Coordination

- ◆ Minimize impacts to parcels and costs to the project.
- ◆ Ensure availability of accurate utility information.

Environmental

- ◆ Assess risks associated with environmental document and commitments.
- ◆ Ensure that ODOT can proceed quickly with construction and avoid pre-construction and construction-related delays due to litigation.
- ◆ Make sure appropriate documentation is provided to prove there are no feasible or prudent alternatives to avoiding sites, i.e., the Africentric School.
- ◆ Address staging area concerns.

Archival
May no longer reflect current or accepted
regulation, policy, guidance or practice.

2.1. Project Overview

The I-70/I-71 South Innerbelt Corridor in downtown Columbus, known locally as the “downtown split,” is one of the busiest and most vital sections of highway in the region. Built in the 1960s, the highway lacks the capacity to serve the 150,000 vehicles and 17,000 trucks that traverse it daily. While the project corridor makes up only six percent of the freeway system, it is the site of 27 percent of all I-70/I-71 freeway accidents occurring in Franklin County.

The corridor is bounded on the north by I-71 and Fifth Avenue; on the south by I-71 and Greenlawn Avenue; on the west by I-70 and Mound Street; and on the east by I-70 and Eighteenth Street.

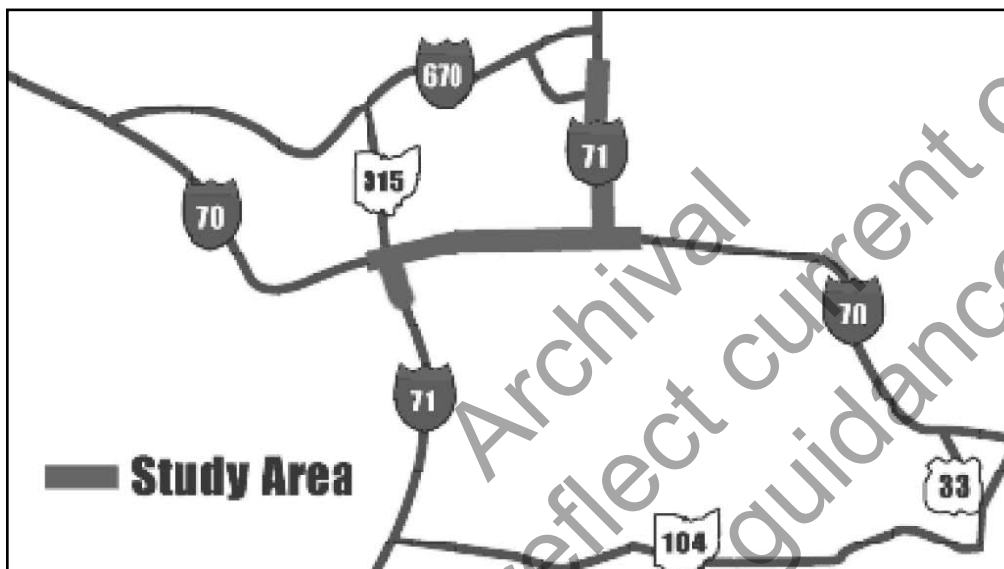


Figure 1. The Columbus Crossroads – I-70/I-71 South Innerbelt Corridor Study area.

2.2. Project History and Development

The I-70/I-71 South Innerbelt design was considered a groundbreaking solution for traffic congestion in the 1960s: it addressed the need to reduce congestion in the downtown Columbus area while adding to the Interstate system and improving regional mobility.

Like many Interstate corridors, the I-70/I-71 South Innerbelt plays host to a mix of local and through travelers. An origin and destination study conducted by ODOT from 1995 to 1997 showed that between 25 to 30 percent of daily traffic was on long-distance trips, while between 70 to 75 percent was on local or commuter trips with origins or destinations within the Columbus area. The survey also determined that 60 to 70 percent of trucks utilizing the Columbus Crossroads were on long-distance rather than local trips.

Faced with increasing traffic counts, operational deficiencies and a population that is expected to grow 36 percent by 2030, ODOT conducted a Major Investment Study (MIS). After two years of public input, the department issued a Strategic Plan Summary in 2004 that identified three possible alternatives needing additional study: a one-way pair of collector-distributor (C-D) roads; a two-way C-D road using local streets; and an urbanized freeway.

2.3. Project Purpose

Public input was key in developing the goals and objectives for the Columbus Crossroads project:

Goal I: Operational Efficiency

- ◆ Design facilities to meet or exceed design standards.
- ◆ Reduce or eliminate weaving maneuvers.
- ◆ Minimize impacts of freeway maintenance activities.
- ◆ Integrate the freeway and the arterial street system for ease of use and compatibility with the community.
- ◆ Consider cost effectiveness.
- ◆ Coordinate with other transportation studies underway and with planned infrastructure improvements, i.e., the Spring Sandusky project.

Goal II: Mobility

- ◆ Reduce congestion and improve the operation of the South Innerbelt.
- ◆ Consider public transit opportunities and other methods of improving mobility, such as Transportation System Management (TSM) and Transportation Demand Management (TDM) opportunities.
- ◆ Enhance freight/goods movement within and through the corridor.

Goal III: Accessibility

- ◆ Improve access to downtown from the Innerbelt.
- ◆ Improve the gateways to downtown.
- ◆ Develop a ramp system that provides efficient traffic flow on the freeway while maintaining the integrity of local neighborhoods.
- ◆ Provide easy access to area health facilities.

Goal IV: Safety

- ◆ Reduce accident rates and accident severity.
- ◆ Reduce truck/car conflicts.
- ◆ Provide ITS signage as needed within/around the Innerbelt Corridor for directional guidance.
- ◆ Provide for safety of police and emergency medical services vehicles.

Goal V: Environmental and Community Issues

- ◆ Coordinate with community and economic development plans and projects.
- ◆ Plan for aesthetics in the freeway design.
- ◆ Be sensitive regarding impacts to residential or institutional structures.
- ◆ Address air and noise impacts.
- ◆ Protect and enhance the natural environment.
- ◆ Adhere to Federal requirements in regards to environmental justice (EJ) in minority and low-income populations.
- ◆ Protect historic resources.

Goal VI: Constructability

- ◆ Minimize community and business disruption.
- ◆ Assure cost effective implementation during construction sequencing.
- ◆ Maintain access and current levels of service during construction.
- ◆ Provide for safe and adequate alternate routes and modes of transportation.
- ◆ Develop clear criteria for the selection of alternative routes.

Goal VII: Cost Effectiveness

- ◆ Maximize returns/benefits for capital and operating costs.
- ◆ Leverage Federal, State and local funds to meet capital needs.
- ◆ Maximize opportunities for private investment.
- ◆ Use life-cycle costing to fully account for long-term maintenance and future replacement costs.

2.4. Project Challenges

The overall operational performance of the corridor is poor due to delays, crashes and undesirable lane changing to continue on desired routes. According to 2002 traffic data, the Columbus Crossroads area carries 170,000 to 175,000 vehicles per day on a freeway system designed for 120,000 vehicles per day. The hourly traffic volume trends indicate that the number of vehicles on the freeway system peaks at around 7 a.m. and continues at near peak volume until 7 p.m.

The I-70/I-71 South Innerbelt is characterized by a number of geometric deficiencies when compared to current ODOT design standards, including 11 major curve deficiencies. These areas, along with substandard curves carrying mainline traffic, significantly slow traffic and cause major disruption of traffic flow.

All of the service interchange on-ramps have insufficient length for proper acceleration and merging into mainline traffic. This causes slower-moving vehicles to enter the mainline through lanes, which interferes with traffic flow. In addition, there are 15 locations where the ramp terminal spacing does not meet current AASHTO guidelines.

2.5. Project Status

Since June 2006, ODOT has been working with urban designers and community leaders to identify design enhancements for the I-70/I-71 South Innerbelt project. The department held a public meeting in December 2006 to share design ideas for cap and gateway treatments, and in February 2007 it hosted a public meeting to discuss alternatives for the south side. ODOT expects that the preferred alternative will be identified during the spring of 2007, with detailed design beginning in the fall.

3.1. Construction/MOT

The construction skill set offered the following recommendations:

Sequencing

- ◆ Consider spot improvements on alternate routes for added capacity.
- ◆ Construct the east leg of the C-D and connectors before the south leg.
- ◆ Build the East Interchange next.
- ◆ Construct the mainline last.

Packaging of Structures for Contracts

- ◆ Group all structures on the East Interchange under one contract. This includes the Fulton C-D to eastbound connection, the eastbound/westbound mainline and the westbound to Mound C-D.
- ◆ Package the cross street structures on the east leg under one contract. Do the same with the cross streets on the south leg.
- ◆ Group the west end of Fulton Street/I-670 interchange and the east end connectors for Mound and Fulton together.

East Interchange

- ◆ Locate the structure piers early in design so that they don't conflict with existing traffic lanes/flow. Can be built offline early.
- ◆ Consider combining the T intersection with Parsons and the flyover of Mound on structure with the signal starting the city grid.
- ◆ Build the Fulton to 70 eastbound connector early and offline.
- ◆ Add temporary pavement to 70 eastbound, move ramp traffic into the tunnel and build the new 70 mainline.

West End C-D Connectors (Fulton and Mound)

- ◆ Utilize either a temporary structure or a one-way on the Short Street Bridge as a connector to Fulton.

Cross Street Bridges on the East and South Legs

- ◆ Allow the contractor to select sequence and method (alternative bidding) for replacing crossings, and allow more than one crossing to be under construction at a time.
- ◆ Use drilled shaft/secant piles for new bridge abutments; they can be constructed offline.
- ◆ Consider Texas thin-deck tied-arch structures.

Incentives/Disincentives

- ◆ Use intermediate milestones for coordination of multiple contracts or sequencing based on time.
- ◆ Utilize performance specification options in the contract.
- ◆ Consider incentives such as A-plus-B contracting, lane rentals, weekend closures, long construction seasons and lane assessment fees.

Retaining Walls

- ◆ Use secant pile walls built from the top of the trench (the C-D road level); excavate as needed from the highway level.

Utilities

- ◆ Address possible asbestos pipes, making sure that all utilities are clear prior to the contracts being let.
- ◆ Consider two or three utility/pedestrian bridges or tunnels.
- ◆ Build/relocate early.

Staging Areas

- ◆ Eliminate Fulton Street parking.
- ◆ Hold off on development at Whittier Peninsula (owned by City Parks).
- ◆ Consider Africentric School grounds, the East Interchange split midfields and the I-670/71 ramp areas (midfields).
- ◆ Obtain temporary easements.

Night Work

- ◆ Allow night work as needed. ODOT needs to determine where a 24/7 schedule will be allowed due to premiums prior to bidding.

3.2. Innovative Contracting and Financing

The innovative contracting and financing team brainstormed the following suggestions:

Project Delivery Options

- ◆ Review the following project delivery options, noting that the types of financing and number of contracts vary with each:
 - Design-Bid-Build.
 - Design-Build (D-B).
 - Design-Build-Finance-Operate-Maintain.

Multiple Contracts – Design-Bid-Build Delivery

- ◆ Note that the number of contracts is based on various factors:
 - Timing and availability of funding.
 - Availability of contractors.
 - Number of access points and logical breakpoints.
 - Inherent efficiency of the work.
 - ODOT's contract management and availability of staffing.
- ◆ Consider public finance options. Note that these options could lead to longer-term staging and higher costs.
 - Pay as you go as funds become available.
 - Utilize public debt, i.e., bonds or an Infrastructure Bank loan.

Single Contract

- ◆ Consider D-B (public financing) or Design-Build-Finance-Operate-Maintain (a concession agreement with public/private financing).
- ◆ Investigate public-private finance options, including the following:
 - Grant Anticipation Revenue Vehicle (GARVEE) bonds.
 - Tolling the facility to repay public or private debt, such as Transportation Infrastructure Finance and Innovation Act (TIFIA) funding, State bonds and/or private investor debt.
 - Availability funding payments to the developer.

Availability Funding

- ◆ Consider a concession contract with or without tolling.
- ◆ Make the developer responsible for financing project construction; the State could contribute funds through milestone payments.
- ◆ Designate the developer as responsible for design and construction of the project, with completion on an agreed-upon date.

- ◆ Pay the developer annually for performing operations and maintenance. Annual payments would vary according to the changes in the Consumer Price Index (CPI) and would be adjusted based on the developer meeting established performance standards.
- ◆ Consider a long-term arrangement of 30 or more years.

3.3. Traffic Engineering/ITS

The traffic engineering/ITS crew outlined the group's mission statement and goals before offering their suggestions:

Mission Statement

- ◆ Safely handle traffic before, during and after construction to minimize disruptions to motorists, businesses and residents.

Goals

- ◆ Identify risk areas.
- ◆ Identify options to minimize disruptions to motorists, businesses, etc., in a cost-effective manner.
- ◆ Identify appropriate technologies and methodologies to be considered.

Freeway Construction

- ◆ Avoid simultaneous major construction on freeways.
- ◆ Complete other projects before starting this one, if possible. Projects to be completed prior to commencing freeway construction include the following:
 - North Outer Belt at SR315, US23, I-71 (2006-12).
 - South Outer Belt widening (2009-10).
 - SR 315 near Ohio State University (OSU) bridge rehabilitation (2009-10).
 - West Outer Belt major rehabilitation (2011-12).
- ◆ Coordinate with other major city projects, including Town Street and the one-way/two-way conversion.
- ◆ Get people who can affect the schedule and money involved in the decision-making process; accelerated funding may not be available.

City Street Construction

- ◆ Add capacity improvements to predetermined alternate routes. Money for additional projects may prove difficult to obtain.

Signal Coordination

- ◆ Adjust signal timing to move traffic efficiently through downtown.

Operational Changes to City Streets

- ◆ Change one-way to two-way and vice versa.
- ◆ Provide directional travel during peak hours.

Operational Changes of Freeway

- ◆ Detour traffic to provide one-way traffic through overlap section.

Spot Capacity Improvements on Alternate Routes

- ◆ Improve corridor capacity along bottleneck areas on I-670, SR 315 and I-71.

Level of Service Outside of Project Area

- ◆ Determine how improvements in the split will affect the level of service (LOS) upstream and downstream.
 - Capacity outside the work area will not be improved; however, some other minor improvements to ramps and connectors will occur.
 - Possible barriers include scope creep.

City Street Parking

- ◆ Remove parking from city streets to improve capacity. (Current design of intersections provides bump outs for parking.)
- ◆ Encourage use of alternate means of travel.
 - Possible barriers include public response.

Temporary Route Designation

- ◆ Re-sign I-71 to use SR 315 and I-670.
- ◆ Re-sign I-70 to use I-670 and I-71 or US 33 and SR 104.
 - Possible barriers include motorists disregarding signs, enforcement issues without a full closure, the capacity of alternate routes and motorist confusion.

Temporary Ramp Closures

- ◆ Close ramps in proposed work area to reduce volume on mainline.
 - Barriers may include the city street and ramp capacity and the need to maintain access to local businesses and Children's Hospital.

Alternative Means of Transportation

- ◆ Encourage bus and street car use.
- ◆ Promote carpooling; provide free parking for HOV.
- ◆ Utilize business shuttles to outlying employee parking lots.
 - Potential barriers include enforcement and cooperation from businesses.

Rerouting/Detouring Traffic

- ◆ Move traffic so the freeway can be a one-way through the project area. Force I-70 westbound and I-71 southbound to use I-670 westbound. (The capacity of I-670 may be an issue.)
- ◆ Make a one-way into downtown in the morning and a one-way out of downtown (the opposite direction) in the evening.
- ◆ Use moveable barriers to provide directional movements into and out of downtown during peak hours.

Downtown Employers

- ◆ Ask businesses to 1) provide flex hours; 2) establish satellite offices and parking lots; 3) encourage carpooling and bus use; and 4) provide shuttles.
- ◆ Exchange information to improve guidance to unfilled parking areas.
- ◆ Address potential resistance from employers and employees.

Freeway Management System (FMS)

- ◆ Direct traffic to parking areas.
- ◆ Provide information on detour routes/city streets.
- ◆ Use dynamic message signs (DMS) on city streets.
- ◆ Expand ITS on freeway and city streets.

Media/Public Information

- ◆ Provide timely information to media outlets. This will require ongoing communication between the project manager, contractors and ODOT Office of Communications.
- ◆ Utilize highway advisory radio (HAR) for construction notifications.
- ◆ Provide construction information to American Trucking Association and Ohio Trucking Association.
- ◆ Provide information to Indiana DOT to pass onto truckers through their own informational programs.
- ◆ Provide construction updates at rest areas.
- ◆ Use citizen band (CB) wizard to provide information to truckers on the road.

- ◆ Utilize advanced detection to identify traffic queues within the work zone and disseminate information to the public.
- ◆ Provide up-to-the-minute work zone traffic information to global positioning system (GPS) internet mapping providers.
- ◆ Provide detour and route designations to GPS providers.
- ◆ Utilize billboards to promote the start of construction.
- ◆ Consider messages on sports stadium boards, i.e., the OSU/Clippers message board.
- ◆ Create a project website and e-mail notification list.

3.4. Structures (Major Bridges)

The structures (major bridges) skill set offered the following recommendations:

Constructability/Cost Review

- ◆ Perform a constructability/cost review early in the process, while geometrics is still in development.
- ◆ Consider making the constructability review part of bridge type studies. Bridges constitute half of the total construction cost – they are obviously a major driver.

Africentric School Athletic Fields

- ◆ Raise the field about 16 feet, and adjust the profile of the east end of Fulton Street as it crosses under the field.
- ◆ Cap the structure to support a portion of the field.
- ◆ Buy the property and relocate the school. Utilize it as a staging area, and sell the property at the end of construction, or offer the property as an incentive to the contractor.

Local Streets over the South Leg of 70/71

- ◆ Consider a two-span shallow structure.
- ◆ Utilize rapid construction techniques/prefabrication.
- ◆ Design a shallow depth arch.
- ◆ Use a shallow structure to raise the profile of the trench.

Western Crossover for the Collector over 70/71

- ◆ Consider either a transversely framed structure with a median pier or a transversely framed clear span structure.
- ◆ Construct conventional beam structures with straddle bents.
- ◆ Temporarily reroute Fulton Street traffic onto Front Street.
- ◆ Prohibit the use of above-deck structures.

Eastern Crossover for the Collector over 70/71

- ◆ Construct conventional beam structures with straddle bents.
- ◆ Consider transverse framing in a type study.

Braided Bridge

- ◆ Flip the profile of the Braided Bridge south of Miranova.
 - Would reduce bridge costs.
 - Requires geometric consideration.
 - Would need to review access to Miranova.

Major Interchange Issues

- ◆ Address mono-shaft (large diameter) foundations.
 - Install shafts with oscillator/rotator.
 - Include an obstruction clause in the contract.
- ◆ Consider flyover ramp superstructure options, including:
 - Steel plate/box girders.
 - Precast segmental box girders.
 - Cast-in-place (CIP) concrete box girders.

Other Recommendations

- ◆ Consider a utility bridge/tunnel at Eighteenth Street. Need a power supply for Children's Hospital.
- ◆ Provide for early identification of sensitive noise/vibration impact sites, i.e., with drilled foundations or near the hospitals.
- ◆ Consider eliminating the Oak Street structure or the pedestrian bridge (cost-saving modification).
- ◆ Make sure there are no trees on the bridges. This was an overwhelming mandate from the group.

3.5. Retaining Walls/Geotech

The retaining walls/geotech team reiterated the group's goals before making their recommendations:

Team Goals

- ◆ Retaining walls.
- ◆ Cut/fill.
- ◆ Drainage.
- ◆ Structure type selection – future caps.
- ◆ Utilities.
- ◆ Pavement type.
- ◆ Subgrade stabilization.



Photo 1. Example of a drilled shaft wall.

Wall Types

- ◆ Consider anchor soldier pile walls. Whether or not vertical loads are applied will depend on soil conditions.
 - Advantages include the cost, top-down construction and the ability to utilize conventional construction methods.
 - Disadvantages include easement/ROW/utility obstructions. Anchor soldier pile walls make it difficult to accommodate vertical loads; require a time-consuming step-wise construction process; and may interfere with frontage/service road operations during the first phase of construction.
- ◆ Investigate applicability of soil nailing, again noting that whether or not vertical loads are applied is dependent on soil conditions.
 - Advantages include the cost, top-down construction and the smaller equipment needed when compared to an anchor wall.
 - Disadvantages include their inability to accommodate vertical loads. The ROW requirements are less than for anchor walls, but they are considered unconventional in Ohio.
- ◆ Utilize drilled shaft walls, which include secant, tangent or spaced walls.
 - Advantages include their ability to take vertical loading; top-down construction; off-path construction; and the minimal easement required, which lessens utility conflicts.
 - Disadvantages include cost and potential interference with frontage/service road operations during initial construction.

- ◆ Construct slurry trench walls.
 - Advantages include their ability to take vertical loading; top-down construction; off-path construction; and the minimal easement required, which lessens utility conflicts. In addition, slurry trench walls are effective in areas where high ground water conditions exist.
 - Disadvantages include the high cost of construction and the limited experience of Ohio contractors in building this type of wall.

Subgrade Stabilization

- ◆ Utilize global chemical stabilization to address subgrade issues.

Foundation Soils

- ◆ Evaluate settling, and monitor during construction.
- ◆ Evaluate the waiting period for settling in the foundation design.
- ◆ Utilize methods to accelerate settling and shorten the waiting period.
- ◆ Evaluate the use of reinforced soil slopes (RSS) with appropriate erosion control.

Drainage

- ◆ Evaluate the effects of drainage on retaining walls throughout the corridor.
- ◆ Conduct long-term monitoring of water levels as part of ODOT's geotechnical investigation.
- ◆ Anticipate potential settlement in drainage design.

Utilities

- ◆ Evaluate potential interference with tie-backs and soil nails.
- ◆ Field locate and verify existing underground utility locations.

Other Issues

- ◆ Consider 3-D modeling of the existing and planned conditions to include utilities, structures, soil borings and construction phases.
- ◆ Consider waste and borrow needs in light of dividing the project into multiple contracts.

3.6. Roadway/Geometric Design

The geometrics team made a number of recommendations:

Africentric School

- ◆ Shift I-70/I-71 northbound to the north.
 - Puts the road in conflict with the convergence of the system ramps.
 - Faces potential vertical conflicts with ramp crossings.
 - Makes structural crossings challenging (at a minimum).
- ◆ Purchase the Old Kroger Property from Children's Hospital to relocate the athletic fields.
- ◆ Raise the football fields and track to allow tunneling of the ramps.
- ◆ Cap I-70 to relocate the football field next to the school.
- ◆ Address potential barriers, including the following:
 - Children Hospital's plans for the property are unknown.
 - The cost of the property could be prohibitive.
 - The structure cost could be high.
 - ODOT is unsure if the available space is adequate.
 - The aesthetics of a raised field may be unacceptable.
 - There are sight distance and signing issues under the structures.

Miranova

- ◆ Provide alternative access.
 - Lower the Mound Street intersect with Short Street. This will decrease construction time.
 - Retain the Second Street entrance ramp.
- ◆ Mitigate aesthetic and noise issues through the use of fountains and vegetative screenings.
- ◆ Note that potential barriers at Miranova include the following:
 - Would improve access to Miranova but not to the parking facility.
 - Might encounter issues with raising Mound Street to cross the railroad, which is immediately to the west.
 - Could encounter operational issues with a left turn onto the Second Street ramp.
 - Would face structural challenges with the crossing of the Second Street ramp and the exit to SR 315.
 - Face a potential encroachment to the American Electric Power (AEP) substation.

Scissor Intersection

- ◆ Eliminate two-way traffic on Parsons and make it a one-way northbound.
- ◆ Consider a no-build C-D south of Broad Street by using a one-way C-D crossover.
- ◆ Replace the Parsons Avenue exit with an Oak Street exit.
- ◆ Consider a roundabout.
- ◆ Address potential barriers:
 - A one-way northbound is unacceptable to the community.
 - A two-way on the west side would have additional impacts to properties west of I-71; would likely create operational problems at Main Street; faces potential vertical clearance issues within the East Split; and would require the construction of a costly and complicated “S” structure over I-71.
 - Replacing the Parsons Avenue exit would introduce weaving conflicts on I-71 northbound and add circuitry to the access to Children’s Hospital.
 - The roundabout footprint would require an unconventional design. It would also create ROW impacts and decking challenges over I-71.

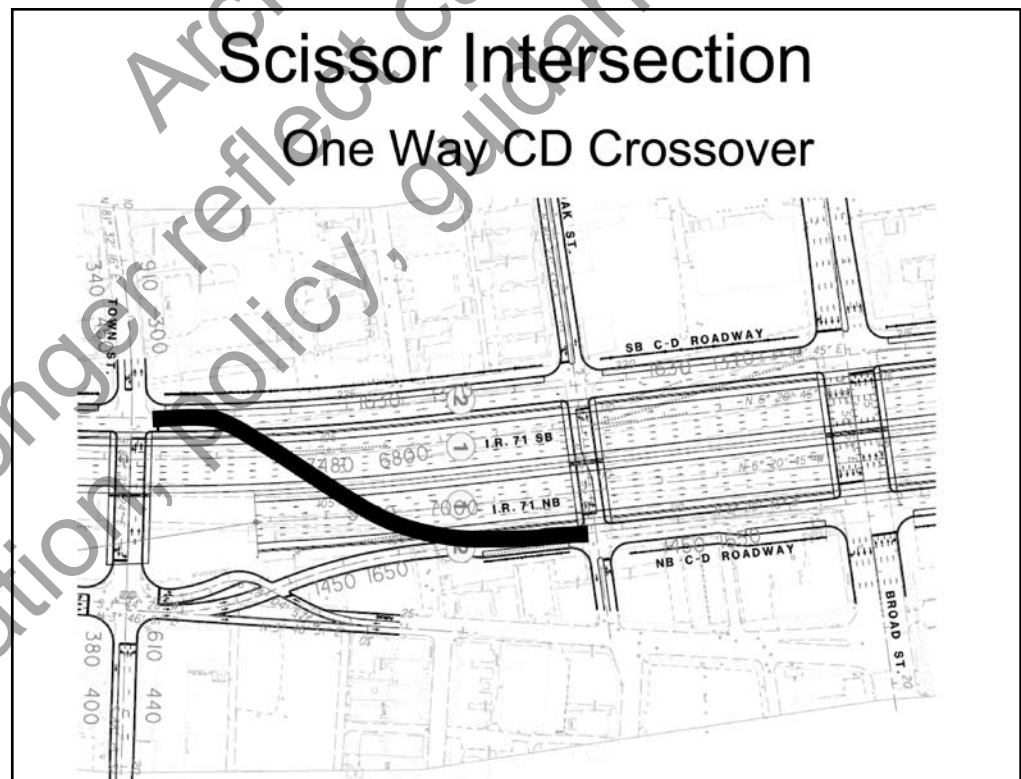


Figure 2. Depiction of the one-way C-D crossover proposed by the roadway/geometric design team.

Spring Street to 670 Westbound

- ◆ Eliminate the direct connection from Spring Street to I-670 westbound. Could provide indirect access via Leonard Avenue to I-670 westbound by utilizing the existing ramp.

3.7. ROW/Utilities/Railroad Coordination

The ROW/utilities/railroad coordination crew offered the following suggestions:

- ◆ Purchase or compensate the Africentric School for impacted property.
 - Be aware that the site has recognized 106 (building) and 4(f) (track) resources.
 - Identify the costs for various options. The impact to track and fields is estimated at \$4 million; the total site impact, at \$24 to \$30 million.
 - Determine how much the proposed ramp to Grant Street would impact the school parcel.
- ◆ Utilize advanced acquisition; it would provide 22 acres for staging and unquantified savings by reducing construction costs. It would also provide potential residual value after construction is complete.

Whittier Peninsula

- ◆ Note that site is a recognized 4(f) resource.
- ◆ Coordinate early with Franklin County Metro Parks – the property was recently handed over to them but reconstruction has not yet begun.
- ◆ Make this a staging area; it is one of two potential localized staging areas.
- ◆ Recognize that this area may be needed for storm water best management practices (BMPs)/detention ponds.
- ◆ Use retaining walls. Avoid the use of tie-backs to reduce ROW.

Utilities

- ◆ Provide early utility coordination.
 - Make utility companies part of the team.
 - Establish a dedicated, full-time utility coordinator beginning now and ending at the completion of construction.
 - Require the designer and contractor to assign one full-time person to work with utilities.
 - Provide sufficient time to acquire all needed permits from the Army Corps of Engineers, the railroad, etc.

- ◆ Require the contractor to perform utility relocation work for the utility companies.
 - Make the contractor responsible for utility delays.
 - Allow the contractor to hire sub-contractors who are certified to install utilities.
- ◆ Maximize the use of subsurface utility engineering (SUE) information during design and construction.
 - Develop a conflict matrix and analyze all areas of concern.
 - Make efforts to “design around” major conflicts.
- ◆ Consider compensation and incentive issues.
 - Provide full compensation for all utility work, and tie compensation to a completion schedule.
 - Create financial and other incentives for meeting completion dates.

Railroad

- ◆ Avoid the railroad at all cost.
 - If the railroad cannot be avoided, provide sufficient time to review plans and agreements.
 - Get any and all agreements in writing.
 - Avoid drainage onto the railroad ROW.
 - Provide sufficient time to acquire all needed permits.

3.8. Environmental

The environmental group noted that their focus was not necessarily to accelerate the project but rather to prevent delay. Team members made the following suggestions:

General Issues

- ◆ Evaluate the environmental consequences of construction, including the duration of the project, following the National Environmental Policy Act (NEPA) process.
- ◆ Establish a project coordinator for environmental commitments. Have that person serve as a community ombudsman.

Construction Noise and Vibration

- ◆ Involve the public in the analysis and development of a noise control plan.
- ◆ Work with city officials/developers to encourage noise-compatible redevelopment.

Construction Staging

- ◆ Identify contractor restrictions based on location, type of activity and time of day.
- ◆ Complete an environmental assessment of all staging areas, including information on the alternatives considered, the potential impacts and any necessary mitigation.

MOT

- ◆ Complete an environmental assessment (EA) of MOT, including information on the alternatives considered, the potential impacts and any necessary mitigation.
- ◆ Consider noise, community disruption and safety services.
- ◆ Make targeted transit investments to reduce traffic volumes.

Legal Issues

- ◆ Ask FHWA to conduct a legal review of all 4(f) documents.
- ◆ Complete an environmental document classification review detailing cumulative construction impacts.

4.1. Next Steps

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

Two follow-up meetings, one in the area of traffic diversion and the other concerning estimating, have taken place. Additional meetings are in the works.

As this report shows, local and national transportation experts came together to brainstorm innovative techniques that will accelerate delivery of a much-needed project. Once again, ACTT has proven to be a valuable tool in project planning and success.

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4- CONCLUSIONS

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
AEP	American Electric Power
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
CB	Citizen Ban
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
CRCP	Continuously Reinforced Concrete Pavement
CSO	Combined Sewer Overflow
CSS	Context Sensitive Solutions
CSU	Cleveland State University
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
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

APPENDIX A:

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
IT/ITS	Intelligent Transportation/Intelligent Transportation Systems
LOS	Level of Service
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
NOACA	Northeast Ohio Area Coordinating Agency
NPDES	National Pollutant Discharge Elimination System
NS	Norfolk Southern
ODOT	Ohio Department of Transportation
ORDC	Ohio Rail Development Commission
OSU	Ohio State University
PAB	Private Activity Bond
PCC	Portland Cement Concrete
PCMS	Portable Changeable Message Signs
PIO	Public Information Officer
PMT	Project Management Team
PR	Public Relations
PSI	Pounds per Square Inch
QA/QC	Quality Assurance/Quality Control
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
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
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
TMC	Traffic Management Center
TMP	Traffic Management Plan
TRAC	Transportation Review Advisory Committee
TRB	Transportation Research Board
TSA	Transportation Security Administration
TSM	Transportation System Management
TSP	Thrift Savings Plan
VE	Value Engineering
VMS	Variable Message Sign
VPPP	Value Pricing Pilot Program
WiFi	Wireless Fidelity

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Workshop Attendees

Construction/MOT

Jennifer Gallagher - C.O. Traffic	614-644-5928
Mack Braxton - C.O. Traffic	614-752-8829
Dave Holstein - C.O. Traffic	614-644-8137
James Hunt - TxDOT	281-238-7900
Adam Johnson - Ohio FHWA	614-280-6843
Bernie Kuta - FHWA	720-963-3204
William Womack - Womack Consulting Services	508-295-1718
Duane Soisson - D6 Construction	740-833-8162
Liza Zigmund - D6 Planning	740-833-8323
John Stains - ms consultants	614-898-7100
Barry Waites - City of Columbus	614-645-8376
Jim George - Complete General	614-258-9515
Mike Lynch - Complete General	614-258-9515
Dave Carlin - D6 Planning	740-833-8345

Innovative Contracting and Financing

Jerry Blanding - FHWA ACTT Coordinator	410-962-2253
Henry Guzman - City of Columbus (now with ODPS)	614-466-3383
Robert Lawler - MORPC/Columbus	614-228-2663
Paul Huston - HNTB	512-334-3807
Keith Bishop, FHWA, Federal Resource Ctr., MD	410-962-0634
Tom Wester - City of Columbus (now with ODOT)	614-833-8000
Barney Allison - Nossaman, Guthner, etc.	213-612-7847
Jennifer Townley - Systems Planning/Program Mgmt.	614-466-7493
Jack Marchbanks - D6 District Deputy Director	resigned
Brad Jones - D6 Construction	740-833-8346
Randall Bowman - City of Columbus	614-645-8376
Jessica Patterson - Ohio FHWA	614-280-6858
Ken Harvey - Ohio FHWA	614-280-6833
Susan Vest - Ohio FHWA	614-280-6830
Julie Ray - C.O. Finance	614-466-2687
Dan Compston - Kokosing Construction	614-228-1029

Traffic Engineering/ITS

Joe Glinski - Ohio FHWA	614-280-6844
George Saylor - C.O. Traffic Engineering	614-752-8099
Mark Robinson - SAIC	703-676-2384
Jim Buckson - Ohio FHWA	614-280-6846
John Tolle - FHWA	708-283-3541
Eagan Foster - City of Columbus	614-645-8376

APPENDIX B:

Structures (Major Bridges)

Steve Stroh - URS Corp.	813-286-1711
Tim Keller - C.O. Structures/ODOT	614-466-2463
Vasant Mistry - FHWA	202-366-4599
Kevin Fiant - D6 Production	740-833-8056
Bob Taylor - D6 Planning	740-833-8354
Nicole Freeh - D6 EIT	740-363-1251
Panchy Samy - ms consultants	614-898-7100
M. Douglas Roberts - City of Columbus	614-645-8376
Matt Shamis - Ohio FHWA	614-280-6847
Wade Dennis - D6 EIT Production	740-363-1251

Retaining Walls/Geotech

Jawdat Siddiqi - C.O. Structures/ODOT	614-728-2057
Peter Narsavage - C.O. Structures/ODOT	614-466-4318
Gene Geiger - C.O. Geotech/ODOT	614-275-1318
Alex Dettloff - C.O. Geotech/ODOT	614-275-1308
Randy Morris - C.O. Construction/ODOT	retired
James Sheehan - HDR Engineering	412-497-6000
Barry Siel - FHWA	720-963-3208
Ed Kagel - C.O. Production	614-752-4857
Tom Lefchik - Ohio FHWA	614-280-6845
Dennis Sheets - D6 Production	740-833-8089
Camilla "Kim" Shepherd - City of Columbus	614-645-8376
Ferzan Ahmed - D6 Construction	740-833-8367
Jamal Shanaa - ms consultants	614-898-7100

Roadway/Geometric Design

Steve Wilson - Michael Baker & Associates	412-269-2096
David Giardino - V.P. of Plexus Corporation	401-275-5840
Bill Prosser - FHWA	202-366-1332
Rick Bruce - C. O. Roadway Engineering	614-995-5519
Dirk Gross - C. O. Roadway Engineering	614-752-5576
James Young - C. O. Roadway Engineering	614-387-1622
Laura Wright - D6 Production	740-833-8228
Gary Harrington - D6 Production	740-833-8176
Larry Shannon - ms consultants	614-898-7100
Leonard "Len" Kutney - City of Columbus	614-645-8376
Hassan Zahran - D6 Construction	740-833-8085
John Neighbors - Kokosing Construction	614-228-1029

ROW/Utilities/Railroad Coordination

Ray Lorello - C.O. Real Estate	614-466-2279
Laura Philabaum - S.E. Region R.E.	614-995-0757
John Maynard - D6 Real Estate	740-833-8257
Paul Scott - TBE	703-680-5665
John Turpin - FHWA	202-366-5853
Gary Davis - Ohio FHWA	614-280-6840
Dick Henry - Ohio FHWA	614-280-6842
James Hall - Ohio FHWA	614-280-6851
Nina Kelley - US Army Corp of Engineers	410-962-7783
Steve Fellenger - D6 Production	740-833-8272
John Stickney - ms consultants	614-898-7100
Kenneth A. Yost - City of Columbus	614-645-8376
Rob Sherrett - The Shelly Company	740-246-6315

Environmental

Carmen Stemen - C.O. Environmental Services	614-644-7097
Mary Ann Rondinella - FHWA	720-963-3207
Mariano Berrios - Florida DOT	850-414-5250
Bob Newbery - WisDOT	608-266-0369
Michelle May - Systems Planning/Program Mgmt.	614-644-8309
Karel Cubick - ms consultants	614-898-7100
William Lewis - City of Columbus	614-645-8376
Sara Greemore - Ohio FHWA	614-280-6835
Brian Hupp - D6 Construction	614-387-2403
Janice Gartner - D6 Environmental	740-833-8362

SKILL SET RECORDING FORMS

- Construction/MOT
- Innovative Contracting and Financing
- Traffic Engineering/ITS
- Structures (Major Bridges)
- Retaining Walls/Geotech
- Roadway/Geometric Design
- ROW/Utilities/Railroad Coordination
- Environmental

APPENDIX C:

Construction/MOT Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Sequencing	First do spot improvements on alternate routes for capacity. Then construct C-Ds and connectors – do the east leg before the south leg. Third do the East Interchange. Lastly, do the mainline.	
Packaging of structures for contracts	Package the East Interchange – all structures – Fulton C-D to the eastbound connection, the eastbound/westbound mainline, and the westbound to Mound C-D. Group the cross streets on the east leg, the cross streets on the south leg and the west end of Fulton Street. Package the I-670 interchange and the east end connectors of Mound and Fulton.	Realignment of mainline and ramps.
East Interchange	<p>Locate the structure piers early in design so they don't conflict with existing traffic lanes/ flow to build offline early.</p> <p>Consider combining T intersection with Parsons and flyover of Mound on structure with signal starting city grid. Build Fulton to 70 eastbound connector early and offline. Add space to 71 southbound to 70 eastbound ramp tunnel by adding temporary pavement to 70 eastbound and moving ramp traffic into the tunnel to build the new 70 mainline.</p>	<p>Structure type not selected.</p> <p>Pier foundation size and construction space needed.</p> <p>Profile grade of Parsons Road.</p> <p>Space and geometrics of 70 eastbound.</p>
West end C-D connectors (Fulton and Mound)	Consider a temporary structure as a connector or a one-way using the Short Street bridge to Fulton C-D.	<p>Mainline grade change of 7 feet.</p> <p>Grades of connector and substation restrictions.</p> <p>315/70 ramps need to be upgraded to two lanes.</p>

Construction/MOT Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Cross Street bridges (east and south legs)	Allow contractor to select processes (alternative bidding) for replacing crossings, and allow more than one under construction at any one time. Use drilled shaft/secant piles for new bridge abutments: can construct offline. Consider Texas thin-deck tied-arch structures.	Various options available: build in place, slide into place, roll into place, etc. Assumes geotech wall type. Arches could affect capping.
Incentives/disincentives	Use intermediate milestones for coordination of multiple contracts or sequencing based on time. Use options in contract with performance specifications. Utilize lane rentals, A-plus-B bidding, weekend closures, long construction seasons, etc.	Need to more closely evaluate schedule requirements. No overall time restraints identified.
Retaining walls	Use secant pile walls built from the top of the trench, i.e., at C-D road level. Excavate as needed from highway level.	Boulders in soil could disrupt drilling. Temporary closures of ramps needed.
Utilities	Face possible asbestos pipes – need to make sure that all utilities are clear prior to contracts. Consider two or three utility/pedestrian bridges or tunnels; build early with relocation early.	
Night work		Noise in local communities. Safety.

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Construction/MOT Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Staging areas	Eliminate Fulton Street parking. Utilize the 670/71 ramp areas (midfields). Consider Whittier Peninsula (owned by City Parks). Hold off development on the Africentric School grounds. Utilize the East Interchange midfields.	Access limited in all areas. Tight ROW lines. Existing slopes. School grounds need easement/purchase.
Material recycling	Reuse rubble from structures and pavements – potential to excavate 1,000,000 cubic yards.	Hauling in through traffic. Disposal off site.

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Innovative Contracting and Financing Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
<p>One project</p>	<p>Sell this as one project (D-B). Create a consortium of contractors to bring about the best attributes of each of the individual contractors. One prime contractor would hold the contract.</p> <p>ODOT has traditionally taken on the responsibility of acquiring ROW, utility relocation and environmental mitigations.</p>	<p>This project requires more labor per dollar compared with other projects that have tried this. This might require local contractors to team with out-of-State contractors for support. Could put this out to the contracting entities to perform the ROW acquisition, EPA/NEPA mitigation and utility relocations as part of the contract. This would require a D-B type of contract. In the downtown corridor the utilities include more risk than most contractors would be willing to assume. By-pass construction would be more reasonable. Large companies such as Granite Construction are cutting back on D-B projects because they cannot assess the risk for large urban projects. Ohio does not have a large appetite for tolling this road. Have the owner pre-buy materials to lock in material prices. If the owner pre-buys materials, he/she takes on the risk of mistakes, changes and fit-up. These risks traditionally belong to the contractor. Time savings is one very big benefit to D-B.</p>
<p>Tolling</p>	<p>Toll the entire new facility or just the capacity added to the new facility.</p>	<p>The previous governor was against tolls and we have no indication that the new administration is different. Set-up tolls for only the added lanes can be done. No booths required. Can be done through video/computer enforcement. This would require State legislative action. Question is how to identify the excess capacity to toll. Has anyone studied the cost for setting up and administering the tolling to identify what the real return would be? Private investors will look at this and ask how long the road can be tolled. At some point they expect a reasonable profit. If these profits become excessive, they will return some of that money to the State.</p>

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Innovative Contracting and Financing Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Capping part of the project	Build private entities over the proposed roadway. Can we leverage private money to install the foundations for the future construction of the caps?	Sell future development rights on the caps. Can the cost of the caps be offset by selling development rights? State law can challenge the sales of the cap rights because the businesses would be located on State ROW and would be competing with businesses on private property. Note: Caps are not included on the current environmental document. COC may help finance the building of the caps.
Availability payment financing	Have a private entity take on the risk of maintaining the facility to set standards for a fixed cost. Performance standards may include reduced congestion. This would include 15 percent private money and possibly 85 percent tax-free bonds.	Requires the private entity to take on maintenance and relieves the owner of life-cycle cost concerns. The owner sets the standard to which the facility will be maintained. Owner would then make availability payments to the contractor. These payments could be supplemented with tolls or not. Capacity additions throughout the life of the agreement would need to be discussed up front. Need to consider property tax exemptions for private investors.
PABs		Requires tolling to provide an incentive to the concessionaire.
TIFIA financing		
Waste areas	Localize some ODOT-specified waste areas if the project has excess waste.	Could reduce costs, congestion.
Access/haul roads	If this is broken into several (5 to 15) projects, identify access/haul roads that all contractors must keep open for all other contractors for the duration of construction.	
Risk analysis	Go through the top five (or more) risks and assess how these risks should be allocated.	

Innovative Contracting and Financing Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Concessionaire	Hire a concessionaire to design, build and maintain the facility.	Requires tolling to provide an incentive to the concessionaire.
Compliance goals for vendors meeting the requirements in the contract	Have points associated with a dollar amount for not complying with the requirements. Must give notice to non-compliant vendors.	Operating cost for moving forward; approximately 800 accidents per year. Place something in the process to penalize the company for not having the traffic moving consistently. Consider performance standards versus prescriptive technical standards. May face issues from bond or policy holders.
Innovating contracting and financing (private funds or State funds)	Consider contract options: A) D-B (single contract). B) State operated. C) Design-bid-build-operated. Finance one contract through public finance. D) Multiple contracts. Provides access points and inherent efficiencies.	Build the core portion of the project, where you gain the safety improvements without building the entire project all at once. Consider different contract types, i.e., a big D-B for one single project or a build contract with alternate financing.

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Traffic Engineering/ITS Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
TRAFFIC CAPACITY		
Avoidance of other major construction	Complete other projects before starting this one, if possible: <ul style="list-style-type: none"> ◆ North Outer Belt at SR315, US23, I-71 (2006-12). ◆ South Outer Belt widening (2009-10). ◆ SR 315 near OSU bridge rehabilitation (2009-10). ◆ West Outer Belt major rehabilitation (2011-12). ◆ Other major city projects, including Town Street, the one-way/two-way conversion, etc. 	<i>Barriers:</i> Funding may not be available for acceleration. Get people who can affect the schedule and money involved in the decision-making process. <i>Other skill sets:</i> contracting.
City street construction	Add capacity improvements to predetermined alternate routes.	<i>Barriers:</i> Money for additional projects.
Signal coordination	Adjust signal timing to move traffic efficiently through downtown.	
Operational changes of streets	Change one-way to a two-way and vice-versa. Provide directional peak capacity.	
Operational changes of freeway	Detour traffic to provide one-way traffic through the overlap section.	
Spot capacity improvement on alternate routes	Improve corridor capacity along the bottleneck areas on I-670, SR315 and I-71.	<i>Barriers:</i> Additional funding required to initiate an unplanned project. <i>Other skill sets:</i> contracting.

Traffic Engineering/ITS Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Crashes	Eliminate crashes due to congestion and weaving.	
LOS outside the project area	Consider how the improvement in the split will affect LOS upstream and downstream.	<i>Barriers:</i> Scope creep. Note that capacity outside the work area will not be improved; however, some other minor improvements to ramps and connectors will take place.
TRAFFIC REDUCTION		
Elimination of parking	Remove parking on streets to improve capacity on city streets. May encourage use of alternative means of travel.	<i>Barriers:</i> Public response; intersection design with bump outs needs to be revisited.
Temporary re-designation of routes	Re-sign I-71 to use SR 315 and SR 670. Re-sign I-70 to use I-670 and I-71 or US 33 to SR 104.	<i>Barriers:</i> Motorists disregarding signs, enforcement without full closure, capacity of alternate routes, motorist confusion.
Downtown business locations/hours	Ask businesses to provide flex hours and satellite offices and parking lots, to encourage carpooling and buses, and to provide shuttles for their employees.	
Temporary ramp closures	Close ramps in proposed work area to reduce volume on mainline.	<i>Barriers:</i> Capacity on city streets, maintaining access to businesses and Children's Hospital, ramp capacity.
Permanent ramp closure	Close ramps on a permanent basis. Force traffic to use local streets.	<i>Barriers:</i> Business disapproval. <i>Other skill sets:</i> ROW.
Alternative means of transportation	Encourage carpooling (provide free parking for HOV) as well as use of buses and street cars. Encourage businesses to provide shuttles to outlying parking lots.	<i>Barriers:</i> Enforcement. Talk to Nationwide, AEP for enforcement.

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Traffic Engineering/ITS Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Rerouting/detouring traffic	Move traffic so freeway can be one-way through project area. Force 70 westbound and 71 southbound to use 670 westbound. Establish a one-way into downtown in the morning and a one-way out of downtown in the evening. Use moveable barriers to provide directional movements into/out of town during peak hours.	<i>Barriers:</i> Capacity of 670.
CONSTRUCTION		
Constructability of proposed scheme	Determine how this could be built and what the cost would be. The C-D connectors require cantilevers. Could construct a temporary C-D using Livingston or Mound as a two-way. Need to determine which C-D option weighs better for MOT purposes.	Requires early contracts for city work/utilities; a memorandum of understanding (MOU) with the railroad and utility companies; East Interchange access and early work on the West Interchange. Need to close alternate ramps and build the bridges and retaining walls, the C-D connectors, the mainline and the West Interchange. Major excavation concerns include drainage when lowering the profile and the Fulton connector on top of the retaining wall. Clearance issues as well.
PUBLIC NOTIFICATION AND MEDIA BLITZ		
Downtown employers	Coordinate to provide compressed work schedules, satellite offices, shift work and carpooling, all designed to reduce peak volumes. Exchange information to improve guidance to unfilled parking areas.	<i>Barriers:</i> Resistance from employers, employees.
Freeway management system	Use to direct traffic to parking areas. Use to provide information on detour routes and which city streets to use. Use dynamic message signs (DMS) on city streets. Expand ITS on freeways.	

Traffic Engineering/ITS Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Radio/TV/paper	Provide timely information to media outlets.	<i>Barriers:</i> Lack of communication between the project, contractor and ODOT's public information office.
HAR	Place construction notifications on HAR.	
CB Wizard and dissemination of trucking information	Provide information to American Trucking Association and Ohio Trucking Association. Share information with the Indiana DOT. Post updates at rest areas. Use districts' CB Wizard.	<i>Barriers:</i> Lack of coordination.
Improved highway signs		
Advance detection	Provide detection of traffic queues within the work zone, and quickly disseminate information to the public.	
Information to GPS providers, internet mapping services	Provide up-to-the-minute work zone traffic information to providers. Provide detour route designations to GPS providers.	<i>Barriers:</i> Providing continual, up-to-date information.
Billboard campaign	Buy advertising space to promote the start of construction.	<i>Barriers:</i> Funding. <i>Other skill sets:</i> contracting.
Messages on sports stadium boards	Buy space on OSU/Clippers boards.	<i>Barriers:</i> Funding, lack of cooperation.
Website and e-mail notification	Create project website and e-mail notification list.	<i>Barriers:</i> Maintaining website.

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Structures Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Africentric School	Maintain athletic fields continuous with school campus. Consider a tunnel – field would remain on top at the same grade. Could utilize structure cap to support a portion of the field or raise the field approximately 16 feet and adjust the profile of Fulton Street (the east end) so it crosses under the field. (The field would go over the top of the roadway.)	Requires close coordination with geometrics and ROW to ensure selection of the best option from a cost-benefit standpoint.
Fulton Street structure at Front Street	Consider a sharp skew over the Interstate with complex framing at the intersection of Front and Fulton. Suggest framing perpendicular to the trench (either clear-span or two-span depending on MOT needs), with deck and extra greenspace on top.	Would ease future widening. Greatly simplifies framing for the structure at the intersection. Requires coordination with MOT to determine if a pier could be placed in the center. Determine if two-span would provide benefits from raising the profile of the trench. Requires temporarily routing Fulton Street traffic onto Front Street.
Bridges over combined 70-71 south leg section (four structures from High Street to Grant Avenue)	Recommend one span for constructability (due to MOT and grade change of the mainline). Need to use rapid construction techniques. Build bridges alongside the existing structures and move into place. Construct shallow-depth-with-arch structures. Consider other shallow sections to allow the trench profile to be raised.	If depth is reduced, will save in excavation costs in the trench. Requires coordination with geometrics and constructability. One-span option would provide added flexibility for MOT.
Mon shaft foundations at major interchanges	Utilize mon shaft foundations at major interchanges for ease of construction. A mon shaft requires a smaller footprint and therefore provides greater construction flexibility.	Potential barrier: Boulders/cobbles may impact drilling operations. Would need to be considered in contract specifications. Either specify a pay item per hour for drilling if boulders are hit or specify drilling equipment requirements (oscillator or rotator) that would drill through boulders.

Structures Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Segmental concrete or steel box at flyovers	Consider either a segmental concrete or steel box at the major interchange flyovers. Use of this structure type provides greater torsional resistance for the large number of required curved structures.	
Constructability and layout meeting	Ensure that structures issues are dealt with early in development and that geometrics are modified accordingly. Many times the layout is driven by traffic/geometric design, however, structures are greater than half the total cost of this project and need to be considered accordingly.	Coordinate with geometrics, traffic, MOT, geotechnical (foundations).
Structures just south of Miranova complex	Flip the profiles on the structures just south of the Miranova complex. Change the elevation on 70/71 westbound to the 315 northbound ramp structure so it goes over the Mound C-D instead of under. This would also help with the access issue at Miranova.	Requires traffic and geometric consideration. Access to the Miranova complex must also be considered.
No trees on bridges	Allow no trees on the bridges.	Allow no trees on the bridges!
Utility crossing at Eighteenth (near Children's Hospital)	Provide a tunnel for the electric feed. Consider a utility bridge.	Requires coordination with utilities and Children's Hospital.
Problems with utilities on structures	Address potential problems with utilities on structures.	Coordinate closely with utilities.
Noise and vibration issues	Provide special monitoring of foundation construction (pile driving) adjacent to critical sites, i.e., Children's Hospital.	Recommend drilled shaft near critical locations. Early identification of critical locations is essential.

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Structures Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Bridge G4-b1	Consider changing the structure type of Bridge G4-b1 (the braided structure on the east leg between Spring Street and Long Street) from a large-skew single-span to a two-span with a straddle bent. The high skew creates uplift and constructability concerns.	Bents will result in fractures in critical sections.
Structure G11-4	Change the skew of the north abutment of Structure G11-4 at the I-670 and I-71 interchange to less than 45 degrees. Reduction of the skew will reduce the forces transferred in the x-frames.	Requires coordination with MOT. Can the abutment location be shifted without impacting MOT?

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Retaining Walls/Geotech Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Retaining walls	Future loadings.	Evaluate future loadings and cut/fill wall locations. Address possible conflicts with the power station – estimated relocation cost is \$250 million.
Retaining walls	Bridge abutments.	Need to identify areas where heavy vertical loadings will exist. Consider different wall type(s) for bridge abutments.
Retaining walls	Drilled shafts.	Consider using for foundation of bridge wall. Install early in construction, excavate soil at later date and attach precast panels to shaft face. Water issues need to be considered. If water is encountered, engineer will need to design a secant structure to prevent water from being an issue.
Retaining walls	Drilled shafts.	Are soils good enough for uncased shafts? Most soil is estimated to be glacial till. Only temporary casing is estimated for drilling operations. Not necessary to use additional casing for shaft construction.
Retaining walls	Drilled shafts.	Drilled shafts generate minimal noise and vibration.
Retaining walls	Spread footings.	ROW may be an issue. Probably need a mix of drilled shaft and spread footings for structure design. Differential settlement issues could exist if MSE walls are built in phases. Foundation soils need to be evaluated.
Retaining walls	Driven piles.	Evaluate vibration concerns. Consider options to prevent adverse noise/vibration conditions within the construction limits.
Retaining walls	Secant/tangent structures.	Evaluate ground water conditions. Will be easier to provide for axial loadings on caps with these structures.
Retaining walls	Soldier pile and lagging.	
Retaining walls	Slurry walls.	

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Retaining Walls/Geotech Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Retaining walls	Anchor walls.	Need to consider short-term versus long-term anchors.
Retaining walls	Anchor walls.	Cannot add additional axial loads to tie-back structure if a tie-back wall is constructed and not accommodated for caps. Later construction can add future shafts behind the tie-back walls.
Retaining walls	Anchor walls.	Cut wall. Maximum height is 25 to 30 feet.
Retaining walls	Anchor walls.	Fill wall. Fill wall height is 50 feet plus or minus. Define soil conditions in areas of fill walls. Soils vary within structure limits. Estimated to be stiff glacial clay.
Retaining walls	Aesthetics.	Need to consider what aesthetic treatments will be required. This needs to be discussed before construction. Uniformity and consistency is required.
Design consideration	Field issue – flexibility.	Need to design for flexible construction. Do not limit the contractor's ability to construct the structure. DESIGN FOR CONSTRUCTION! Conflicts WILL exist. Flexibility is critical.
Design consideration	Existing bridges crossing I-70 will be rebuilt.	Need to evaluate proposed structure foundations and how they relate to the mainline widening. Room is necessary for construction (i.e., equipment mobilization, egress/ingress, etc.).
Design consideration	Existing bridges crossing I-70 will be rebuilt.	Propose two-span structures with a pier in the median, with localized widening of the median to accommodate center piers.

Retaining Walls/Geotech Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Caps	Locations.	Widen structures at the following locations: Front, High, 3 rd , 4 th , Main, Oak, Long and Spring. Do not cap the entire bridge, just the ends of the bridge near the intersections. Assume 100 feet from both ends of the structure for future cap limits.
Caps	Locations.	Construct retaining walls to accommodate future cap loadings – do not want to have a retrofit situation at a later date. May be cheaper to allow for a retrofit instead of accommodating the full loading of future caps. The assumed incremental cost is \$7-8 million.
Caps	Future structure type.	Estimate single-story structures, not high-rise structures.
Caps	Vertical forces.	Additional tie-backs are not enough for vertical capacity. Drag-down forces may become a concern.
Drainage	Retention systems.	Metro Parks changing area into a nature preserve near Whittier Peninsula. Ponds may exist in the new preserve. Consider using the ponds as possible retention locations for project drainage. Not a consideration for post-construction BMPs, but a consideration for runoff retention.
Constructability	Soil conditions.	Need good subsurface information to prevent unnecessary project delays/change orders.
Constructability	Consider wall-type selection. The additional cost to build more expensive structures may be warranted to expedite construction.	Note that wall types are important. Certain wall units may cost more to construct, but they will result in faster construction.
Constructability	Existing structures (public/private).	Identify existing structures, buildings, existing soil boring information, etc. Research existing material and use during design.

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Retaining Walls/Geotech Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Constructability	Existing structures (public/private).	Need to evaluate proposed structure against existing conditions. Need to evaluate existing structure foundations and how they relate to the proposed structure. Phasing is also an issue.
Constructability	Dewatering conditions.	Need to be aware of dewatering near existing structures. Take special care to prevent settlement in adjacent structures, buildings, etc.
Constructability	Phasing.	Temporary walls may speed up construction.
Constructability	Phasing.	Creativity will be required to facilitate construction. Ramp closures will be required. Consider nighttime closures, 24-hour closures, temporary shoe flies, etc. (Utilized on the Denver TREX project.)
Constructability	Phasing.	Consider advancing C-D construction. Once completed, divert traffic onto the new collector roads. Is it possible to shift traffic onto the collector roads when the mainline is under construction?
Soil conditions	Identify soil conditions.	Address rock concerns.
Utilities	Need good utility information for design and construction.	Thoroughly review all utility information and coordinate design (i.e., foundations) with existing and proposed utility locations. Existing power utilities are a major concern and are a costly item to relocate, i.e., power stations, etc.
Pavement type		
Subgrade stabilization		

Roadway/Geometric Design Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
AFRICENTRIC SCHOOL		
Connector between Fulton and Parsons	Eliminate connector between Fulton and Parsons.	Structures and environmental.
71 North ramp	Move to the north and shift the mainline north.	Geometric and structures.
Eastbound C-D	Slide eastbound C-D farther east.	Traffic and structures for the intersection on Main Street; environmental for historic properties.
Land swap and reconfiguration	Acquire Children's Hospital property (Old Kroger) next to the school.	Environmental and ROW.
70 East ramp	Eliminate the ramp from 70 East to Parsons. Get on the C-D farther to the west.	Traffic.
C-D to 70 East	Force the C-D through the Parsons intersection and then enter 70 after the intersection.	Traffic.
Location of fields	Move the fields to the football field location, and move the football field to the field location; then cap between the pedestrian bridge to Grant for the football field.	Structures, real estate and environmental.
MIRANOVA		
Visual aesthetics		Environmental.
Fountains as a counter noise		Environmental.
Mound Street intersection with Short Street		
SPRING STREET TO I-670 WESTBOUND		
Spring Street connection	Eliminate the direct connection from Spring to 670 westbound, and use the existing indirect connection.	City and local concerns.

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Roadway/Geometric Design Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
SCISSOR INTERSECTION		
Roundabout	Roundabout.	Already previously investigated.
Elimination of two-way on Parsons	Eliminate two-way traffic and move the traffic to Lester. Parsons would be a one-way going north to Oak Street.	Locals.
No-build C-D south of Broad Street		City – interrupting continuity.

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ROW/Utilities/Railroad Coordination Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Contractor-performed utility relocation work	Consider requiring the contractor to perform utility relocation work for the utility companies. Accelerate completion; excessive time is needed for utilities to move prior to project. Utility conflicts - 300 to 500 test holes needed to determine location. Consider making the contractor responsible for all utility work. Allow contractor to hire utility sub-contractors approved by the utilities.	Discussion between project and utility companies. Utility company may be opposed to this. Allow prime contractor to hire sub-contractors to complete work. Tie compensation and incentives into a schedule for meeting completion dates for accelerated relocation. Assign one person or group full-time to be responsible for utility coordination from design team, contractor and utility company, to begin now and end at the completion of construction. The officer could be employed directly by ODOT or hired as a consultant. Need to relocate enormous number of utilities, which could have a significant impact on the project schedule. Need to design to avoid major impacts. Begin coordination efforts early, and hold regular update meetings with the utility companies.
Railroad	Avoid the railroad at all cost.	If railroad cannot be avoided, provide sufficient time to review plans and agreements. Get all agreements in writing. Consider revised alignment of the storm sewer if the Whittier Peninsula site is used as a detention pond. Avoid drainage onto railroad ROW. Provide sufficient time to acquire all needed permits.
Africentric School property	Purchase or compensate Africentric School for impacted property. Impacts to fields and track - \$4 million. Total site impacts - \$24 to \$30 million. Potential ramp to Grant Street would further impact school property. Total acquisition would provide 22 acres of staging area, an unquantified cost savings. This would reduce construction costs. There is also significant value in the potential residual after construction is complete.	Columbus City School board involved in process. Advanced acquisition should be considered.

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ROW/Utilities/Railroad Coordination Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Staging areas	Possible increase to overall cost if excessive distance from project.	Consider Africentric School site. Whittier Peninsula is another possibility; however, this may be utilized for storm sewer drainage and detention ponds. More coordination needed with Whittier Peninsula.
SUE	Maximize use of SUE information during design and construction.	Develop conflict matrix. Make effort to "design around" major conflicts.
Compensation and incentives	Consider compensation and incentive issues.	Consider full compensation for all utility work. Create financial and other incentives for meeting completion dates.
Utility coordination	Provide early utility coordination.	Make utility companies part of the team. Establish a dedicated, full-time utility coordination officer beginning now and ending at the completion of construction. Require designer and contractor to assign one person full-time to work with the utilities. Design to avoid major impacts. Begin coordination efforts early. Provide sufficient time to acquire all needed permits.

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Environmental Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Vibration analysis	Look at soil characteristics, proximity and other factors to determine if work exceeds identified thresholds.	Allows ODOT to avoid or mitigate in advance of the project.
Noise and vibration analysis	Share results of the noise and vibration analysis with the public. Share potential effects, and include the public in the decision-making process for avoidance and mitigation.	
Round-the-clock construction	Recommend 24-hour construction. It will be necessary to complete the project in an acceptable timeframe. Will need to involve the public in establishing restrictions for specific areas as well as type and time of activity allowed.	
Environmental consequences of construction	Determine the effects of staging on water quality, neighborhood/historic resources, etc.	Involve the public in discussions through stakeholder committees, public meetings, Section 106, etc.
Design and the environment	Consider how highway design criteria will impact environmental factors. ODOT should consider how the design criteria can be modified to avoid or minimize environmental impacts.	Need to make sure the criteria used are consistently applied.
Project coordinator for environmental commitments	Identify the process for overseeing environmental commitments and assigning a coordinator to handle concerns and complaints during construction.	
Transit investments to reduce traffic volume		
Environmental assessment of MOT plan	Include the public, and consider MOT's effects on access, neighborhood connectivity, transit, bicycle routes, etc.	

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Environmental Skill Set

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Reclassification of EA to EIS	Upgrade the environmental document decision-making to an EIS.	Could substantially lower litigation risk. Compare time associated with document types and potential litigation.
Thorough accumulative effects analysis	Prepare an analysis that is legally defensible. Must include large development plans in the city.	
Legal sufficiency review	Work with FHWA to conduct a 4(f) evaluation soon (prior to design) to ensure project decisions can withstand legal challenges.	
Noise-compatible redevelopment plans	Work with city officials and developers to incorporate noise-compatible redevelopment plans. ODOT should be working with developments like Liberty Place to help them understand the noise implications of the project and develop sites to reduce noise.	

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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>.