HAWAII ACTT WORKSHOP

FOSTERING INNOVATION

INTERSTATE ROUTE H-1 VIADUCT IMPROVEMENTS

U.S. Department of Transportation

Federal Highway Administration

DEPARTMENT OF TRANSPORTATION · STATE OF HAWAII

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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EXECUTIVE SUMMARY

> "This is what this is all about – doing what you have inside of you to make a difference."
>
> *Jim Sorenson, Construction and System Preservation Team Leader, FHWA*

Those familiar with the Accelerated Construction Technology Transfer, or ACTT, process will tell you that comments such as the one made by Jim Sorenson during his closing remarks at the Hawaii ACTT workshop on April 20, 2006, are an accurate reflection of how Accelerated Construction Technology Transfer impacts the project planning process.

That's because ACTT brings together a host of national experts who are committed to fostering innovation, saving time and money, and minimizing inconvenience for the department of transportation's (DOT's) ultimate customer, the traveling public.

The traveling public was very much on the Hawaii Department of Transportation's (HDOT's) mind when it approached the Federal Highway Administration (FHWA) about hosting an ACTT workshop for the Interstate Route H-1, Pearl City, Waimalu and Airport Viaduct Deck Improvements project: steadily increasing traffic volumes and deteriorating deck conditions were prevalent throughout the corridor, and funding constraints meant that the public could face up to five years of construction. HDOT found this timeframe – and the potential public impact – unacceptable.

Together, FHWA and HDOT established the following skill sets for the Interstate Route H-1, Pearl City, Waimalu and Airport Viaduct Deck Improvements project:

- Construction.
- Innovative Contracting.
- Traffic Engineering/Safety/ITS (Intelligent Transportation Systems).
- Public Relations.
- Structures/Geotechnical/Materials.
- Environmental.

Each skill set team focused on how the ACTT process applied to their area of expertise, while the group as a whole searched for methods and measures to help HDOT achieve its goals of reducing project costs and accelerating the construction timeframe by at least 50 percent.

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, HDOT will sift through the various recommendations and decide which ideas should be implemented as part of the Interstate Route H-1, Pearl City, Waimalu and Airport Viaduct Deck Improvements project.

1.1. Opening Session

HDOT hosted the ACTT workshop April 18-20, 2006, at the Hilton Hawaiian Village in Honolulu, Hawaii.

The workshop began with a tour of the project corridor on Tuesday morning. Following registration, the attendees gathered for the opening session. HDOT Director Rodney Haraga and Hawaii FHWA Assistant Division Administrator Vince Mammano provided opening remarks, after which the participants introduced themselves. HDOT State Bridge Engineer Paul Santo provided a project overview, and Caltrans Deputy Director Randy Iwasaki discussed "Why ACTT, Why Now." FHWA Construction and System Preservation Team Leader Jim Sorenson served as session moderator.

1.2. Workshop Process

FHWA Baltimore Resource Center Contract Engineer and Work Session Moderator Jerry Blanding began the second day with an overview of the day's agenda, after which North Carolina DOT Administrator Len Sanderson discussed the brainstorming process. The skill set teams then broke apart to discuss the project and brainstorm preliminary ideas. Before lunch, the group reconvened to share their initial thoughts. After lunch, the skill sets continued their work, intermingling with other teams to ask questions and share ideas. They spent the remainder of the afternoon preparing final recommendations for presentation to the group on Thursday morning.

1.3. Skill Set Goals

The overall goal for the ACTT workshop was to explore innovations for constructing the deck improvements to the viaducts in a timely manner while minimizing impacts to the traveling public and the environment.

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

Construction

- Address construction sequencing.
- Identify contractor staging and material storage areas.
- Maintain safety of construction workers and the traveling public.
- Recommend innovative construction methods that will minimize cost and the construction timeframe.
- Partner to reduce cost and duration.
- 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.
- Reduce the estimated total construction time down to one to two years from the initial five-year estimate.
- Reduce the estimated construction cost by 50 percent.

Innovative Contracting

- Evaluate multiple contracts versus one large contract.
- Consider A-plus-B and A-plus-B-plus-C bidding opportunities.
- Discuss alternate funding mechanisms.
- Minimize cost and duration.
- Consider advance construction contracts.
- Explore innovative construction methods that could minimize both the cost and the project timeframe.
- Evaluate design-build (D-B) options.

Traffic Engineering/Safety/ITS

- Consider parallel/alternative detour routes and low-cost improvements to facilitate traffic movement.
- Maintain the existing number of lanes on H-1 to the maximum extent practical.
- Reduce congestion during peak hours, and consider methods to mitigate congestion.
- Minimize impacts to traffic.
- 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.
- Implement an incident management system and a freeway service patrol contract.
- Maintain traffic at all interchanges and cross streets to the extent practical.
- Consider truck traffic options.
- Consider other area projects and traffic detours.
- Evaluate the potential trade-offs for not meeting current design standards.

Public Relations

- 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.
- Publicize the project well in advance to allow the public to change/adapt their travel patterns.
- Collaborate with the media on traffic mitigation.
- Develop a strategic marketing plan to ease congestion during construction.
- Minimize secondary road usage.

Structures/Geotechnical/Materials

- Extend the service life of the bridge decks to 50 years.
- 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.
- Use prefabricated components to the maximum extent practical.
- Use high-performance materials such as very high early-strength concrete where practical.
- Integrate connections to existing roadways.
- Consider alternatives that provide for rapid construction while minimizing costs.

Environmental

- Identify and minimize project impacts.
- Acquire advance environmental clearance permits with affected agencies, i.e., the Department of Health, the U.S. Army Corps of Engineers, the U.S. Fish & Wildlife Service, etc.
- Minimize environmental construction impacts such as dust and debris.
- Consider innovative methods for noise reduction.
- Utilize aesthetics to minimize visual impacts.
- Evaluate methods to minimize the economic impacts on local businesses.
- Consider innovative alternatives to costly storm water treatment facilities.
- Integrate urban design elements that reflect the character of the surroundings.
- Develop concepts that respect the integrity and character of the people and places in the affected (surrounding) areas.
- Respect and restore the way of life in neighborhoods along the corridor.
- Maintain a safe and efficient road that is sensitive to the context of the H-1 corridor.

2.1. Project Overview

HDOT has proposed improvements to three viaducts – the Pearl City Viaduct, the Waimalu Viaduct and the Airport Viaduct – located within the Ewa and Honolulu districts on the island of Oahu, Hawaii.

The project spans Interstate H-1 from Waipahu (milepost 8.8) to the Honolulu International Airport (milepost 18.1). Collectively, the three viaducts comprise nearly four miles of the nine-and-a-half-mile corridor.

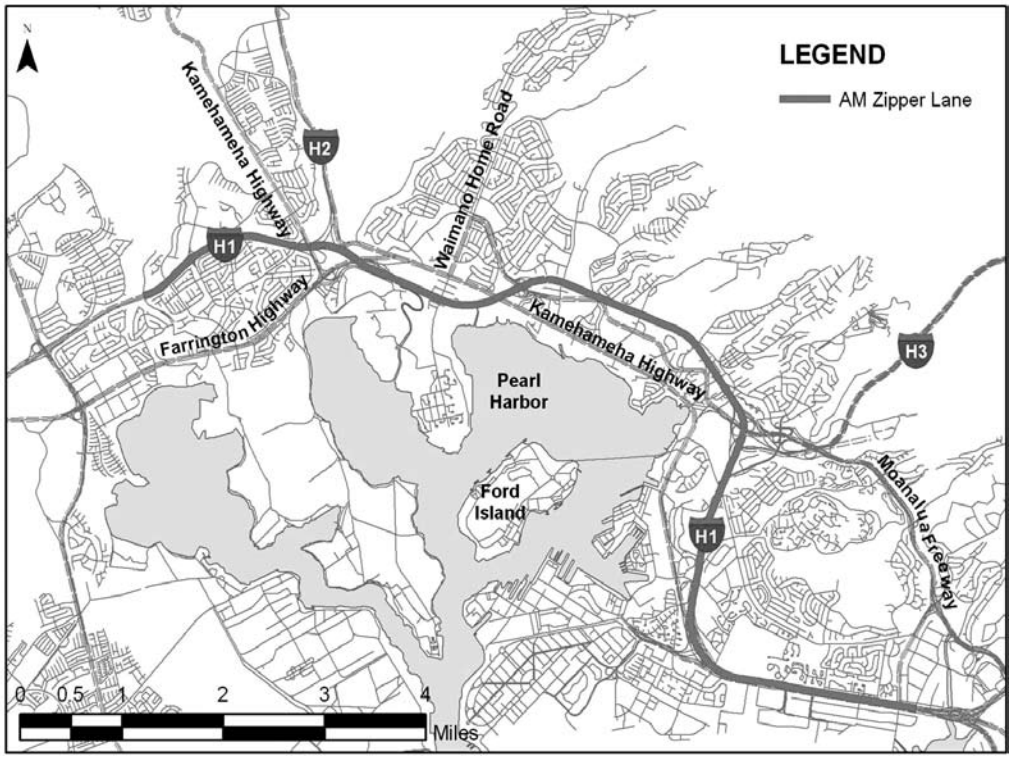

Figure 1: Project Area

The scope of work for the Interstate Route H-1, Pearl City, Waimalu and Airport Viaduct Deck Improvements project is to provide a repair method that will address the deteriorating deck surface of the three viaducts. Ultimately, HDOT's goal is to find a long-term (50-year) solution that will prolong the life of the three structures without crippling traffic along some of the State's most heavily used roadways.

Pearl City Viaduct

The Pearl City Viaduct is an American Association of State Highway and Transportation Officials (AASHTO) girder bridge with a total length of approximately 1.1 miles. It is located between Waiawa Interchange and Waiau Interchange and extends from the Sears Distribution Center building where H-1 crosses over Kamehameha Highway to the Waipahu off-ramp. It was constructed between 1968 and 1970 under four separate contracts.

The superstructure comprises 62 spans of precast, pre-stressed concrete AASHTO girders spaced at five feet, four and a half inches to support an approximately six-and one-half-inch-thick reinforced concrete deck. The eastbound and westbound roadways are actually two independent structures, each 69 feet, eight inches wide.

The substructure of both the Pearl City and the Waimalu Viaducts comprises reinforced concrete piers of multi-circular column frames supported on 16-inch pre-stressed concrete piles.

Waimalu Viaduct

The Waimalu Viaduct is an AASHTO girder bridge with a total length of approximately 0.3 miles. It is located between Waiau Interchange and Halawa Interchange and crosses over Kaahele Street, Waimalu Stream and Pono Street near the Moanalua Road intersection. The construction of Waimalu Viaduct was completed in 1970 under a single contract.

The superstructure consists of 12 spans of precast, pre-stressed concrete AASHTO girders spaced at five feet, four and a half inches to support a six-and one-half-inch-thick reinforced concrete deck. The total bridge width is 138 feet and four inches.

The Waimalu Viaduct is currently being widened in the westbound direction between the Kaonohi Street overpass and the Pearl City off-ramp. The widening will provide a total of six continuous westbound lanes between Halawa Interchange and the Pearl City off-ramp. In addition, shoulder widths will be brought up to current Interstate standards. The widening is expected to be completed in June 2006.

Airport Viaduct

The Airport Viaduct is a tee-girder bridge with a total length of approximately 2.3 miles. It is located between Pearl Harbor Interchange (Valkenburgh Street) and Keehi Interchange and includes the Airport Interchange, which provides access to the Honolulu International Airport, Rodgers Boulevard and Paiea Street. The Airport Viaduct is constructed over Nimitz Highway, which runs parallel to and directly beneath the viaduct. The Airport Viaduct was constructed under multiple contracts and completed in 1981.

The superstructure consists of 111 spans of precast, pre-stressed concrete tee-girders laid side by side to support a six-inch-thick reinforced concrete composite topping. The two half-sections are separated and symmetrical about the centerline.

The substructure comprises reinforced concrete piers of two rectangular-legged rigid frames supported on weathered rock foundations. Planter boxes were installed on top of the inside legs of the rigid frame for landscape planting.

2.2. Project History and Development

KSF, Inc. documented the deteriorating deck conditions along the project corridor in their July 2003 Project Assessment Report on the Pearl City Viaduct:

> *Deterioration of the top surface of the bridge deck has been an ongoing maintenance problem. Potholes initiated by spalled concrete are located throughout the length of the viaduct and are severe in several concentrated areas.*

KSF, Inc. attributes the spalling of the top surface to "corrosion of the top layer of reinforcing steel." The corrosion, meanwhile, was caused by a number of factors, including insufficient cover, cracks, carbonation, high levels of chlorides, tining and simple concrete fatigue. Overall, KSF notes, the viaduct is still structurally sound.

Because Hawaii's climate plays a major factor in long life pavement maintenance, HDOT has initiated a research project on the Waimalu Viaduct. The goal of the study, which is being conducted in conjunction with the current widening project, is to find a long-term solution to deck deterioration on the Interstate viaducts.

The research project will evaluate five proprietary high-performance concrete (HPC) overlay materials: Quikrete, MasterBuilders Set 45 HW, SikaSet Roadway Patch 2000, Sinak Relay and Tamms Express Repair Rapid Hardening Mortar. Besides allocating a specific section of the viaduct to each product, HDOT will be utilizing special surface preparation methods (shot blasting and hydro-demolition) as appropriate for each HPC. The HPCs will then be monitored for five years to assess their performance under local environmental conditions.

2.3. Project Challenges

The primary challenge for the Interstate Route H-1, Pearl City, Waimalu and Airport Viaduct Deck Improvements project is to accomplish the work within severe time constraints. This corridor experiences extremely heavy traffic volumes during the morning and afternoon peak periods (see traffic data below), and it is common to see backlogs throughout the day and on weekends. Therefore, minimizing traffic disruptions and providing reasonable continuity of traffic during construction operations are of paramount concern.

Traffic Data

PEARL CITY VIADUCT

Average Daily Traffic, (2004)	215,249
Average Daily Traffic, (2025)	239,857

AIRPORT VIADUCT

Average Daily Traffic, (2004)	117,932
Average Daily Traffic, (2025)	166,683

Projected traffic volumes were obtained from the Oahu Metropolitan Planning Organization (OMPO). OMPO's data does not represent actual traffic counts; rather, it represents forecasts based on population and employment projections from census data.

HDOT anticipates that the majority of the repair work will occur during the overnight hours on weeknights and, possibly, on weekends.

2.4. Project Status

Rehabilitation of the Pearl City and Waimalu Viaducts is scheduled to begin in FFY 2007 and be complete in FFY 2011. Estimated project cost is $50 million.

The Airport Viaduct portion is not yet programmed, in large part due to funding constraints – the estimated rehabilitation cost is $50 million. HDOT plans to let a short-term repair contract in 2006.

3.1. Construction

The construction team discussed the options available to HDOT and made the following recommendations:

- Identify existing conditions.
- Discuss viable options.
- List advantages and disadvantages.

Existing Conditions

- Evaluate chloride content throughout the entire depth of the deck.
- Determine the extent of crack depth.
- Determine the extent of delamination and the relative quantities.
- Assess the depth of steel before scarifying.
- Evaluate other issues as determined by structures.

Viable Options

- Avoid patching and polymer overlay because of short service life.
- Avoid widening because of cost and environmental concerns.
- Do not recommend half-depth reconstruction because of cost, service life uncertainties and the good condition of the existing deck.

Recommended Option

- Scarify deck to required depth (hydro-milling, roto-milling, micro-milling).
- Consider making hydro-demolition a requirement.
- Do patching concurrent with overlay.
- Increase deck thickness by one inch or more.

Airport Viaduct

- Based on traffic splits, detour traffic from off-peak direction onto surface streets.
- Consider daily shift of peak traffic to viaduct and lesser traffic to surface streets.
- Give contractor full use of viaduct under repair.
- Use conventional construction techniques and materials.
- Consider the impact of other factors, such as:
  - Zipper median coordination.
  - Labor force (both contractor and State). HDOT needs to look at staffing levels in terms of inspections, overtime and timely decision-making.
  - Staging areas.
  - Public transportation/diversion.
  - Traffic counts.

Pearl City and Waimalu Viaduct

- Remove median barrier.
- Create traffic lanes 11 feet wide. This would provide 10 travel lanes with 20 to 22 feet of work area.
- Phase from outer lanes in.
- Provide for zipper lane coordination, including temporary traffic control.
  - Remember that the additional inbound lane will not be available when working in the median area.
  - Address overpass center piers.

3.2. Innovative Contracting

The innovative contracting group began by discussing the assumptions underlying their recommendations and then proceeded with their suggestions:

Assumptions Underlying Recommendations

- HDOT is looking for a long-term solution, not just a crack sealing and patch.
- The Airport Viaduct rehabilitation cost estimate is $50 million.
- A single project is desirable for financing and traffic management purposes.

Recommended Funding Tools

- Consider using Transportation Infrastructure Finance and Innovation Act (TIFIA) funds.
  - Note that there is a $50 million project cost threshold.
  - Can finance up to 33 percent of eligible costs.
- Fund with Grant Anticipation Revenue Vehicle (GARVEE) or other bonds.
- Look at joint development agreements for the right-of-way (ROW) under the viaducts.
- Investigate Highways for LIFE (HfL) financing options.
  - Can apply for a 20 percent grant up to $5 million (100 percent Federal share).
- Solicit stakeholder contributions, i.e., Federal Aviation Administration (FAA), Navy, Air Force, etc.
- Consider private sector financing with private activity bonds (PABs)/TIFIA credit.
  - Combine with availability/performance payments.
  - Take advantage of depreciation tax benefits.
  - Package as a single project to make it more attractive to the private sector.
- Implement user fees or high occupancy toll (HOT) lanes.

    - Might require State legislation.
    - Requires Federal approval under a value pricing pilot program (VPPP) or a similar Interstate tolling pilot program under SAFETEA-LU, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.
    - Will be challenging politically.
- Hold bake sale (Malasadas/Shaved Ice/Zippy's chili/Huli Huli chicken).

Recommended Procurement Options

- Consider A-plus-B or A-plus-B-plus-C contracting, where C is a quality parameter, a maintenance option, etc.
- Utilize a two-step process that consists of short listing qualified contractors and reviewing their proposals.
- Rate proposals utilizing best-value factors, such as:
    - Schedule.
    - Traffic management.
    - Quality.
    - Price/contractor financing/life cycle costs.
    - Public information/public relations.
- Accept alternative technical concepts (ATCs).

Recommended Contracting Tools

- Recommend a single contract versus multiple contracts.
    - Must maintain the option of removing segments from the contract without termination costs. This would provide extra time for financing individual segments and allow HDOT to control the funding/cash flow.
    - Allows for coordination of construction.
    - Provides risk transference.
    - Provides efficiencies of scale.
- Utilize D-B or Design-Build-Maintain.
    - Offers advantageous approach for performance goals.
    - Enables State to accelerate construction.
    - Offers a fixed price.
    - Transfers risk to contractor.
- Implement a long-term maintenance agreement: it offers the quality hook as well as life cycle cost efficiencies.
- Include performance specifications in the areas of traffic management, quality and life cycle efficiency.
- Provide incentives and disincentives in the following areas:
    - Schedule/milestones.
    - Traffic management.
    - Lane closures/liquidated damages/lane rentals.
    - Shared contingency for change orders.
    - Quality.

- Value engineering (VE).
- Public relations/consumer satisfaction.

Other Contracting Issues

- Set up a lump sum contract with schedule-based progress payments. HDOT inspectors would not be required to verify quantities.
- Ensure adherence to all permitting requirements: HDOT bears the responsibility for National Environmental Policy Act (NEPA)/404 permits.
- Address ROW issues early.
- Provide adequate construction staging areas. HDOT is responsible for acquisition of temporary property rights and permits.
- Deal with utilities early. Note: this is not much of an issue, as responsibility falls on the contractor to address this.
- Coordinate with other contractors on potential alternate routes.
- Provide a streamlined contract administration and oversight processes that includes the following:
  - Alternative dispute resolution.
  - Dedicated staff.
  - Escrowed pricing documents.
- Include quality assurance/quality control (QA/QC) specifications.
  - Make the contractor responsible through ISO 9000 or an equivalent program.
  - Have an independent QA/QC firm report directly to HDOT.
  - Have HDOT be responsible for verification testing/audits.

3.3. Traffic Engineering/Safety/ITS

The traffic engineering/safety/ITS skill set offered the following recommendations:

Modeling/Simulation

- Collect traffic data and build a traffic model immediately.
- Use the model to estimate traffic impacts for the various construction alternatives.
- Use graphical outputs for public relations and decision makers.

Traffic Performance Goals

- Set realistic goals early, both for during and after construction.
- Manage the public's expectations.
- Establish responsibility for meeting traffic performance goals.
- Determine how to measure these performance goals.
- Determine the appropriate remedy if the performance goals are not met.

Demand Management Alternatives

- Maximize transit use.
  - Make existing transit more attractive by making it free or subsidizing it during construction, by offering wireless fidelity (WiFi) or by making it more comfortable.
  - Institute a public information campaign to promote transit.
  - Improve travel time reliability.
  - Give transit vehicles preferential treatment at signalized intersections on parallel routes.
  - Think long-term, not just for construction.
  - Construct temporary bus bays.
- Promote rideshare.
  - Consider changing high occupancy vehicle (HOV) lanes from two-plus to three-plus.
  - Promote HOV during construction.
  - Provide more secure park and ride facilities.
- Promote telecommuting and/or flexible commuter work schedules.

Traffic Management During and After Construction

- Use existing and portable devices (closed circuit television, or CCTV, and detection) to monitor traffic during construction.
- Install permanent devices (CCTV and detection instruments) for 100 percent coverage.
- Install variable message signs (VMS) early for use during and after construction.
- Coordinate with the City, H-3 traffic management center (TMC) and construction field office.
- Maintain communication to ITS devices during construction.

Incident Management

- Coordinate work effort with police, emergency management system (EMS) and fire.
- Form a project incident management team.
- Detect and remove incidents quickly.
  - Utilize a freeway service patrol.
  - Provide rapid towing capability.
- Provide access for emergency services.

Traveler Information

- Use existing City/State TMC to disseminate traffic information.
- Coordinate and support public information staff.
- Provide an up-to-date hotline for real time information.
- Create a project web site.
- Provide accurate travel time information.

Construction Phasing and Staging

- Designate a corridor traffic manager.
- Consolidate small projects into one large project.
- Coordinate the construction schedule with projects on alternate routes.
- Consider spot improvements on alternate routes.
- Allow directional-specific lane closures on the basis of actual traffic flow.

Safety

- Consider both the traveling public and the workers onsite.
- Ensure safety for the workers by utilizing barriers and intrusion alarms and by providing safe access to the work site.
- Ensure the safety of the traveling public by providing safe access and by not violating the public's expectations.
- Supply ample education and training.

3.4. Public Relations

The public relations teams offered the following suggestions:

Communications Needs

- Create a vision for the future of the corridor.
- Establish a communications budget that comprises one percent of the project's construction funds.
- Conduct market research to determine the audience and their needs and concerns.
- Develop a strategic marketing plan.
- Build support for the project corridor.

Primary Communications Tactics

- Establish the project management team.
- Hire a communications firm.
- Dedicate a full-time community liaison for the corridor.
- Brand the corridor, i.e., "There's only one H-1."
- Utilize traditional and grassroots marketing efforts to "match the audience with the message."
    - Utilize mailings, a project web site, news releases, paid placements, a project hotline, electronic message boards, etc.
    - Attend community meetings and utilize legislative outreach, community walk-throughs, door hangers, posters, church bulletins/community newsletters, word-of-mouth.
    - Incorporate TV coverage and work with radio and newspaper reporters; editorial boards and traffic reporters.

Additional Communications Tactics

- Seek Federal or other funding sources for public relations (PR) monies.
- Involve City and County officials in developing the traffic management plan.
- Utilize marketing promotions, i.e., art/school contests, grocery bags showing project details, poster contests, a State fair booth, etc.
- Incentivize customer satisfaction.
  - Provide level of service (LOS) bonuses to the contractor.
- Market transportation alternatives through incentives, i.e., bus subsidies, carpool incentives, NU-Ride Program, Guaranteed Ride Home Program, etc.
- Solicit third party and celebrity endorsements.

Ongoing Communication

- Remember to communicate with the internal (HDOT) audience.
- Celebrate project milestones.
- Use a countdown to completion.
- Conduct surveys to determine the effectiveness of HDOT messages. Adjust HDOT's messages and methods as needed.
- Nominate the project for awards.

Additional Corridor Needs

- Provide access for emergency services personnel throughout construction.
- Work with internal and external partners to develop a congestion mitigation plan.
- Require the contractor to hire a private tow service.

Remember: communicate, communicate, communicate and collaborate, collaborate, collaborate!

3.5. Structures/Geotechnical/Materials

The structures/geotechnical/materials group identified what they considered to be key issues along the corridor and made their recommendations accordingly:

- Cracks/spalls/delaminations.
  - Most cracks are shallow (less than one and a half inches deep).
  - The actual causes are not known at this time.
- Bridge joints.
  - The spacing of the existing joints is 200 feet plus or minus.
  - Most of the joints are leaking.

- The long-term deterioration of the beam ends and piers is a concern.
- All repair options should address the joints.
- HDOT needs to try and minimize the number of joints, if possible.

Recommended Investigations

- Investigate the cause of the cracking.
  - Perform a survey and take field samples.
  - Perform a petrographic analysis (alkali-silica reaction or ASR, sulfate, w/c ratio, carbonation, segregation).
  - Take full-depth cores through the cracks and the rebar at good locations as well as bad.
  - Do half-cell potential testing to check active corrosion.
  - Once the cause is known, identify proper repair methods.
- Look into possible repair materials.
  - Survey repair methods from other States/countries.
  - Investigate previous research projects.
  - Investigate potential suppliers.
  - Investigate required material properties.
  - Perform field testing.

Repair Options

- Consider a crack seal and patch.
  - Seal cracks with methacrylate crack sealer or equivalent.
  - Patch the delaminated areas.
  - Provides a low cost alternative.
  - Allows for overnight construction.
  - Has a low probability of long-term success.
  - Consider for Waimalu Viaduct to delay the deck rehabilitation project.
- Do a thin bonded overlay.
  - Does not require partial deck removal.
  - Patch delaminated areas and repair existing patches.
  - Place a thin polyester overlay that is less than one inch thick (can be less than half an inch thick).
  - Need to consider long-term durability: it is a concern.
- Do a patch and overlay.
  - Remove the concrete to the top of the rebar (entire deck).
  - Patch isolated areas.
  - Perform a full width overlay, adding approximately one inch to the existing deck thickness (a one-and-a-half-inch to two-inch total overlay).
  - Use low water content concrete with quality curing methods (a seven-day minimum curing time).
  - Ensure that material is compatible with existing deck concrete.

    - Offers the best benefit to cost ratio.
- Consider a full-depth deck replacement (either cast-in-place or precast).
    - Is the best option for long-term durability.
    - Probably not warranted in this case: the existing deck is not in bad condition overall.

Traffic Control

- Utilize overnight lane closures.
    - Not desirable for a long-term repair.
- Consider weekend lane closures.
    - Minimizes the time needed for a quality repair.
    - Consider local streets, advanced warning, public involvement and truck detours.
    - Need to improve local roads prior to bridge construction.
- Think about long-term closure.
    - Provides the best option for a high-quality repair.
    - Need to decide how this could be done.

Temporary Bridge

- Build the bridge (two-plus lanes wide) over the existing deck to support traffic over the work area. A temporary bridge to the side of the existing bridge is not considered viable because of ROW issues.
- Need to check the structural capacity of the existing bridge.
- Can establish a full-time work area without disrupting traffic.
- Allows for longer term curing of concrete.
- Can establish a work area of one or more spans at a time.
- Can advance the bridge forward as work is complete. Need to determine the best way to advance the bridge from span to span.
- Need to maintain six to eight feet of vertical clearance underneath the bridge.
- Need to support the temporary bridge at the existing piers.
- Need approaches to the temporary bridge with a maximum three percent additional/supplemental grade.
- Design for lower-speed traffic, and close the temporary bridge during non-peak hours.

3.6. Environmental

The environmental group stated that decisions should be made to avoid environmental impacts. If such impacts cannot be avoided, HDOT must incorporate all feasible and reasonable measures to minimize these impacts. With this in mind, they made the following recommendations:

- Process as a categorical exclusion (CE).
- Coordinate with resource agencies early and often.
- Establish an interdisciplinary project development team to make project decisions.
- Establish stakeholder advisory committee(s) that include community representatives (residents, business owners, etc.). Their role would be to provide input to the project development team.

Construction Noise

- Develop a construction noise policy that balances the need to maintain the project schedule and other constraints with the desire to minimize impacts and complaints and provide peace and quiet in noise-sensitive areas.
- Ensure that noise impacts/mitigation will not inhibit the project development schedule.
- Comply with local noise ordinances.
- Include procedures to identify and mitigate noise impacts. Look at the FHWA Roadway Construction Noise Model released in February 2006.
- Include noise control specifications for certification of equipment and maximum lot line noise levels.
- Provide a process to address complaints.

Highway Traffic Noise

- Consider opportunities to reduce traffic noise from H-1 and enhance the noise environment beyond what is required (not a Type I project).
  - Assess alternative pavement textures.
  - Acknowledge that longitudinal textures may provide the greatest benefit.
- Consider increasing the height of bridge rails in noise sensitive areas.

Traffic

- Utilize traffic simulations/assessments to assess cumulative or indirect environmental impacts, especially on alternate routes.
- Develop an adaptive traffic management plan (TMP).
  - Address traffic demand management, i.e., public transportation, park and ride lots, etc.
  - Provide for transportation system management, i.e., traffic signal coordination.
  - Ensure that measures included in the TMP do not add costs to the commuting public.

Other Recommendations

- Identify and assess staging areas and disposal sites. This should be done during pre-design, with permits obtained before construction.
- Be prepared for possible asbestos removal during bridge demolition (joints/bearing pads): assess the situation and obtain the required permits during pre-construction.
- Ensure water quality by minimizing the pollutants leaving the project site.
  - Have the contractor develop approved best management practices (BMPs).
  - Assess possible 404/401/National Pollutant Discharge Elimination System (NPDES) involvement early.
- Maintain air quality by minimizing/controlling dust.
  - Have the contractor develop approved BMPs.
  - Coordinate with the City to optimize traffic signal progression on alternate/arterial detour routes.
- Consider opportunities to enhance aesthetics.
  - Assess the possibility of allowing certain groups to create murals/art on substructures.
  - Consider using anti-graffiti measures or a consistent texture coating for ease in removing graffiti.
- Reduce light diffusion into the adjacent communities, i.e., by increasing the height of bridge rails.
- Assess potential socio-economic impacts, including access to local businesses and residential areas and the efficient transportation of goods and services.
  - Recognize that the impacts are dependent on the volume of diverted traffic.
  - Consider advanced PR with affected businesses/residential areas.
  - Provide free advertising for adversely affected businesses (project newsletters, web site, etc.).
- Identify potential environmental justice (EJ) impacts.
  - Identify the EJ population using census or other available data.
  - Assess possible disproportionate impacts associated with increased/diverted traffic.
- Coordinate with projects near the corridor to minimize other construction and maintain sufficient capacity for diverted traffic.
  - Assess potential project conflicts, i.e., the Kamehameha Highway Resurfacing, H-2 to Waihau Street, the H-1 Rehabilitation, Aiea Heights Drive to Salt Lake Viaduct.

4.1. Next Steps

Now that the workshop is complete, HDOT is evaluating the recommendations to determine which ideas are applicable to the Interstate Route H-1, Pearl City, Waimalu and Airport Viaduct Deck Improvements project. Based on the innovations discussed during the workshop, the agency is discussing a number of issues in depth, including the following:

- Using incentives to speed up construction.
- Constructing a temporary bridge over the top.
- Removing the median barrier to provide for more lanes of traffic.
- Approaching this as one project with multiple phases.
- Branding the project.
- Communicating and coordinating.

As for ACTT's impact on the project, HDOT State Bridge Engineer Paul Santo summed it up well at the conclusion of the workshop: "You've made me a believer, and I think the ideas are all good. Some of the ideas we've known about before but never implemented. Others are new to us."

Once again, ACTT has proven to be a valuable tool in project planning, innovation and success.

LIST OF FREQUENTLY USED TRANSPORTATION ACRONYMS

ACRONYM	FULL NAME
AASHTO	American Association of State Highway and Transportation Officials
ACC	Acid Copper Chromate
ACTT	Accelerated Construction Technology Transfer
ADT	Average Daily Traffic
AGC	Associated General Contractors of America
ASCE	American Society of Civil Engineers
ASR	Alkali-Silica Reaction
ATCs	Alternative Technical Concepts
BIMRS	Bridge Incident Management and Response System
BMPs	Best Management Practices
CAD	Computer-Aided Design
CCTV	Closed Circuit Television
CE	Categorical Exclusion
CM at Risk	Construction Manager at Risk
CMP	Congestion Mitigation Plan
CPM	Critical Path Method
CRCP	Continuously Reinforced Concrete Pavement
D-B	Design-Build
D-B-B	Design-Bid-Build
DEIS	Draft Environmental Impact Statement
DMS	Dynamic Message Sign
DOT	Department of Transportation
EJ	Environmental Justice
EMS	Emergency Management System
EPS	Expanded Polystyrene
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEIS	Final Environmental Impact Statement
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
GARVEE	Grant Anticipation Revenue Vehicle
GPS	Global Positioning System
GRS	Geosynthetic Reinforced Soil
HAR	Highway Advisory Radio
HDOT	Hawaii Department of Transportation
HfL	Highways for LIFE
HMA	Hot Mix Asphalt
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
HPC	High-Performance Concrete
HPS	High-Performance Steel
IT/ITS	Intelligent Transportation/Intelligent Transportation Systems
LOS	Level of Service
MIS	Major Investment Study
MOT	Maintenance of Traffic
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
OMPO	Oahu Metropolitan Planning Organization
PAB	Private Activity Bond
PCC	Portland Cement Concrete
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
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
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
TRB	Transportation Research Board
TSA	Transportation Security Administration
TSP	Thrift Savings Plan
VE	Value Engineering
VMS	Variable Message Sign
VPPP	Value Pricing Pilot Program
WiFi	Wireless Fidelity

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SKILL SET RECORDING FORMS

Skill Sets:

- **Construction**
- **Innovative Contracting**
- **Traffic Engineering/Safety/ITS**
- **Public Relations**
- **Structures/Geotechnical/Materials**
- **Environmental**

APPENDIX C.

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Construction Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Duration of construction time	Add team goal: get in and out as soon as possible.	
Quality product	Add team goal: develop product which has a longer service life (20 to 50 years).	
Customer satisfaction	Add team goal: satisfy administration and the traveling public.	
Contractor storage and staging		Lack of space except for State ROW (interchange).
Access throughout construction area		Ramp closures limited to weekends; lack of manpower in Hawaii. Must provide extra pay for weekend hours; quality may suffer with workers putting in so many hours. There's a lack of manpower on HDOT side. (Field office may have one inspecting supervisor and two working inspectors.)
Adequate HDOT staffing		Lack of qualified personnel to perform inspections; reduce manpower needs by changing bid quantities to lump sum.
Appropriate construction bid item quantities	Use lump sum for quantities easily determined from the plans and unit costs for quantities that are not easily determined.	
Costs	Keep costs to a minimum.	
Warranty	Have contractor provide warranty on repairs.	Very risky for contractor if State specifies method. May be very expensive.
Partnering	Partner with contractors and community.	
Performance based specifications		
Hydro-demolition	Use hydro-demolition or chip out delaminated concrete (construction method).	Hydro-demolition much quicker; need to close two lanes. Possible to hydro-demolish and provide rideable surface. May come in and remove temporary patch and overlay in separate operation.
Traffic demand volumes	Satisfy traffic demand volumes.	

Construction Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Working hours	Change allowable working hours.	
Full deck replacement	Talk to structures group about full deck replacement.	Are girders adequate to support larger deck dead load?
Replacement of bridge deck	Remove and replace larger section of bridge deck. Hydro-demolish and replace concrete up to half the thickness of the existing deck.	Possible problems with time of closure, vibration, steel corrosion of non-replaced section, difficulty in addressing existing rebar. May need to provide uniform chloride content for all concrete throughout deck. Deck may be too thin.
Preliminary investigation	Provide adequate preliminary investigation of the condition of the bridge structure.	Provide coring samples.
Overlay	Consider flyash, microsilica or latex overlay typical in Washington for similar project. Has a 42-hour wet cure requirement.	
Polyester overlay (dry system) or one quarter inch epoxy system	Has a two- to three-hour dry cure requirement.	Saturated surface dry conditions required for placement. Probably only option available to open all lanes during rush hour. Difficult for contractor to predict rainfall.
New lane adjacent to viaduct	Add lane to Pearl City Viaduct or Kamehameha Highway and keep one lane closed during construction.	Possible to involve PM zip lane. On Pearl City and Waimalu Viaduct, it's essential to add another lane. Time factor involved with adding additional lane.
Travel demand management	Determine if feasible to spend money on subsidies for bus, etc.	
Rolling ramp over work area	Previous project in Virginia used a two-lane ramp-over (Route 3, Greys Point Bridge).	Access to work area, type of material. Large section required; eight-foot vertical section minimum for construction.
Longer work times in non-peak directions		

Construction Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Contractor staging areas	Let contractor find own staging areas. Make maximum State ROW available to contractors for staging.	
Reversible traffic	On Airport Viaduct, provide reversible traffic on the viaduct in the peak direction; on parallel roadways, provide reversible traffic in the non-peak direction. Use Nimitz Highway as a detour during peak hours in the non-peak direction (assuming 85/15 directional split). Use viaduct for traffic in the peak direction (eastbound in the AM, westbound in the PM).	Need cross-over of traffic some time during the day.
Work sequence	Remove down to sound concrete, patch and provide overlay using traditional concrete.	No special quick-setting concrete required. Need a known long-term track record.
Incentives for early completion		
Barriers at Pearl City	Remove median barrier and provide movable barrier. Use rapid curing material for end portion of project. Provide seven lanes in peak direction, three in non-peak direction. Will have to provide six peak and four non-peak for a portion of the project. Operations should be concurrent with Pearl City and Waimalu Viaduct work to reduce the duration of lane disruptions.	Need specialized study to determine if cross-over causes hazard. Need to keep zip lane operational. Concern about protecting ZipMobile (attenuator and police minimum). Need incident management response set up for project. Need to protect columns in the median for overpasses.
Containment of hydro-demolition waste		Need to use vacuum truck to remove water from hydro-demolition. May need secondary system to remove other waste.
Barrier between Pearl City and Waimalu Viaducts	Need to decide if a continuous barrier is needed between the two work zones.	
Continuous anchoring of removable barriers	Should be anchored; if not, look at reduction of speed limit.	

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Innovative Contracting Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
D-B		Benefits • Provides accelerated schedule. • Requires less staff oversight. • Fosters private sector innovation in traffic management, methods and processes; offers quality/life cycle. • Has a single point of responsibility. Challenges • May require HDOT to acquire skill set. • There's currently no QA/QC program. Will need to develop specifications. • Need to change mind-set. • Requires change through legislative/ political process.
D-B with independent QA/QC firm	D-B firm would procure independent QA/QC firm to report to HDOT.	Benefits • Less staff time required for oversight. • Requires direct reporting to HDOT to minimize conflicts of interest.
Large contracts	Use a single large contract.	Benefits • May attract larger contractors with requisite experience. • Transfers risk. • Provides coordination of construction/ traffic management by a single entity. • Has a single point of responsibility. Challenges • Cash flow. • Availability of contractors on island.

Innovative Contracting Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Toll road/HOT lanes		Benefits • Requires users to pay for improvements. • Improves cash flow/funding/financing picture. Challenges • May face political/legislative challenges. • Faces public disapproval. • Requires Federal approval under one of SAFETEA-LU pilot programs.
Financing options	Break up projects in phases based on funding.	Benefits • Can pay as you go. Challenges • Currently no funding available for the Airport Viaduct. • Lengthens construction timeframe and increases disruption to traffic and public. • Might foster public perception of "inefficiency" of HDOT.
Financing options	• Consider using TIFIA funds: only accrue interest once you start using. o Secured direct loan. o Loan guarantees. o Line of credit.	Benefits • Only accrues interest once start using. • Lowers project threshold to $50 million. • Can finance up to 33 percent of eligible costs. • Offers attractive interest rate. • Has a long-term payment schedule. Challenges • Involves financing costs. • Requires financial plan.
Financing options	Consider bond finance.	Benefits • Allows accelerated construction schedule. • Allows all three viaducts to be rehabilitated at same time. Challenges • Faces political/legislative opposition. • Adds financing costs.

Innovative Contracting Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Financing options	Consider joint development of ROW under the viaducts.	Benefits • Can be used as additional incentive to contractor. • Provides additional funds for the project. Challenges • Faces homeland security issues.
Financing options	Look into Highways for LIFE financing.	Benefits • Offers up to $5 million in grant money. • Offers 100 percent Federal share. Challenges • Requires additional staff time.
Financing options	Consider contractor financing. o Geared toward $100 million projects. o Need to provide maximum payment schedule for contractor to carry costs in between payments. Base selection on lowest present value price.	Benefits • Allows accelerated schedule without waiting for funding in each fiscal year. • Has low carry costs. Challenges • Might face low contractor interest. • Might receive bids that include carry costs.
Financing options	Look into private sector financing with repayment through availability payments or shadow tolls, i.e., TIFIA and PABs.	Benefits • Offers depreciation tax benefits to private sector. • Offers lower cost of capital than State tax-exempt bond financing. • Can tie payments to availability of lanes and flow of traffic. • Eliminate needs for public user fees/tolls. Challenges • Need to package as a single project. • Involves additional staff time, expertise and consultants as well as additional analysis of financial bids/plans.

Innovative Contracting Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Development of skill sets	Need to develop new skill sets so HDOT has a "toolbox" of skills to utilize the best options.	
Procurement – best value	Utilize a best value selection process with weight given to price and other factors such as schedule, traffic management, quality and the public information plan.	Benefits • Can incentivize quality proposals. • Can consider HDOT goals to process results and select the best team.
Procurement – two step process	Use initial qualification stage to develop a short list of proposers. Second step is the submittal of final proposals with price.	Benefits • Protects owner and contractors by assuring that only qualified contractors will propose. Challenges • Has a longer and more resource/cost intensive procurement process.
Procurement – ATCs	Allow proposers to submit alternative concepts to prescriptive specifications, as long as alternative concepts do not reduce the quality or performance of the project.	Benefits • Fosters innovation.
Long-term maintenance agreement	Require a 15- to 20-year maintenance agreement as part of the bid package. The agreement may be exercised at the option of the owner if the owner believes it adds value after the project is complete.	Benefits • Has a quality hook because the contractor knows that he may need to maintain the project at a fixed price. • Ensures that the contractor considers life cycle costs when designing materials and performing construction work. Challenges • Complicates procurement.

Innovative Contracting Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Performance specifications	Use performance specifications instead of prescriptive specifications, particularly in the areas of traffic management and quality/life cycle efficiency.	Benefits • Fosters private sector innovation. • May reduce costs/price. • May accelerate schedule. • Transfers greater risk to contractor. Challenges • Requires HDOT to develop performance specifications rather than rely on standard specifications.
Incentives and disincentives	Include the following incentives and disincentives to achieve the desired result: o Schedule/milestones, i.e., an early completion bonus and/or liquidated damages for late completion. o Traffic management incentives for maintaining traffic flow beyond the minimum required levels. o Lane closures/liquidated damages/lane rentals. o Shared contingency for change orders. Any unused contingency is shared by the owner and the contractor after the project is complete. o Quality/smoothness incentives. o VE – the owner and the contractor share in any innovations after the contract is signed. o Public relations/satisfaction.	Benefits • Rewards performance that exceeds minimum requirements. • Ensures that the minimum requirements are at least met. Challenges • May need to find additional funding for incentives. • Need sufficient incentive amounts to motivate the contractors to accelerate. • Requires HDOT to gear up for an accelerated construction schedule to ensure that it does not delay contractor operations.
Lump sum contract with schedule based progress payments	Utilize lump sum contract with schedule based progress payments (CPM payment method). Requires contractor to maintain and be paid according to cost-loaded resource schedule.	Benefits • Focuses on inspection and quality of work instead of measuring quantities. • Has a fixed price. Challenges • Requires review and verification of schedule.

Innovative Contracting Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Streamlined contract administration and oversight processes	Involves partnering, development of an alternative dispute resolution process and the use of escrowed pricing documents.	Benefits • Minimizes schedule interruptions. • Minimizes staff resources. • Provides for efficient administration. • Focuses on inspection and quality of work instead of measuring quantities. • Can make this a test case for changing the department's contract administration procedures. Challenges • Requires a new way of administering contracts.

TRAFFIC ENGINEERING/SAFETY/ITS

SKILL SET ROSTER:

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Traffic Engineering/Safety/ITS Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Modeling/simulation	Collect detailed traffic information along the corridor.	Supplement existing ITS detection with temporary detectors to gather volume and speed data.
	Use appropriate simulation models to analyze the traffic impacts of different construction alternatives.	Coordinate with design and construction to choose which method to move forward. A paradigm shift might be required to factor traffic ramifications into the final design.
	Use graphical outputs for the public and for decision makers.	Help them make informed decisions.
Traffic performance goals	Set realistic goals for traffic movement, both during and after construction.	Coordinate with design and construction.
	Manage expectations within the DOT and with the public.	Coordinate with design, construction, operations and public relations.
	Establish responsibilities within the DOT for meeting traffic movement goals within the project limits.	Coordinate with design, construction, operations and public relations.
	Establish performance measures to determine if goals are being met.	Coordinate with design, construction, operations and public relations.
	Determine the remedy if goals are not met, both during and after construction.	Establish project specifications that detail deadlines and remedies. Establish operational goals for use after construction is complete.
Demand management alternatives	Look for ways to maximize transit usage during construction. Look for options that would be useful after construction.	Coordinate between the DOT and local transit.
	Make the existing transit service more attractive to ridership, i.e., provide subsidies during peak hours, add WiFi on the busses and improve seating.	Coordinate between the DOT and local transit.
	Utilize HOV to improve transit reliability.	Coordinate between the DOT and local transit.

Traffic Engineering/Safety/ITS Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
	Provide transit priority on bus route signals throughout the corridor.	Coordinate between the DOT and local transit.
	Install bus bays, either temporary or permanent, on bus routes throughout the corridor.	Coordinate between the DOT and local transit.
	Promote ride-share.	Coordinate between the DOT and local transit.
	Look at implementing HOV-3 for peak hours during construction to offset the loss of capacity due to lane closures.	Coordinate between the design and traffic sections of the DOT.
	Establish additional HOV lanes during construction to offset the loss of capacity due to lane closures.	Coordinate between the design and traffic sections of the DOT.
	Improve security at park and ride locations.	Coordinate between the DOT and local transit.
	Promote telecommuting and flexible work schedules to reduce demand.	Coordinate with major employers or organizations such as the Chamber of Commerce.
Traffic	Utilize existing CCTV and detectors to monitor and manage traffic during construction. Supplement where needed with portable or new devices.	Coordinate between the design and traffic sections of the DOT.
	Install new variable message signs early for use during construction. Supplement with portable signs if needed.	Coordinate between the design and traffic sections of the DOT.
	Establish an ITS TMC for this project. Coordinate with the City TMC and the H-3 TMC.	Coordinate between the design and traffic sections of the DOT.
	Provide specifications which require that existing ITS devices be maintained during construction. This may involve relocating communications or utilizing temporary communications to supplement.	Coordinate between the design and traffic sections of the DOT.

Traffic Engineering/Safety/ITS Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Incident management	Coordinate with an existing traffic incident management task force or establish one for this project. This should include law enforcement, fire and EMS.	Coordinate between the design and traffic sections of the DOT.
	Detect and remove incidents quickly within the project, especially where no safety shoulder is available.	Coordinate between the design, construction and traffic sections of the DOT.
	Implement project-specific freeway service patrols, or incorporate to a corridor-wide program.	Coordinate between the design, construction and traffic sections of the DOT.
	Provide rapid towing capabilities during the project.	Coordinate with DOT incident management, law enforcement and the towing community.
Traveler information	Use a TMC (existing or new) to disseminate traveler information.	Coordinate between the design, construction and traffic sections of the DOT.
	Coordinate and support the DOT public information section in disseminating traffic information for the project.	Coordinate between the design, construction, public information and traffic sections of the DOT.
	Establish a telephone hotline for real time traffic information.	Coordinate between the construction and traffic sections of the DOT.
	Create a DOT traveler information website.	Work with the traffic section of the DOT.
	Deploy sufficient traffic detection to be able to determine travel times at the TMC.	Work with the traffic section of the DOT.
Construction phasing and staging	Provide a traffic manager for all projects throughout the corridor.	Need design specification and/or a construction position.
	Consolidate several small projects into larger projects, as this would have less impact on traffic.	Coordinate between the design and construction sections of the DOT.

Traffic Engineering/Safety/ITS Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
	Coordinate the timing of the HDOT project such that there would be no ongoing construction on any surface streets that would need to be used as alternate routes.	Coordinate between the DOT and locals.
	Consider spot improvements at key intersections on alternate routes to mitigate potential bottlenecks.	Coordinate between the DOT and locals.
	Allow lane closures in off-peak directions based on actual traffic flows versus specific hours set up front in the specifications; the latter might be more restrictive than necessary.	Coordinate between the design, construction and traffic sections of the DOT.
Safety	Consider both the traveling public and construction workers in designing a safe work zone.	Coordinate between the design, construction and traffic sections of the DOT.
	Provide a safe work zone for workers by using positive barriers (where possible), by using technology such as intrusion alarms, and by requiring well designed access points for construction vehicles to enter and exit from traffic.	Coordinate between the design, construction and traffic sections of the DOT.
	Provide a safe work zone for the traveling public by requiring that minimum standards be maintained and by ensuring that work zones don't violate driver expectations.	Coordinate between the design, construction and traffic sections of the DOT.
	Establish worker safety training.	Coordinate between the design, construction and traffic sections of the DOT.

Traffic Engineering/Safety/ITS Skill Set		
Idea Name	**Detailed Description**	**Implementation Details (barriers, skill set coordination, etc.)**
Other	Coordinate with the tourist companies, taxis and rental car companies to make them aware of the construction schedule and to encourage them to avoid the project at certain times.	
	Remove the center median barrier to allow for greater flexibility in providing lanes in the peak direction. This could expand on the zipper lane concept.	

PUBLIC RELATIONS

SKILL SET ROSTER:

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Public Relations Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Public-private proposals	Build as a toll road. Potential partners can come to the DOT, or the DOT can solicit proposals.	
Corridor-wide initiative	Look at the 10-mile corridor from Pearl City to the end of Airport Viaduct in Kalihi.	
Elected officials	Need to get their buy-in on corridor-wide initiative.	
Local constituents	Attend town hall meetings and show plans, graphics, maps, etc.	
Concerns of the traveling public	Ease concerns of the traveling public and corridor residents.	
Excitement for project	Build excitement for the project.	
Project benefits	Promote benefits such as safety and drainage upgrades.	
Formal City partnership	Initiate formal City partnerships: have a joint traffic management team, public relations team and project manager.	
Corridor research	Pay for research to determine who is along the corridor. Do follow-up research as well.	
Multi-lingual efforts	Consider multi-lingual public relations efforts. Conduct research to determine which language to use.	
Work schedules	Work with businesses and large employers to change work schedules. Businesses include Navy base, City government, State government, etc.	
Carpool incentives	Provide carpool incentives.	

Public Relations Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Bus subsidies	Provide bus subsidies.	
Project web site	Buy up all the potential domain names now.	
Project brand	Brand the corridor-wide initiative. Develop a logo and theme, i.e., "There's only one H-1."	
Weekly updates	Place paid weekly updates.	
PR budget	Allocate one percent of construction funds to public relations.	
PR contract	Contract with PR firm to develop and implement a strategic marketing plan.	
Transportation demand	Consider transportation demand strategies, i.e., ITS, lane closures.	
HOV requirements	Increase HOV requirements to three-plus. Research if this is feasible and how to implement.	
Other transportation alternatives	Market other transportation alternatives. Increase bus usage.	
Detours	Identify detours away from the site.	
Media relationships	Build relationships with the media. Talk to editorial boards. Focus on local radio and TV.	
Full-time public information officer (PIO)	Need a full-time person (PIO or media trained person) on this project. Media needs to have 24/7 access.	
EMS access	Provide access for EMS during construction, or at least inform them about alternative routes.	

Public Relations Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Project management team	Establish project management team now. Internally, needs to include every discipline, i.e., public relation, right-of-way, design, construction.	Need to share innovations and successes with everyone.
Alternate modes of transportation	Promote transit or alternate forms of transportation. Develop measurable goals. Consider incentives to promote ridership.	Make part of marketing research.
Guaranteed Ride Home	Check into the Guaranteed Ride Home program.	
NU-Ride	Check into NU-Ride program, a public-private partnership to give you a ride with incentives for members of the public willing to participate.	
Funding	Ask Federal government to pay for public relations.	Check into Federal grants.
CMP	Work with internal and external partners to develop a congestion mitigation plan.	
Grassroots effort	Need an extensive grassroots effort. Build rapport with communities by attending meetings.	Need to center grassroots effort on market research results. Build on current successes.
Future vision	Create vision for the future of the corridor.	
Public face	Consider a "public face" for the project. Needs to be someone who is credible.	
Third party endorsements	Solicit celebrity/third party endorsements for the project.	
Private tow service	Have contractor hire a private tow service for the project.	
Park and ride improvements	Provide park and ride improvements. Requires security upgrades.	
Public opinion surveys	Solicit public opinion surveys. Create a pop-up survey on the web site.	Need scientifically valid data.

Public Relations Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Customer satisfaction	Incentivize customer satisfaction. Provide LOS bonuses to contractor.	Need statistically valid data.
Feature articles	Pitch feature articles to the media. Promote the benefits and the impacts of the project.	
Attention to businesses	Give local businesses special attention. Meet with employees to describe the project.	
Marketing promotions	Utilize marketing promotions, i.e., art contest, grocery bags showing project details, poster contest, etc.	
Project progress	Brag about the progress of the project. Utilize a countdown to completion.	
Awards	Nominate the project for awards.	
TMP	Involve City and County officials in the development of the traffic management plan. Have regular meetings to coordinate detours, lane closures, etc.	
Audiences	Identify audiences, i.e., HDOT, low-income residents (environmental justice), businesses/ large employers, churches, schools, military, travel industry, trucking, shipping industry, emergency personnel, City transit, airports, media, Aloha Stadium, tenants under the viaduct, commuters, elected officials, homeless, residents adjacent to project site.	
Corridor partners	Actively involve management in working with corridor partners.	
Corridor manager	Appoint one person as corridor manager; need one person to ensure efforts are coordinated throughout corridor.	

STRUCTURES/GEOTECHNICAL/MATERIALS

SKILL SET ROSTER:

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Structures/Geotechnical/Materials Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Cracks	Identify what caused the cracks; they are not full-depth. ASR may be a cause. May also be plastic shrinkage cracks. Plastic shrinkage cracks are not full-deck thickness and are typically one inch or less in depth. Deck was probably water cured. Thin deck, salt from air, vibration may also be causing problems to the deck. Lack of proper concrete cover, in addition to plastic shrinkage cracks with the heavy traffic, may be a cause. Carbonation could also be a cause. Petrographic examination may help determine if carbonation is a problem. Most of the cracks are shallow; the majority of the deck can be saved. Craze cracking. Fatigue cracking.	Recommend a detailed investigation as to why there are cracks.
Spalls and delaminations	Look at the corrosion of the rebar and vibration due to traffic. Water infiltration, in addition to vehicle vibrations in the spall pockets, may be causing the spalls. Corrosion ring effect could be a problem. Ten to 15 percent of the entire deck area is spalled (estimate). Almost the entire deck has cracks. Less than a one-inch cover may be prevalent. Some delaminations were found about one and a half inches below the top of the deck.	
Joints	Note that joints are spaced approximately every 200 feet. Leaking of the joints was evident from an underside examination. Damage to the beam ends and beam shelf might be a problem in the future if the joints are not repaired. Compression and strip-seal joints are common. To achieve a 50-year life for the repair, joint repair must be considered.	

Structures/Geotechnical/Materials Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Traffic control	Probably need to work more than just overnight to achieve a 50-year life. Longer term closures are preferred. (A seven-day work period might help.) Utilize a temporary bridge as a detour. Consider night closures. Use local roads. Provide advanced warning/ public involvement. Utilize reversible lanes on alternate routes. Provide truck detours. Use weekend closures. Construct a temporary bridge (moveable) on top of the existing bridge. Use a grid/shorter pattern to accommodate the temporary overhead bridge depth deck. Partial- or full-depth deck replacement is possible using an overhead temporary bridge. Consider a one- or two-lane temporary overhead bridge. Use whatever number of lanes is needed.	Consider both a high-profile (six to eight feet above the structure; no trucks) and a low-profile (put a steel plate over the newly poured overlay) temporary bridge. Need to be able to drive a vacuum truck under the bridge. (Need about eight feet.) If using hydro-demolition, eight to 10 feet of clearance will be required. Use this only during rush traffic hours. Then use other options during non-peak traffic hours. Low level bridge requires a lane closure while the work is being done. Use trailers (self-propelled modular transporters, or SPMTs) to lift the temporary bridge to move as you work along the bridge. Contractor can purchase these systems and re-sell them when construction is complete.
Materials	Note that 4x4 concrete system may not apply to overlay repair. 4x4 is more appropriate for full-depth repairs. Consider the following overnight patch/overlay options: 1. Quikrete. 2. Masterbuilders Set 45 HW. 3. Sika Set Roadway Patch 2000. 4. Sinak Relay. 5. Tamms Express Repair Rapid Hardening Mortar. Look at non-proprietary concrete patch/overlay, i.e., Conventional concrete with low slump with three- to five-day curing, silica fume concrete. Median barrier rehabilitation was mentioned but shouldn't be a problem. Polyester concrete has been used in California. Needs to be done in dry conditions.	

Structures/Geotechnical/Materials Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Partial deck removal	Use hydro-demolition by going to about one-half the deck thickness. Concrete is sound below the rebar.	
Preferred option	Remove concrete to the sound concrete and add an overlay. Consider an additional overlay to add more concrete cover for the rebar.	
Overhead bridge option	Use an overhead bridge option to allow the concrete to cure for five days. The overhead bridge could take up two or three lanes of traffic instead of only one lane. It could be planned such that the contractor doesn't have any down time. If we decide to use the overhead bridge, we don't have to detail everything on the plans; have the contractor do this. The overhead bridge idea may help with the wind conditions. This option: no trucks.	What would the contractor do between pours?
Minimizing joints	Instead of having a joint every 100 feet, consider having a joint every 200 feet. Doing this means you have to address the bridge characteristics and address bearings. Most bearings are elastomeric bearings, so this might not be a problem.	
Seismic	Can be in this project but doesn't have to be.	
Hydro-demolition	Determine what types of pressure should be used for shallow concrete demolition. Pressures at 30,000 PSI could take out too much material. Function of the speed of the machine is important. The operator is very critical for success. Hydro-demolition would take off corrosion. Calcium nitrite could be used as an additive: it doesn't reduce durability. Generally, faster setting concrete reduces durability. Can consider milling to remove concrete and hydro (or shotblast) to prepare the surface for the overlay. Need to consider rebar near the top of the surface when milling.	

Structures/Geotechnical/Materials Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Reinforcing steel	Place corrosion inhibitors on rebar before placing them. Problem is that the existing bars won't have this.	
Low water:cement ratio overlays	Will help with shrinkage.	
Questions for traffic	Can we use weekend closures without the overhead bridge option? Can we use two lanes every weekend for five years? Might be a good idea: Kam Highway can be made reversible. Need to coordinate with City. Upgrading local streets before starting work on the Pearl City Viaduct might help. For what speed limit should we design the temporary bridge? After removing the temporary bridge during non-peak hours, is it okay to close off one or two lanes? Need to address construction while keeping the zipper lane operational.	
Placing normal concrete with low slump.	Determine if there is a vibration problem when placing normal concrete; it's debatable. May be an issue – might want to control speed. NCHRP study says that it wasn't an issue (late 1980s). What is the strength of the overlay versus the existing concrete deck? Is this a concern?	

ENVIRONMENTAL

SKILL SET ROSTER:

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Jodi Chew
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Environmental Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Environmental coordination	Make decisions to avoid environmental impacts. If they cannot be avoided, must incorporate all feasible and reasonable measures to minimize impacts.	Requires close, early and continuous coordination with all resource agencies. Need to establish an interdisciplinary project development team that includes environmental specialists. Develop stakeholder advisory committees to provide input to the project development team. Establish an environmental timeline for milestones (approvals, permits, etc.). Coordination: all skill sets.
Staging areas/disposal sites	Identify, assess and designate potential staging areas and disposal sites. Need to avoid delays, fines, controversy, etc.	Should be completed in pre-design/environmental stage. All required permits should be obtained. Note: California has a policy/process that assesses and designates disposal and staging areas and provides necessary environmental clearance for it. Coordination: construction.
Construction noise	Develop project construction noise policy that would balance the need to maintain the project schedule with the desire to minimize impacts and provide peace and quiet in noise sensitive areas. Policy can include: • Procedures to assess noise impacts and evaluate mitigation methods (movable noise barriers, enclosures, windows, etc.). Use FHWA Roadway Construction Noise Model released in February 2006. • Requirements for noise control plans and monitoring reports. • Noise control specifications for certification of equipment and maximum lot line noise levels. • Process to address complaints.	Project development team should coordinate with staff and stakeholders to develop a proactive noise construction policy. The following possible goals should be considered: • Minimize noise impacts to the greatest extent that is reasonable and feasible (to include detour routes, staging areas and construction sites). • Ensure that noise impacts/mitigation will not inhibit project development schedule. • Comply with local noise ordinance. Coordination: construction, traffic, PR.

Environmental Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Traffic noise	Consider opportunities to enhance the noise environment beyond what is required (not a Type I project).	Assess alternative pavement textures (longitudinal, random transverse, etc.). Increase the height of bridge rails in noise sensitive areas. Has possible visual impacts. Note that decreasing the number of joints/ increasing span lengths will reduce the structural noise. Coordination: construction, structures.
Hazardous waste	Prepare for possible asbestos removal during bridge demolition (joints/bearing pads).	Do asbestos assessment and obtain required permits: should be done pre-construction. Coordination: structures.
Water quality	Minimize pollutants leaving the project site.	Require contractor to develop approved BMPs. Assess possible 404/401/NPDES involvement early. Coordination: construction.
Air quality	Minimize/control dust and pollutant emissions. Address the perception of a deterioration in air quality because of an increase in idling vehicles.	Require contractor to develop approved BMPs. Coordinate with the City to optimize traffic signal progression on alternate/arterial detour routes. Coordination: traffic.
Visual/aesthetics	Consider opportunities to enhance aesthetics.	Assess the possibility of allowing certain groups to create murals on substructure. Consider using anti-graffiti measures or a consistent texture coating to allow for graffiti removal without leaving patches. Coordination: landscape architect, maintenance, PR, structures.

Environmental Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Light pollution	Consider opportunities to reduce light diffusion into adjacent communities.	Consider replacing existing system with updated system that will reduce unwanted light in adjacent communities. Coordination: traffic.
Traffic	Use traffic simulations/assessments to help assess cumulative or indirect environmental impacts, especially on alternate routes: • Kamehameha Highway. • Moanalua Freeway. • Possibly Salt Lake Boulevard. Successful traffic management is key to avoiding many impacts.	Use simulations/assessments to assess indirect or cumulative impacts such as: • Noise. • Environmental justice. • Socio-Economic. • Community cohesion. Develop an adaptive TMP that includes incentives for traffic demand management and transportation system management strategies. Measures included in the TMP should not add costs to the commuting public. Lane closures and other construction in the project area need to be avoided or minimized. Include an extensive PR effort. Coordination: PR (extensive and continuous), traffic.
Socio-economic impacts	Assess potential socio-economic impacts such as access to local businesses, access to residential areas and efficient transportation of goods and services. The extent of adversity depends on the volume of diverted traffic.	Requires advanced PR with affected businesses and residential areas. Possible mitigation measures include providing free advertising for adversely affected businesses (project newsletters, web site, etc.). Coordination: traffic, PR.

Environmental Skill Set

Idea Name	Detailed Description	Implementation Details (barriers, skill set coordination, etc.)
Environmental justice	Identify potential EJ impacts.	Identify EJ population using census or other available data and assess possible disproportionate impacts. Coordination: traffic, PR.
Other projects	Coordinate with projects near the corridor to minimize other construction and maintain sufficient capacity for diverted traffic.	Evaluate possible project conflicts: • Kamehameha Highway Resurfacing. • H-2 to Waihau Street. • H-1 Rehabilitation. • Aiea Heights Drive to Salt Lake Viaduct. Coordination: construction, programming (HWY, HWY-SM, City).

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 2006.

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

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