Collaborative Leadership: Success Stories in Transportation Mega Projects

A “Lessons Learned” Approach to

Collaborative Leadership in Mega Project Management

U.S. Department of Transportation
Federal Highway Administration

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ABSTRACT

What are the keys to successful collaborative leadership for transportation mega projects? The Federal Highway Association (FHWA) asked six graduate students from the University of Maryland University College to conduct a study to identify the keys to successful collaboration necessary to implement large-scale transportation mega projects. The FHWA asked the students to research three successful mega projects; the I-15 Reconstruction Project in Utah; the Infrastructure for the 2002 Olympic Winter Games; and the Alameda Corridor Project. In addition, two smaller successful projects, the Big I in New Mexico and the Hyperfix Project in Indianapolis, Indiana, were also studied.

Collaborative traits presented by David Chrislip were compared to those identified by the project managers of these successful projects in order to identify the keys to successful collaborative leadership for mega projects. The results of this study will be extremely useful for future mega projects or programs as project managers develop their collaborative approaches to achieve success. The document will serve as a basis for a “lessons learned” approach to collaborative leadership in mega project management.

TARGET AUDIENCE AND STAKEHOLDERS

If you are a public official, a member of a grass-roots organization, a business or a citizen interested or involved in the planning, funding, development or implementation of mega projects, this paper is a must-read for you. Since by their nature, mega projects require collaboration with numerous entities with different interests, objectives and needs, excellent collaborative leadership is the key to bringing these projects from inception to fruition. All stakeholders, whether in a leadership role or not, can benefit from knowledge of collaborative leadership. This paper will provide each stakeholder with useful information gathered from several successful FHWA mega projects and will guide you through the collaborative leadership process.

INTRODUCTION

Collaborative leadership is an important tool in the planning, design, and implementation of mega projects. Transportation mega projects are defined by the total expenditures of $1 billion (or more) for the duration of the project or when the interest in the project is at the national level. Mega projects are inherently complex and difficult, but a review of several mega projects shows these extremely complex projects can be completed on time, under budget, and maintain the public trust using the collaborative leadership model. The purpose of the case study is to review previous successful mega projects and highlight the collaborative leadership efforts utilized by the Federal Highway Administration (FHWA), state transportation agencies, local governments, and community based organizations that helped to make these projects successful.

Collaborative leadership will be defined along with details on how collaborative leadership was successfully utilized in several transportation mega projects. The mega projects we examined include; the I-15 Reconstruction Project in Utah; the 2002 Olympic Winter Games

Infrastructure in Salt Lake City, Utah; and the Alameda Corridor in California. We also examined two other projects that were extremely successful, but did not meet the $1 billion threshold. These projects were the Big I (I-25 & I-40) in Albuquerque, New Mexico and the Hyperfix Project in Indianapolis, Indiana. The collaborative successes of these two projects provided additional insight into successful collaborative leadership.

Each transportation project will be described in detail, identifying the requirements for the project; the stakeholders; and a strengths, weaknesses, opportunities, and threats (SWOT) analysis. In addition, budgets, marketing ideas, and collaborative leadership examples within the project will help identify the key reasons for each project's success.

The project team at the University of Maryland University College that compiled the research will perform an assessment of lessons learned by previous mega project managers and provide insightful recommendations to serve as a beneficial tool for future project managers of FHWA mega projects.

WHAT IS COLLABORATIVE LEADERSHIP?

A good way to begin discussing collaborative leadership is to first discuss what it is not. Leadership in the industrial age has mostly consisted of a hierarchical, command and control structure. In an industrial environment, a production-line approach led to stable and predictable processes with a clearly defined power structure. Those at the top owned and controlled the system and the information. In the hierarchical model, people at the bottom of the organization were rewarded for hard work and loyalty by the potential to move up in rank and seniority. We accepted the concept that the success of a venture depended on the leadership skills and directions of the one person at the top (Dentico, 1999). The hierarchical approach is no longer enough since public and private entities are now faced with complex and rapidly changing environments where information is abundant but answers are few. This familiar linear workflow has evolved into a multi-faceted problem-solving effort that needs to be flexible and quickly adaptable. Today's information age presents complex issues that need a different problem-solving approach: collaboration.

Collaboration, as defined by Chrislip and Larson (as cited in Chrislip, 2002):

> "…goes beyond communication, cooperation, and coordination. … It is a mutually beneficial relationship between two or more parties to achieve common goals by sharing responsibility, authority, and accountability for achieving results. … The purpose of collaboration is to create a shared vision and joint strategies to address concerns that go beyond the purview of any particular party"

The collaborative approach within an organization is based on the concept that all workers within that organization need to be fully engaged in pursuing a common goal or vision to ensure success. When the common goal or vision has buy-in from the workers, productivity is increased within a group setting when compared to individual efforts. The collaborative approach centers on the concept that innovation, creativity, and leadership can come from workers at all levels. The job of a leader becomes more focused on ensuring the work environment is supportive of these workers allowing them to succeed on a personal level, which then benefits the entire organization. The goal of the leader is to foster collaborative relationships within and between work teams thereby bringing diverse viewpoints into the decision-making process (Dentico, 1999).

Christopher Avery (1999) presents the collaborative leadership challenge as a two-part problem. The goal of the collaborative leader is to focus the participants on two concepts: results *and* meaningful experience. A typical challenge for the collaborative leader is the fact that most of the people brought together into a group are not under the leader's direct control. In addition, many of the people in the group are the ones causing the problems in the first place. An effective collaborative leader uses the dual-focus approach to enable the people causing the problems to solve the problems themselves. The leader prepares for the task by studying the issues and what motivates the various players and then helps them implement a solution.

In addition to being able to bring together the right people at the right time, a collaborative leader must be flexible. Yeakey (2002) describes how recent developments facing today's military such as technological changes and the constantly changing flow of information in the operational environment require the use of adaptive leadership in order to succeed. This concept has parallels to transportation mega projects that are illustrative of the challenges faced by project managers and collaborative leaders. Yeakey discusses the U.S. Army Field Manual (FM) 22-100, Army Leadership wherein it is stressed that leaders must adapt their style to the situation and people with which they are faced at any given time. A military leader has two primary tasks: the task specialist who accomplishes the task; and the social specialist who focuses on the relationships within the group. This is similar to mega project management in that the group dynamics need to be in good order for the mega project task to succeed. The leader must adapt his or her leadership style in accordance with the maturity level of the person being tasked. People in a group will range from being technically able to do a task and having the self-confidence and responsibility to accomplish it alone to people who are neither able to complete a task nor willing to take the responsibility upon themselves to actually get the job done. A mega project often does not get to choose who will participate on a given task from the public's side. Another parallel with mega projects is that the military leader is imposed, as is the mega project management staff. The ability to help those who are being led or managed to look beyond this fact requires the ability to adapt to the given situation.

The collaborative approach is in contrast to an authoritarian federal government approach that has been used for many years. Chrislip (2002) presents several assumptions about public decisions that support the practice of collaboration and collaborative leadership that are keys to successful interactions for transportation mega projects.

- *The quality of public decisions stems directly from the quality of the engagement used to make them.* There must be a conscious decision made to engage the public that has come to mistrust the government with the goal of arriving at better decisions.
- *Public decisions must respond to the real needs of the community or region*. Imposing a solution from "Washington" will only cause resentment. Engaging the local citizens and authorities can bring to light their true needs and foster a sense of ownership in the project.
- *People in a place should have some control over forces that affect their lives*. The world is changing at an incredibly fast pace. Competing interests threaten to divide the public into ever smaller and competing groups. Collaboration helps counter these effects.
- *Understanding of others and of essential information about public concerns comes before judgment and decision*. Collaboration looks for common ground before moving forward. While it may take time, the effort expended in gaining mutual understanding results in trust and a willingness to compromise.
- *In order for collaboration to work, all participants must engage as peers*. All participants have equal weight in a collaborative environment. While this may not be possible for all mega project decisions, allowing as many decisions to be made in a peer environment as possible will gain the project credibility and participant buy-in.

BENEFITS OF COLLABORATIVE LEADERSHIP FOR FHWA

Mega projects, by their nature are inherently complex because they involve many entities with different interests. There is usually much opposition and controversy surrounding these projects making them even more difficult. There are numerous problems to resolve, many of them involving competing and conflicting interests. The following generalized SWOT Analysis briefly illustrates some of the issues that must typically be addressed and offers possible strategies to resolve them using a collaborative process:

Table 1 - Generalized SWOT – Mega Projects

	Strengths	**Weaknesses**
	1. Strong need 2. Grassroots support 3. Political support 4. Funding 5. Strong, creative leadership 6. Collaborative process	1. FHWA tends to be large, slow government 2. Mega projects are very complex 3. Mega projects are very costly 4. Mega projects are likely to present many unforeseen problems 5. Mega projects always have Environmental impacts
Opportunities	**S-O Strategies**	**W-O Strategies**
1. Improve the economy of the effected area 2. Improve safety for those that live in the area 3. Conserve the environment by eliminating other impacts	1. Use creative leadership to strategically initiate the project 2. Use a collaborative process to define the benefits of the project – economics, safety and environmental 3. Use grassroots and political support to gain funding	1. Perform detailed cost benefit analysis to show the public that the project is worth the cost 2. FHWA should focus its attentions on building an efficient mega project management organization in order to take advantage of the opportunities these projects offer 3. Using a collaborative process, show the public how the project eliminates or improves existing environmental problems (i.e., rail system eliminates smog by getting trucks off the road)
Threats	**S-T Strategies**	**W-T Strategies**
1. Environmental constraints 2. Limited funding 3. Scope creep 4. Time – delays increase costs 5. Politics – People use large projects to satisfy personal needs 6. Opposition – People hate change	1. Balance environmental constraints with need 2. Design the project such that existing environmental impacts are eliminated as a result of the project 3. Leaders need to control scope creep by carefully defining the project through a collaborative process with the stakeholders and be tough on any deviations from scope 4. Use an open, collaborative	1. Mitigate environmental impacts by replacing lost resources as a part of the project (i.e., reforestation, wetlands mitigation, storm water management, etc)

	process to validate the opposition's concerns and address issues 5. Creative leaders should encourage supporters to lobby for increased political support and funding 6. Leadership should perform extensive research through environmental studies, obtain property data, cost benefit analysis, etc. to ensure that time delays are avoided due to unforeseen issues	

Collaborative leadership in a transportation mega project environment can help the managers of the project successfully deal with the complexities of the project by bringing those affected into the problem-solving and decision-making process. The task of the project managers is to bring together the various stakeholders as soon as possible.

The sense of buy-in gained by the stakeholders, as well as, the detailed information on stakeholder concerns gained by the project managers outweighs the challenges in managing a mix of public and private groups. The following section describes how collaborative leadership has worked in the successful completion of recent mega projects by the FHWA.

SUCCESSFUL COLLABORATIVE LEADERSHIP EXAMPLES

INTERSTATE 15 (I-15) RECONSTRUCTION PROJECT

I-15 (van Eyck, 2003)

Description/Purpose

As one of the fastest growing areas in the nation, (during the mid to late 1980s) and with I-15 being the main North-South transportation route through Salt Lake County and Utah, the local planning agency, the Wasatch Front Regional Council, (WFRC), the Utah Department of Transportation (UDOT), and the Utah Transit Authority (UTA) felt the need to address the problems on I-15. I-15 was a very busy highway with severe congestion and damage on most of the bridges caused by 30 years of traffic and deicing salts. The existing I-15 had six lanes with current traffic volumes of about 140,000 vehicles per day Southbound, and about 200,000 vehicles per day Northbound. There was also no parallel or substitute route for traffic going either way on the highway.

These problems prompted a decision to do a study on the joint highway transit needs and an environmental study. In early 1990, a Draft Environmental Impact Study (DEIS) was issued, and the study reported a need for additional capacity and a light rail transit facility on I-15. Five years after the DEIS was issued, a Supplemental Environmental Impact Study (EIS) was sent out to the public for review. This Supplemental EIS, with a proposal for an improved highway design received strong public support. In 1996, the final EIS along with a Record of Decision in the I-15 project was issued.

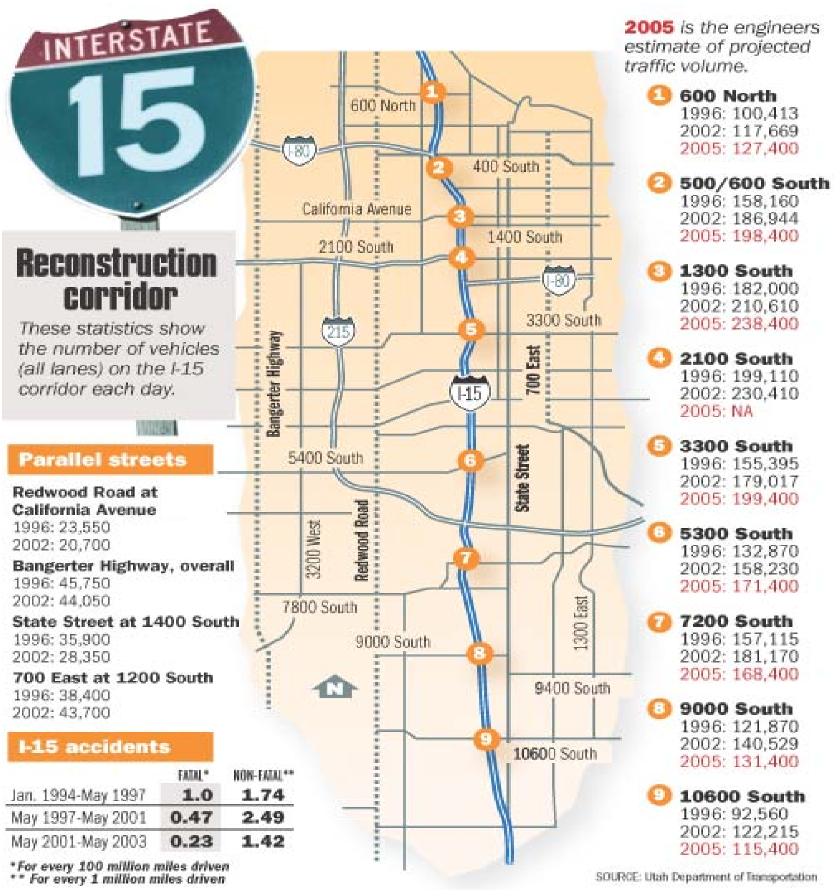
The I-15 Reconstruction Project was born, "the largest project ever undertaken by the State of Utah, and the largest single design-build highway contract in the United States." This project, a $1.59 billion design-build project, would involve "Reconstruction of 26km of Interstate mainline and the addition of new general purpose and High Occupancy Vehicle (HOV) lanes, construction and reconstruction of more than 130 bridges, the reconstruction of seven urban interchanges, reconstruction of three major junctions with other Interstate routes including I-80 and I-215, construction of an extensive region wide Advanced Traffic Management Services (ATMS) component." (Nelson, Utah's I-15 Design-Build project: Preconstruction Phase).

The reasons for the design-build method of contracting, a decision agreed upon by the State Governor, the local chapter of the Association of General Contractors, political leaders and other Executive Directors of UDOT, included:

- Strong public support to complete the project as soon as possible so as to minimize severe traffic congestion that would result from traffic being diverted off I-15.
- A need to complete the project early before the 2002 Winter Olympics to be hosted in Salt Lake City.
- This method would relieve UDOT of problems associated with the design and construction of other individual projects which were happening at about the same time (Nelson, Utah's I-15 Design-Build project: Preconstruction Phase).

"A revamped "spaghetti bowl" interchange is part of the finished I-15 reconstruction project. Two years after the $1.59 billion project's completion, Utahans are enjoying state-of-the-art travel on the 17-mile corridor." (van Eyck, 2003)

I-15 Statistics



(I-15 Statistics, 2003)

Stakeholders

- Utah Department Of Transportation (UDOT)
- Federal Highway Administration (FHWA)
- Parsons Brinkerhoff (PB) (Project Consultant)
- Wasatch Front Regional Council (WFRC)
- Metropolitan Planning Organization (MPO) for the Salt Lake City urbanized area.
- Utah Transit Authority (UTA)
- Residents of Salt Lake City and Utah Counties
- Utah State Governor's office
- Utah State Legislators
- Wasatch Constructors
- Railroad
- Utilities

Requirements

The design-build approach for the I-15 project was approved by the FHWA under the Special Experimental Project (SEP-14) procedure. This procedure "provides for some deviations from the normal Federal aid requirements dealing with selection of contractors and consultants." (Baxter, Utah's I-15 Design-Build Project: Meeting the Challenge through Innovation).

Since the I-15 was the first of its kind, the management team created by the UDOT Executive Director (which included seven UDOT engineers; the Project Consultants Parsons Brinkerhoff; an oversight team, made up of UDOT upper management and a representative from the FHWA, and from WFRC; Salt Lake City's MPO) set out to educate and promote the campaign on the benefits of the design-build method. The team made several presentations to

Legislative groups, contractor organizations, and governmental units not associated with the project.

The plan called to award the contract in approximately 12 months and give about four and a half years for construction of the project. The project was divided into seven design sections, each sublet to a consultant firm to identify all needed Right of Way (ROW) and access issues. The project factors used included: Organizational Qualification, Management, Work Plan/Schedule, Technical Solution (which included Maintenance of Traffic (MOT), Geotech, Pavement, Structures, and Maintainability), and Other (which included Aesthetics, Drainage/Water Quality, Roadway Geometrics, Lightning/Signals/Signing, Hazardous/Harmful Material Remediation, Concrete Barrier, and ATMS).

On March 26, 1997, the UDOT Executive Director, announced the winning contractor with the Best value offer as the Wasatch Constructors, who would design and build the I-15 project.

SWOT Analysis

Strengths

- Strong Need and Public Support: Public survey showed that Utah citizens understood the need for the project and would prefer a more aggressive, shorter scheduled project.
- Political Support: The Governor of Utah identified transportation issues as critical and after the final EIS was done, agreed this was an area he would like to advance.
- Favorable economy (with Salt Like and Utah Counties being one of the fastest growing urban areas) made it possible for the project to advance.
- Strong and Creative Leadership: Leaders and State Legislatures supported the reconstruction projects and also funded other needed transportation projects.

- The use of the design-build method of contracting made it possible to complete the project ahead of schedule, under budget, and with minimum disruption to the public.
- Collaborative Leadership process: There was a partnership between UDOT and FHWA, and UDOT created a project management team, separate from its traditional and established processes, to encourage “an environment for creativity and innovation” for the project. (J.R. Baxter, personal communication, November, 2004)
- Funding: Even though the project was mostly funded by the state via the Centennial Highway Endowment Fund (CHEF) initiative, it was also eligible for Federal-aid funding, making it possible for FHWA to have approval authority for many parts of the project.
- Good Planning/Strategy: The project's initial plan for a three-phase procurement process allowed it to carefully select the best value contractor for the project.

Weaknesses

- Complexity: an issue with mega projects, since there has to be coordination with a lot of entities.
- Environmental impacts.

Opportunities

- The willingness of the FHWA to approve the design-build approach under the SEP-14.
- The “Olympic Impact”: Upcoming Winter Olympics were also instrumental in getting the project on a fast track.
- The need for additional capacity and improved traffic congestion on the existing I-15 corridor.
- The Best Value Offer would encourage competition, innovative design and a proposal that would be most cost effective.

Threats

- Option of having one contractor could easily backfire and cause public accusations.
- Poor cash flow, which could cause schedule delays.
- Coordination with railroad and utilities given the high number of such facilities on the I-15 corridor.
- Railroad related delays with about 500 or 600 construction conflicts due to roughly 1500 utility crossings.
- Impact on the business community along the I-15 corridor due to access restrictions on selected interchanges and increased congestion.
- Increased traffic problems and congestion due to traffic being redirected to the Salt Lake City belt route I-215.
- Possible opposition from the many entities involved in the project.
- Upcoming Winter Olympics Games.

Budget/Funding

The initial funding of the project came about as part of a 10-year statewide Centennial Highway Endowment Fund (CHEF), established by the Utah State Legislature in 1996. The CHEF created a 10-year commitment of $2.6 billion in revenues for highways. However, the project was eligible for Federal aid funding.

The $1.325 billion contract awarded to Wasatch Constructors Joint Venture included:

- $565 million in structures
- $197 million in earthwork
- $110 million in pavements
- $67 million in ATMS infrastructure

- $32 million for maintenance of traffic
- $104 million in engineering/design.

Other costs related to the project included UDOT's management costs, ROW, upgrades to parallel facilities, insurance, and other miscellaneous costs, which brought the grand total to $1.59 billion.

Marketing

The unique I-15 Reconstruction Project involved several different entities; and would create an improved traffic pattern on the highway and also improve traffic during the 2002 Winter Olympics.

Given that the design-build approach was approved under SEP-14, some deviations and waivers were allowed in the project coordination and process. Also most of the issues that may affect the different entities were somewhat included in the contract package such that the cost was borne by the design-build contractor.

- The local chapter of the Associated General Contractors (AGC) requested that Utah contractors be given a share of the contract work. However, this commitment was no longer possible when the project became eligible for Federal aid funding. UDOT therefore made it possible for the contract to allowing bidding on approximately $100 million in construction subcontracts to allow local contractors the opportunity to bid on some of the work.
- For the dozens of railroad overpasses and underpasses to be constructed or reconstructed in this project, the UDOT coordinated with the railroads; however, made the contractors responsible for dealing with the railroads and such related issues.

- With approximately 1500 utility crossings in the I-15 corridor, the UDOT will provide direct reimbursement to the utilities for eligible relocation costs; however, the design-build contractor is responsible for any utility related work and will pay for any relocation costs by the utility.
- There was a fuel adjustment clause in the contract allowing for any increase or decrease in the base price of crude oil by more than twenty-five percent, since a percentage of the work would include grading, paving, and structures.
- To facilitate the design-build approach, the UDOT provided 100% of complete design packages for some critical design project areas, which needed to be completed early. This made it possible for the contractor to start construction as soon as the (Notice to Proceed) NTP was issued.
- The project served as a training ground for engineers and employees of the UDOT and FHWA. FHWA sent its staff on professional development programs out to the site, and there was FHWA staff on a 2-4 month rotational assignment on the project.
- For the non-selected contractors, a stipend of $950,000 was given to each contractor to offset the cost of preparation of some portions of their proposal, given that each contractor spent about $3-5 million on their proposals. This move gave the UDOT the opportunity to "ensure a maximum degree of innovation and quality on the development of the proposals, and to allow the UDOT to own and share with the successful proposer (Wasatch Constructors) any ideas contained within the proposals." (Baxter, Utah's I-15 Design-Build Project: Meeting the Challenge through Innovation)
- A $50 million award fee (comprised of pay outs on a six month interval throughout the duration of the project) was to be given to the design-build contractor. The award was based on timely performance, quality of work, management and community

relations/maintenance of traffic. (Baxter, Utah's I-15 Design-Build Project: Meeting the Challenge through Innovation.)

- Overall, issues related to insurance, risks, ISO 9000 Certification, quality control and assurance were made the responsibility of the design-build contractor.

Collaborative Leadership During the I-15 Project

With the I-15 mega project being the largest single project ever built in the U.S. at the time of its completion; and with the design-build method of contracting, which led to successful completion of the project ahead of schedule and under budget, there was some significant impact made as a result of the leadership skills applied on the project. The collaborative leadership process included:

- Support from Utah leadership at the highest levels;
    - The Governor of Utah, whose agenda to address transportation, land and water issues, ultimately made this project significant.
    - The Utah State Legislature who worked to provide state funding for the project through the CHEF initiative; while also addressing other projects.
- Creative environment encouraged by the UDOT's management team, which changed from the traditional way of contracting to the innovative design-build method to successfully finish the project.
- Partnership between UDOT and FHWA; which created an avenue for FHWA to provide the needed support to UDOT for the duration of the project. Partnership would also ensure continuous, open communication and full understanding of the project goals, and expectations by all entities involved.

- Involvement of the public by the UDOT through the initial public survey conducted pre-project to obtain public understanding of the need for and support of the reconstruction project.

Key Reasons for Success

These included:

- The decision to use the design-build contracting method which:
    - "allowed for an objective and timely consideration of massive, complex proposals, using a structured team approach
    - provided opportunities to implement and understand innovative contract techniques, leading to improved project quality and delivery for the transportation industry
    - was necessary to meet schedule constraints, meet public's request and would balance the project goals of time, quality and cost." (Baxter, & Daves, Utah's I-15 Design Build Project: Evaluation and Selection process)
- Public Support: After the extensive public opinion survey conducted by the UDOT, the citizens of Utah preferred a shorter duration for the project, even if it meant a greater inconvenience. The community understood the need for the project.
- There was adequate planning to fund the project through the state legislature's CHEF initiative.
- Collaborative leadership amongst the various entities involved in the project plan and execution.

Conclusion

The I-15 Reconstruction Project is seen as a unique project to the transportation industry; with a tremendous opportunity for the FHWA to study and incorporate in other projects of such size and complexity. The design-build approach says it all about the strength, strategy, quality, goal, innovative techniques, leadership process and structured team approach incorporated in this project. From the initial DEIS to the final construction phase of this project, the processes worked well given the limited application within the transportation industry.

As the division representative to UDOT's I-15 project oversight committee, and a member of the Management Technical Advisor Team during the evaluation and selection process, Mr. Roy Nelson in his article "Utah's I-15 Design-Build Project: Preconstruction Phase" noted that the I-15 project "presented UDOT with a significant challenge for scheduling and completion in response to citizens concerns for prolonged disruptions and the 2002 Winter Olympic Games;" however, the choice of the design-build approach over the traditional contracting "allows UDOT to meet scheduling demands and minimize disruptions to the public," and " it also allows UDOT to benefit from several private sector innovations and value added features." "The traditional contracting would have taken extraordinary coordination of multiple projects and an extended delivery period for completion." (Nelson, Utah's I-15 Design Build Project)

After completing the I-15 project, the safety record for the highway improved. In recent UDOT statistics, from May 2001 to May 2003, there has been a noticeable drop in the overall accident rate from 1.74 (from 1994 until the spring of 1997 when the project started) to 1.42, for every million miles driven. Also for every 100 million miles driven, there has been a significant drop in the fatal accident rate from 1 to 0.23. This, according to UDOT executive director John Njord, makes I-15 a very safe facility. (Safety, 2003)

2002 OLYMPIC WINTER GAMES INFRASTRUCTURE

Description/Purpose

If you want your city to become a focal point for the world, then submit your nomination to host the Olympic Games. Although the 2002 Olympic Winter Games would only last for seventeen days, when the Olympic Committee announced in June 1995 that Salt Lake City, Utah won the selection to host the Winter Games, it started a chain of collaborative events the world had never seen before.

The transportation professionals associated with the planning for the Utah infrastructure quickly came together to develop partnerships between federal, state, and local stakeholders to ensure the success of the Winter Games. The tremendous amount of international media coverage associated with the Olympics caused great concern for the transportation professionals. Just like the Olympic athletes, the world would judge the performance of the transportation professionals. The media could report on the smallest of problems associated with traveling to and from the multiple sites surrounding Salt Lake City and create a black eye for the transportation professionals. The world would remember their traveling experiences and forever associate that aspect with their overall experience at the Olympic Games.

Therefore, efficiency and reliability of transportation would be among the most important benchmarks in determining the success of the Winter Games. The transportation practitioners were charged with carefully developing and implementing a transportation plan to ensure efficient operations during this acutely sensitive time. The Federal Highway Administration (FHWA), by supporting their partners in the preparation and operation of the transportation network during the Winter Games, had an active role in this dynamic initiative. (The Federal Highway, 2002)

Stakeholders

Building the infrastructure for the 2002 Olympics Games involved a large number of organizations and people from around the globe. People from nearly every country attend the Games and go home with stories to tell regarding their experiences. The large list of stakeholders included:

- Federal Highway Administration (FHWA)
- Office of the Secretary of Transportation (OST)
- Utah Department of Transportation (UDOT)
- Salt Lake Organizing Committee (SLOC)
- Utah Transit Authority (UTA)
- U.S. Forest Service
- Federal Aviation Administration (FAA)
- Residents of:
    - Salt Lake City, Utah
    - Park City, Utah
    - Provo, Utah
    - Ogden, Utah
    - Salt Lake County
    - Utah County
- Olympic participants
- Olympic spectators
- Media personnel from around the globe

Requirements

The Olympics bring thousands of additional people to a location and can create havoc if the infrastructure and transportation system are not addressed accurately. The committee working on the design for Olympics in Salt Lake City had the following requirements to design, build, or improve:

- Eight highway improvement projects.
- Improve access to several of the Olympic venues.
- Expand and make accessible Utah's mass transit system.
- Build "park-and-ride" lots or "park-and-walk" lots near venue sites.
- Clear and build a 33.6-hectare (83-acre) temporary, paved parking lot and then restore all of the temporary lots to their original state by removing the recycled asphalt base, re-contouring, spreading topsoil, and re-vegetating the areas.
- Create a 20 percent reduction in non-Olympic traffic.
- Improve local airports due to the increase in travelers.

(Njord, 2002)

SWOT Analysis

Strengths

- Developed partnerships developed early between the Federal, State, and local agencies.
- Determined the roles and responsibilities for the agencies early in the timeline.
- The creation and development of an overall Olympic transportation plan that included representatives from all the agencies involved.
- Designed and utilized communication systems to disseminate up-to-the-minute advisory conditions to the public.

- Flexibility in federal funding generated many issues and interagency cooperation allowed timely processing of the Olympic projects.
- Identified and implemented security initiatives early in the planning process.

Weaknesses

- The disappointment felt by local governments when their unrealistic expectations of financial gain were not what they expected.
- The significant increase in security requirements after the events of September 11, 2001 created longer waits than originally planned.
- Travel plans were affected due to the tighter security at airports around the world.

Opportunities

- Many of Utah's infrastructure improvement projects already in place were accelerated after the selection of Salt Lake City as the host of the Olympic Games.
- The funding personnel had the opportunity to re-evaluate the funding methods due to the accelerated projects.
- After conducting an opinion survey in 1996, the design-build method was utilized as the public preferred a timelier construction process.
    - "Utah needed to shorten the overall project duration and also hoped to promote innovation and improved performance," says Michael Morrow, field operations engineer at FHWA. "Design-build appeared to be the only contracting tool to get the job done." (Yakowenko, 2004)
- Ability to collaborate with staff from the Atlanta and Nagano Olympics to gain insight into their transportation challenges.

- The need for clear, accurate, and distinctive signing was one of the lessons learned from previous Olympics. (The Federal Highway, 2002)

Threats

- The cyber threat associated with the internet-based reporting system (Activation Information Management System (AIMS)).
- Employee burnout as preparing for the Games required extensive coordination.
- Environmental concerns with re-vegetating after the removal of the temporary parking lots.
- With billions of dollars involved, fraud may occur.
  - "Fraud schemes are sophisticated operations, and can operate undetected." (Peters, 2004)
- The events of September 11, 2001 redefined Olympic security and the entire security plan was re-evaluated and refocused.

- Increased security due to the aftereffects of September 11 had an enormous impact on transportation, including more closed roads, increased security credentialing for those involved in the Olympics, and longer waits for people entering secure areas, including venue sites. (The Federal Highway, 2002)

Budget/Funding

Funding a billion dollar mega project takes collaboration from many organizations. The difficulty in identifying and obtaining the large sums of capital required to complete the project is a tremendous task.

- Table 2 lists federally participating highway projects that were completed specifically for the Olympic Games. These projects were developed after the Olympics were announced and were intended to directly support Olympic-related traffic. The federal share on these projects was derived mostly from discretionary funds or by Congressional earmark.

Table 2

Olympic Projects (in thousands of dollars)		
Project	**Federal Funds***	**Total Funds**
Snowbasin/Trappers Loop Road	**$15,000**	**$15,000**
Utah Winter Sports Park Road	**$3,871**	**$4,686**
Soldier Hollow	**$3,750**	**$4,038**
Intelligent Transportation System	**$2,998**	**$3,339**
Olympic Planning	**$6,972**	**$6,981**

Includes formula and discretionary funds. As of March 2002.
(The Federal Highway, 2002)

- Table 3 contains a list of major highway projects that were identified early in the planning process as necessary for hosting the Olympics, but which were also previously (prior to receiving the award of the 2002 Olympics) identified in the state's planning and programming process as needed improvements. These projects would have been built regardless of whether Utah had received the Olympic Games. However, in most cases, the projects on this list were accelerated to ensure completion before the Olympic Games.

Table 3

Accelerated Projects (in thousands of dollars)		
Project	**Federal Funds***	**Total Funds**
SR-248	**$8,633**	**$8,736**
Silver Creek Junction	**$26,715**	**$28,859**
Kimball Junction	**$13,415**	**$14,540**
Soldier Hollow	**$6,091**	**$6,528**
U.S. 89 Interchange	**$5,557**	**$14,435**
I-15 Design-Build	**$225,773**	**$1,428,888**
I-15 ITS & ATMS	**$21,698**	**$33,022**
I-215/3500 S. Interchange	**$1,885**	**$2,180**

Includes formula and discretionary funds. As of March 2002.
(The Federal Highway, 2002)

Marketing

Completing a mega project is extremely difficult in that all parties involved have their own agendas. The parties involved must work together to send a common vision to achieve success. Marketing your organization's agenda openly and honestly provides the best opportunity for overall success and gaining the public trust.

- The Olympic Transportation Plan was developed by all of the agencies and was a critical element in disseminating advisories to the public.

- UDOT's "Know Before You Go" campaign included a website, radio updates, media alerts, and several other outreach mechanisms to provide transportation updates to the public during the Games.
- The AIMS tool provided the public with up to the minute information on accidents and emergencies affecting routes to and from the events.
- An Olympic transportation guide with maps to the events was distributed at local retail stores and with the Olympic ticket packages, which also helped local residents know which areas to avoid.
- A U.S. DOT Information Center served as an information/command center for stakeholders during the Games and was designed to facilitate monitoring of Olympic operations and efficient dissemination of Olympic-related information.
- Olympic pins were designed and distributed for walkers and shuttle riders for walking or riding to various events to reduce traffic.
- UDOT launched its toll-free 5-1-1-traveler information hotline to hear the latest traffic updates, current road conditions, public transportation information, and weather forecast.
- CommuterLink℠, a new state-of-the-art nerve center at the Traffic Operations Center (TOC) was built as the muscle and brain behind Utah's transportation management program. Information from approximately 200 closed-circuit TV cameras, congestion detectors, 55 variable message signs, 540 traffic signal controls, ramp meters, and 21 weather sensors is processed through the TOC. (Njord, 2002)

- The information room at the TOC was one of the key transportation centers during the Winter Games. (The Federal Highway, 2002)

Key Reasons for Success

The success of the 2002 Olympic Games resulted from successful collaboration on many fronts. Working together on a clear, common goal ensured success in designing and building the infrastructure and transportation systems.

- **Partnerships**
    - The partnerships created a sense of teamwork and cooperation that resulted in a highly successful plan of operation that moved Olympic participants, spectators, media, and area residents efficiently and effectively.
    - The One DOT approach was an effective strategy because it facilitated exceptional cooperation between the activities of state and local partners who had not traditionally worked together.
- **Roles and responsibilities**
    - A formal agreement between partners identifying roles and responsibilities should be developed as a working document and adjusted as the process progresses.

- Visiting the previous Olympic sites in Atlanta and Nagano to review their lessons learned proved invaluable in identifying potential problems during the planning phase and not after construction.
- The early identification of key Olympic projects and the subsequent funding requirements is extremely important.

- **Funding**
  - Funding for Olympic and non-Olympic facilities should remain separate, but separate funding sources for Olympic and non-Olympic critical facilities should be identified.
  - Flexibility in funding for transportation projects can accelerate the receipt of appropriate funds to complete the key projects. Evaluate innovative contracting and financing scenarios in the early planning phase.
  - Establish a joint single audit process to allow for a more streamlined process.
- **Communications**
  - CommuterLink℠ collaboration has been the key to making technology integration in Utah so successful. This technologically advanced site experienced dramatic success as site hits, which averaged 1,500,000 per month before the official launch, spiked to over 23,000,000 hits per month in December 2001. As the official source of transportation information during the Salt Lake 2002 Olympic Winter Games, during which it experienced more than 74 million hits, the Intelligent Transportation Society of America honored the CommuterLink℠ website with a "Best of ITS 2002" award. (Knopp, 2002)
  - The "Know Before You Go" campaign provided outreach for key transportation updates to the public during the Games and helped instill the public trust.

- "OLYMPIC TRAFFIC JAM, ON THE WAY TO SOLDIER HOLLOW, My heartfelt thanks to the "transportation experts." (Trent Nelson/ The Salt Lake Tribune)" - This photograph and caption from the February 19 issue (courtesy of the Salt Lake Tribune) was one of many positive media messages about transportation during the Games. (The Federal Highway, 2002)

Conclusion

The announcement in June 1995 to hold the 2002 Winter Games in Salt Lake City, Utah started a tremendous chain of events that involved countless people from around the world. How the designers and developers of the infrastructure and the transportation system completed their tasks would be judged by the entire world, as the media would be on hand during the Games to relay any negative press.

One of the key concepts of the plan for successful Olympic transportation was the need for a 20 percent reduction in non-Olympic traffic. Due to an aggressive outreach campaign, the 20 percent reduction was achieved and exceeded. (The Federal Highway, 2002) In the aftermath of the completed project, Morrow says, "There's a sense of 'can do' within Utah now." Morrow credited a solid public information effort, a spirit of partnering, visible progress, and delivery on promises with helping achieve the successful public approval ratings. In fact, transportation for the 2002 Winter Olympic Games was deemed a remarkable success, and many observers credited Utah with providing the best transportation of any Olympic games. (The Federal Highway, 2002)

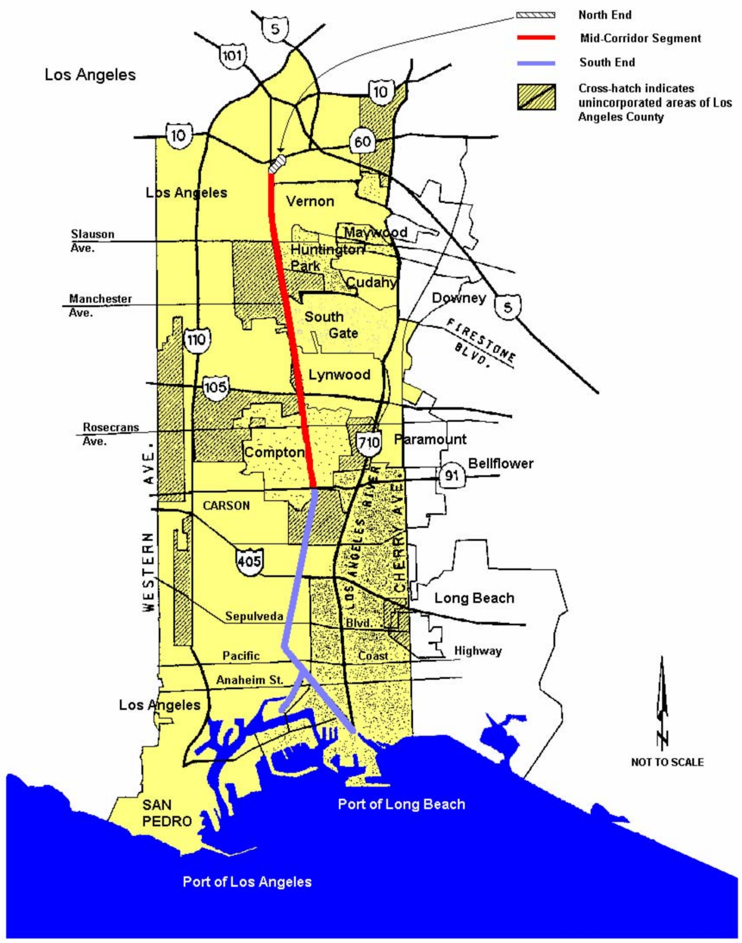
ALAMEDA CORRIDOR PROJECT

Description/Purpose

The Alameda Corridor was a rail project designed to consolidate rail traffic between the Ports of Los Angeles and Long Beach and the rail yards near downtown Los Angeles. It consolidated 90 miles of rail and 200 roadway crossings into a 20-mile high capacity transit corridor between the ports of Long Beach and Los Angeles, California. “Twenty-five percent of all waterborne international trade in the United States passes through these ports,” representing the third largest shipping container complex worldwide. (U.S. DOT, 1999) The Corridor will provide a capacity of 12.7 million containers per year as opposed to the current 3.5 million over existing tracks as of 1998. The project will also reduce motor vehicle congestion because it eliminates some 200 rail-high crossings.

The corridor consists of three segment divided into 15 subprojects:

- North Segment – 3 miles – 8 subprojects
- South Segment – 7 miles – 6 subprojects
- Mid-Corridor Segment – 10 miles – 1 subproject (U.S. DOT, 1999)



Alameda Corridor (U.S. DOT, 1999)

Stakeholders

- Federal Highway Administration
- Federal Railroad Administration
- Alameda Corridor Transportation Authority (ACTA)
- Cities of Los Angeles and Long Beach, Ca.
- Ports of Los Angeles and Long Beach, Ca.
- Six cities through which the railroad passed known as the “Corridor Cities”– Los Angeles, Long Beach, Vernon, Huntington Park, Lynwood, South Gate, Compton and Carson.

- Private railroads (Santa Fe, Union Pacific and Southern Pacific) – to share common ROW with competitors.
- Southern California Association of Governments (SCAG) - interested in easing traffic congestion.
- Ports Advisory Committee (PAC).
- Los Angeles County Metropolitan Transportation Authority (LACMTA) – interested in easing traffic congestion.
- Residents of area – interested in jobs.

Requirements

The Ports of Long Beach and Los Angeles are the two busiest ports in the United States and the third busiest in the world, handling more than $200 billion in cargo in 2001. The rail system to these ports had become inefficient. The four rails coming to the ports could not handle the increasing traffic and were causing detrimental impacts on the communities through which they passed. (ACTA, 2004) The benefits of the project included:

- Consolidated, more efficient rail movements.
- Reduced congestion/conflict with motor vehicles at some 200 crossings.
- Community beautification projects since the rails bisected many communities.
- Reduced emissions by 28 percent since the rail mileage was reduced from 90 miles to 20 miles.
- Cut delays at crossings by 90 percent.
- Reduced emissions of idling motor vehicles waiting at crossings by 54 percent. (ACTA, 2004)
- Improve economy of the entire area by creating job training and new jobs.

- Improve the quality of life to over 2 million people in Southern California. (Argarwal, Giuliano, & Redfearn, 2004)

SWOT Analysis

Strengths

- Strong needs to provide adequate infrastructure to carry cargo to the port areas.
- Many entities benefit from the project's success – the ports, the rails, the corridor cities through which it passes, and all who benefit from trade.
- The two ports were strong champions of the project.
- Creative people at the Federal level to help create the funding package. (M. Huerta, personal communication, November 12, 2004)

Weaknesses

- The project took 21 years to bring to fruition. As time went on, the project became more and more expensive just through escalation of costs due to inflation.
- Rail projects were not eligible for Federal grants. (M. Huerta, personal communication, November 12, 2004)
- The project was very complicated.
- The project was very expensive.

Opportunities

- Improve traffic safety in the port cities by eliminating 200 crossing points.
- Improve the environment by reducing emissions.
- Improve trade by increasing rail capacity.
- Improve economics of the corridor cities, as well as the port cities, by providing job training and creating job opportunities.

Threats

- Corridor cities, communities through which the new rail passed, could slow the project by going to the legislature, holding up permits and causing controversy.
- Environmental issues.

Budget/Funding

Illustrating what a truly collaborative effort the project was, the funding for the Alameda Corridor came from a mix of both private and public sources as follows:

- Revenue Bonds $1,229 million
- Federal DOT Loan 428 million
- LACMTA Contribution 355 million
- Ports Contributions 394 million
- Railroads Contributions (Purchase of ROW) 18 million
- State of California 7 million
- TOTAL $2,431 million (U.S. DOT, 1999)

Gaining cooperation from this many entities was no small feat and is testimony to the leadership talent of those involved.

Marketing

- One important aspect of marketing was getting the media on board, especially in terms of the environmental process. The other major effort was the "road show" – a series of presentations designed to educate the administration and congress on the importance of ports and why the project was in the national interest. They used customs receipts and taxes paid as examples. Unfortunately, they failed to distinguish the ports of Los Angeles and Long Beach from other ports. This made it impossible to fund with grant funds since it would set a precedent and all of the other ports would be coming to the FHWA for money. (M. Huerta, personal communication, November 12, 2004)

The many stakeholders of the Alameda Corridor Project had their own personal interests. Cities in the mid-corridor were concerned about the effects of construction, increased trail traffic and the many negative effects the projects could bring to their community. ACTA offset these concerns by including economic development features into the project that included:

- Employment of local residents for at least 30 percent of all work hours.
- Establishment of training centers for local residents for both construction and non-construction jobs.
- Commitment to enroll graduates of train centers in apprenticeship programs.
- Funding of a youth program for graffiti removal, trash pickup and other activities at $1.2 million. (Argarwal, Giuliano, & Redfearn, 2004)
- The ACTA Board voted to remove the six mid-corridor cities from the Board. The cities sued and lost; however, ACTA knew they could cause project delays. To offset this, they signed memorandums of understanding with each city in exchange for monies to mitigate the impacts of the projects. The cities agreed not to cause permitting delays or challenge environmental impact reports. (Argarwal, Giuliano, & Redfearn, 2004)

Key Reasons for Success

- Strong project champions, the Ports.
- Flexible leadership at both the local, as well as the Federal level.

- "Creative, willing people on the Hill (Capital Hill)." (M. Huerta, personal communication, November 12, 2004)

(ACTA, 2004 Photo Gallery)

Conclusion

The Alameda Corridor project was a huge success for all involved because its project champions were able to make the project a win-win situation for everyone involved, even those who opposed it. This required strong project champions, in this case, the Ports of Los Angeles and Long Beach and a great deal of flexibility from everyone involved including the Federal level made the project come together. Some important lessons learned from this project are applicable to all mega projects:

- Mega projects must have a strong group of champions in the region – in this case, the ports.
- Mega projects need champions in the Federal Agencies in powerful positions who can help solve problems and get to people who can help solve problems. Sometimes special legislature is needed to overcome problems.
- There needs to be flexible, creative people at the federal level (Capitol Hill).
- Do not allow anything anyone says to be fatal. Take the problem and go to the right people and get it solved.

- These large projects are inherently chaotic. Need to be flexible and willing to work together right down to the signing of the loan.
- Cannot go into the project with preconceived notions of what the right answer is. Focus on the outcome. (M. Huerta, personal communication, November 12, 2004)
- The faster you get to the press with changes in funding the more likelihood that the focus will be on a solution to the problem rather than who to blame
- Quality control will always be a concern due to change orders, supervision, capabilities and oversight.
- Human resources require technical expertise but also institutional knowledge.
- Projects of this type require a visionary leader and an extraordinarily, well thought out sales pitch.
- "Humility – Egos get in the way. You have to put aside your knowledge/feeling/perspective and accept what others say and do – listen." (P. Basso, personal communication, November 15, 2004)

BIG I (I-25 & I-40)

Big I, Albuquerque, New Mexico (FHWA, 2001)

Description/Purpose

The Big I construction project was the largest transportation project constructed in New Mexico. It is located at the junction of two major interstate highways I-25 (Pan American Freeway) and I-40 (Coronado Interstate), which connected to the downtown area of Albuquerque. The intersection was ranked number 10 in congested interchanges in the nation based on a study conducted by American Highway Users Alliance (AHUA). (Rahn, 2001) The New Mexico State Highway and Transportation Department (NMSHTD) rebuilt the Big I interchange in Albuquerque to make it safer and more efficient.

The original Big I was designed in 1966 for daily volumes of 40,000 vehicles. In 2002, it handled 400,000 vehicles per day, 10 times the original volume. It was the busiest interchange in New Mexico and was severely over capacity. An average of 1.7 crashes per day was estimated to cost about $12 million annually. (Bergeron, 2004)

The Big I contains a total of fifty-five bridges within the project of which eight precast concrete segmental bridges are curved "fly-over" ramp bridges. The eight precast segmental ramps consist of:

- Ramp SE (15 spans, 767 meters in length)

- Ramp NW (11 spans, 565 meters in length)
- Ramp WS (6 spans, 288 meters in length)
- Ramp SW (4 spans, 184 meters in length)
- Ramp NE (4 spans, 199 meters in length)
- Ramp ES (4 spans, 181 meters in length)
- Ramp EN (4 spans, 198 meters in length)
- Ramp WN (4 spans, 190 meters in length) (ASBI, 2002)

- Interstate Highways 25 and 40 intersect at the heart of Metro New Mexico. (MNMDA, 2002)

Approximately 320,000 square feet (7.4 acres) of bridge deck was required to complete the project (Camp, 2001). It added frontage roads parallel to the main lines and upgraded the four mainline legs for some distance each side of the interchange. These precast segmental bridges were the first of this type built in New Mexico. It involved more than 2 million cubic yards of dirt; 610,000 tons of hot-mix asphalt (HMA); and 165,000 cubic yards of concrete. (ASBI, 2002)

Stakeholders

- Avar Stone Company - Second Post-Tensioning materials
- D'Ambra – Rebar Subcontractor
- City of Albuquerque
- The D.S. Brown Company - Bearings and Expansion Devices
- Federal Highway Administration (FHWA) - Administrators
- Finley McNary Engineers, Inc. - Construction Engineering and Inspection (now Parsons Bridge and Tunnel)
- Intelligent Transportation System (ITS) – Traffic management system
- New Mexico Department of Transportation (NMDOT) - Owner
- New Mexico State Highway and Transportation Department (NMSHTD) – Engineers
- Peter Kiewit Sons', Inc. - Subsidiary
- Residents of Bernalillo County
- Schwager Davis, Inc. - Post-Tensioning materials
- Sika Corporation - Epoxy
- Southern Forms, Inc. - Segment Casting Forms
- Twin Mountain Construction – Contractor and Precaster
- URS Corporation - Structures Design Manager: Alex Whitney
- U.S. Department of Transportation (USDOT)
- Waycor – Concrete supplier

Requirements

- 700 construction workers with 2 million work hours without a lost-time accident. (Riek, 2002)

- Two traffic lanes open from 5:30am to 9:00pm. (Illia, 2002)
- The project required contractors to provide quality control and construction engineering inspection for the project.

SWOT Analysis

Strengths

- The design of the Big I was finished in 18 months and received data from multiple stakeholders. (ASBI, 2000)
- The superstructure design was very uniform and the contractors worked on the project very quickly.
- The construction of the ‘Big I’ established a national record for the most rapid completion of an urban freeway interchange in 22 months and 3 weeks and approximately 1 month ahead of schedule. (Illia, 2002)
- Good working relationship between designer, owner and constructors allowed flexibility on suggestions/requests to be integrated into the project. They worked very closely together.
- Quick response to most Big I accidents within five minutes or less by placing police and fire officials in construction zone.
- Cost savings due to applying automated systems at Intelligent Transportation System (ITS) work zones so no agency staff personnel were required.

Weaknesses

- Resources are scarce in New Mexico and funding is not easy to gather.
- Current highway has no interior shoulder available; it may increase traffic congestion if there is an accident.

- There is no analysis completed to determine the effects of the project in the environment of Albuquerque, such as air and noise quality.
- Sealer needs to be applied every 3 – 5 years on the concrete bridges to prevent cracks. (Zdravesky, 2002)

Opportunities

- Improve the materials applied to the concrete bridge with proper design of concrete bridge structures.
- Use asphalt rubber as a noise wall to reduce sound from 50% to 80%. (Zdravesky, 2002)

Threats

- The construction violates U.S. Environmental Protection Agency (EPA) standards for ozone and carbon monoxide; Albuquerque would lose a substantial amount of federal funding.
- In order to proceed with construction, traffic congestion increased 20% during peak hours.
- Faced a $2,000-an hour penalty when traffic lanes delayed to open or kept for construction. (Illia, 2002)
- Hundreds of cracks appear on the surface of concrete bridges; about 35% of thermal cracking on the new Big I occur when warm weather arrives. (Zdravesky, 2002)
- Second coat of sealer, Mark-135, apply to 40% of the concrete bridges and cost three quarters of million dollars from New Mexico taxpayers. (Zdravesky, 2002)

Budget/Funding

- Interstate Maintenance Discretionary program (IMD-025-4(078)) - $10 million.

- New Mexico issued $1.2 billion in bonds with 4.6% interest rate and 4.5% of inflation rate. (Riek, 2002)

Marketing

NMSHTD used different media channels to increase the project transparency and interests for Albuquerque residents, travelers, media outlets, and local businesses. According to NMSHTD, Big I construction information released through:

- A daily map of Big I construction was published in the major Albuquerque newspapers. (Leyendecker, 2001)
- Weekly updates and daily announcements on construction activities were posted by the Interstate Ernie Traffic Network.
- A highway radio advisory and KRQE-TV show informed project features to I-25 and I-40 neighborhood. (Leyendecker, 2001)
- A media response team was formed by project engineers and contractors to answer media questions in real time.
- The Big I website was launched and supported subscriber's e-mail and pager updates.

By providing the construction services and news support, job opportunities and economic benefits were created to the city of New Mexico:

- According to Department of Labor statistics, construction businesses added about 1,200 jobs in 2003. (Webb, 2004)
- I-25 and I-40 are major routes for freight transport from Los Angeles through New Mexico into the mid-west, points east, and north-south, and serves the North American

Free Trade Agreement trade commerce. Therefore, reducing the bottleneck of Big I will lower the cost of goods shipped over this route.

- Albuquerque commuters and residents reap more than $10 billion in economic benefits from the improvement of Big I. It saves approximately $1,370 per year for travelers if they travel twice a day between the I-25 and I-40. (Rebuild California, 2002)
- The economic benefits of improvements from 2000-2022:

Over the 2-year construction period and the 20-year life of the project, the improvements to the "Big I," already under way, will generate more than $10 billion in economic benefits.

Personal Time Savings	$5.7 billion
Commercial Time Savings	$2.4 billion
Fuel Savings	$870 million
Safety Savings	$460 million
Environmental Savings	
Greenhouse Gases:	$450 million
Air Pollution:	$220 million
Total Savings	**$10.1 billion**

Economic Benefits of "Big I" Improvements: 2000-2022 (Rebuild California, 2000)

Key Reasons for Success

- The rapid construction of the segmental concrete bridges and right techniques for the precast segmental concrete bridges.

- The project implemented many design-build concepts. The project designer URS continued to remain on site as part of the team.
- NMSHTD maintained a good traffic flow on both side of freeways.
- FHWA committed an on-site bridge engineer to work with NMSHTD for the duration of the project to speed up any construction changes and work order adjustments.
- The right materials were selected from each part of the project, which saved time and kept costs down for long service life in the public.
- Better communication with incident management community by applying ITS.
- All parties did a great job at partnering and have high levels of teamwork.
- The Big I project successfully received public trust and support.

Conclusion

The Big I project started in June of 2000 and was completed in May of 2002. Thanks to successful collaboration, the construction bridges were constructed in record time, less than two years. The Big I project was awarded as a fast-track contract and the superstructure design was finished in 18 months and the entire construction was completed less than 2 years for $270 millions. The project enhanced the level of service and reduced the accident rate on the most heavily traveled interchange in the state. In addition, the NMDOT estimated that the new interchange would benefit the Albuquerque economy by approximately $1 billion over its first 10 years. The public benefited from reduced travel time, enhanced safety, and environmental improvements.

THE HYPERFIX PROJECT

Aerial of North split of I-65/70 of Hyperfix Project (Public Roads, 2004)

Description/Purpose

The Hyperfix Project was a highway rehabilitation plan involving Interstates 65 and 70 in Indianapolis, Indiana. The plan was constructed by the Indiana Department of Transportation (INDOT) and the Federal Highway Administration (FHWA) and officially announced to the general public on May 26, 2003.

As with most cities across the country, the highly traveled Interstates eventually began to show signs of aging that become obvious to motorists. The signs of aging Interstates include things such as potholes, deteriorating joints, and rough pavements.

Traffic counts conducted by the INDOT engineers revealed that more than 175,000 vehicles traveled on Interstates 65 and 70, which is clearly more than the original design of 61,000 daily. (Mroczka, Straumins & Pinkerlman, 2004) Considering the amount of effort and detail needed for a project of that magnitude, INDOT and FHWA proceeded with a collaborative partnership that also included IndyGo (the local transit agency), Indianapolis Department of

Public Works, and the Indianapolis Metropolitan Planning Organization to accomplish the completion of the Hyperfix Project.

Considering the amount of vehicles that traveled the Interstates on a daily basis, any amount of construction would cause major delays that would ultimately frustrate the citizens that utilized those highways. Anticipating the effects of the Hyperfix Project, the Indianapolis Star, a local newspaper, printed an article in March 2003 that warned commuters to brace for the "worst construction season ever." (Mroczka, Straumins & Pinkerlman, 2004)

The FHWA and INDOT assembled a project time line with the phases shown in Table 4. Planning is a very important segment of any project and the collaborative team assembled for Hyperfix started over a year early. Due to the extensive planning in every phase of the project, which helped the project be completed earlier than estimated and with relatively few problems, Michael H. Wenning, an engineer for Hyperfix project won the Indiana Civil Engineer of the Year Award since Hyperfix was voted Outstanding Project of the Year by the American Society of Engineers. (American Society of Engineers, 2004)

To date, Hyperfix 65/70 has won the Federal Highway Administrator's "Team: Strive For Excellence" award, was featured as the 2003 "Project Showcase" at the annual meeting for the Association of State Highway and Transportation Officials and has been featured in several major trade magazines, including *Public Roads* and *Construction Today.* (American Society of Engineers, 2004)

Hyperfix has turned into a household term for many residents in the Indianapolis area, which conveys the meaning of an efficient fix or repair.

Table 4 - Hyperfix Project Time Line

Phase	Description
Planning	This phase completely evaluated every solution to find the best one that achieved maximum efficiency and effectiveness.
Design	The development of working plans that include scope of project.
Letting	The preparation for all necessary paperwork and awarding contracts to the lowest qualified bidder. January 22, 2003 was the initial let on date.
Pre-Closure	The preparation of all necessary work to get ready for the closures of Interstates 65 and 70.
Closure	The complete closure of the roadways that connect the Interstates between the north and south splits. Expected dates are May 26 through August 2003.
Post-Closure	The work involving pavement patching, shoulder reconstruction and ramp resurfacing of northbound and southbound I-65 as well as eastbound and westbound I-70 in the south split interchange area. Expected completion date: September 3, 2003.

(Hyperfix 65/70 Official Web Site, 2004)

Stakeholders

- INDOT
- INDOT Commissioner: J. Bryan Nicol
- INDOT Engineer(s):
    - Michael H. Wenning
    - Tim Conarroe
- INDOT's freeway service patrol operators, know as Hoosier Helpers
- FHWA
- Indianapolis Metropolitan Planning Organization
- IndyGo
- IndyGo's Chief Executive Officer: Gilbert Holmes

- Governor of Indiana
- Mayor of Indianapolis: Bart Peterson
- Indianapolis Department of Public Works
- Indiana State Police
- Walsh Construction Company
- Citizens of Indiana
- Motorists of I-65 & I-70
- The trucking industry
- Public transit

Requirements

The resource requirements for the Hyperfix Project were very extensive, as one would expect for a state highway projects of this size. Resources are considered time, people, cost, equipment, etc.

- Time: The Hyperfix project was a planned 85-day complete shutdown of Interstates I-65 & I-70 between May 27 and August 20, 2003.
- Cost: The Walsh Construction Company was expected to complete the repairs of the Interstates for approximately $33 million. An early completion incentive was offered totaling $3.6 million or $100,000 everyday the contractor opened travel lanes prior to the 85-day contract limit. (Mroczka, Straumins & Pinkerlman, 2004)

SWOT Analysis

Strengths

- Project had multiple agencies involved in the collaborative process.

- Planned more than one year, received input from all stakeholders.
- Retained a public relations firm on how best to engage the public. (V. Straumins, personal communication, December 6, 2004)
- Good proactive communication to public early and often. Hyperfix 65/70 website primary source for recommended alternative routes.
- Project finished on July 20, 2003. Took only 55 days, which was earlier than the estimated 85 days.
- Saved taxpayers more than $1 million (in lost wages, lost productivity, etc.) for each day that traditional construction would add to the project. (Mroczka, Straumins & Pinkerlman, 2004)
- Hyperfix improved safety, provided safer bridges and highways while extending merge lanes to limit traffic congestion.
- Major traffic problems never materialized on the local streets or the Interstate. (V. Straumins, personal communication, December 6, 2004)
- Provided a safe work environment for construction workers since the Interstates will be completely closed for motorists.
- The project extended the repaired areas 10 to 15 years of travel life for motorists and provides safe roadways for residents/visitors. (Hyperfix 65/70 Facts-at-a-Glance, 2004)
- The Mayor's Action Center (MAC) offered extended hours to help motorists during the first week of Hyperfix, the State of Indiana's repair project on I-65 and I-70 in downtown Indianapolis. (Office of the Mayor, 2003)

Weaknesses

- Interstates 65 & 70 will be completely closed to motorists.
- Other roads had increased traffic since the Interstates.

- It took some time to establish the Park and Ride pick up locations since the sites had to provide free and safe commuter parking at a convenient location. (V. Straumins, personal communication, December 6, 2004)

Opportunities

- Completing the project early.
- Extending the Interstates travel life.
- Complete closure will ultimately save taxpayers money.

Threats

- Lack of involvement from stakeholders.
- Angry motorists/citizens whose life was negatively affected by the Interstate's closure.
- IndyGo transit system might not be able to support the increased passengers.
- Increased overtime pay, which could mean going over the $100,000 budget allotted for police overtime.
- Increased traffic congestion.
- Interruption of business activities for businesses located downtown.
- Increased noise from construction would affect downtown residents, businesses and employees.

Budget/Funding

- $33 million was allocated for the Hyperfix.
- $1 million in funds from the Congestion Mitigation and Air Quality (CMAQ) Improvement Program was allocated by FHWA to support the Hyperfix Park & Ride project.
- $100,000 for police overtime to direct traffic was allocated by the State of Indiana.

- Local traffic control improvements were eligible for Federal funds. However, the programming of federal funds could not be expedited to meet letting schedule. INDOT elected to go with 100% State funds. (V. Straumins, personal communication, December 6, 2004)

Marketing

The hiring of the public relations firm significantly added to the positive marketing of Hyperfix. In a joint effort with FHWA and IndyGo, INDOT launched a web site specifically for stakeholders and the general public to find information about the Hyperfix. A Hyperfix Interstate 65 & 70 information line was started for interested parties to find information such as the current status of the project. In addition to the web site and information line, advertisements were also placed in local newspapers and magazines, on highway billboards, and posters were displayed on designated spots within the IndyGo Park & Ride system. The Indianapolis Department of Public Works also posted 600 new signs downtown, on heavily traveled corridors, and up to 8 miles away from the construction to inform motorists about the detours. (Mroczka, Straumins & Pinkerlman, 2004)

Key Reasons for Success

The Hyperfix project had a few keys to success, which were early planning, collaborative effort, and the support of stakeholders to completely close the Interstates. When the project was being planned, INDOT discovered that rehabilitating infrastructure using traditional methods that utilize partial closures would take at least 180 workdays, which would possibly take two construction seasons and cost $1 million per day in lost productive time for motorists. (Hyperfix

65/70 Facts-at-a-Glance, 2004) If the project didn't have input from all involved in the collaborative process, the project might have taken a more traditional route.

As part of the collaborative planning process, INDOT and FHWA implemented detours for motorists that usually travel I-65 & I-70. With collaborative input from the State's Traffic Management Center, Indiana State Police, and INDOT's service patrol operators, the Hyperfix planners directed all national and regional traffic onto the construction-free outer beltway (Interstate 465) and also put up distinctive signage at distances up to 10 miles away, instructing motorists of alternative routes around the construction. (Mroczka, Straumins & Pinkerlman, 2004)

Another key to success with the collaborative planning was the coordination of public transit. IndyGo established its first park-and-ride campaign while FHWA approved the use of $1 million in funds from the Congestion Mitigation and Air Quality (CMAQ) Improvement Program to support the park-and-ride project.

Conclusion

Hyperfix was completed 30 days ahead of schedule due to the extensive planning, collaboration, and cooperation of stakeholders such as INDOT, the Mayor's Office, IndyGo, and FHWA. The decision to close the entire I-65/70 corridor was the biggest decision of the project. Due to that innovative decision of the planning committee, the project was completed quickly.

Since the project was successful by accomplishing the objectives at a lower cost than originally budgeted, it should serve as a model for future projects. However, future project managers reviewing the details of Hyperfix should take note to get more contractors to give a cost and time estimate. This is stated because some may believe the contractor overstated the time estimation in order to receive the bonus by completing early. If multiple contractors are required to submit time estimates, this will reduce the chances of one contractor inflating the time estimates since there will be other parties making proposals.

COLLABORATIVE LESSONS LEARNED

As can be seen from the project material above, there are many positive lessons learned that can be used in future transportation mega projects. At first glance, these examples seem to address typical project management issues that arise consistently across projects, but their magnitude increases with the additional complexities of mega projects:

- Support and involvement from leadership at the highest level
  - The Hyperfix project needed support to completely close the highway for construction which resulted in reduced construction time
- Extensive planning
  - Preparing and enforcing the use of a standard superstructure design in the Big I project took time to prepare but resulted in rapid completion and consistent implementation
- Flexibility in solution
  - Willingness to try a non-standard design-build approach in the I-15 project simplified implementation and brought the project in early, under budget, and with minimal traffic disruption
- Partnerships
  - The One DOT approach brought cohesion and a sense of identity to the participants in the Olympics project
  - Figuring out a way for local communities to participate in construction contracts benefited the Alameda, Olympics and I-15 projects
- Keep the customer informed
  - Creative use of technology in managing accident response during the Big I project and giving the public up-to-date information on traffic status for the Hyperfix and

Olympics projects reduced public frustration and increased willingness to tolerate inevitable inconveniences

Clearly the above projects were well designed, managed, and implemented. Additional scrutiny will quickly bring your attention to the type of leadership that was used. In this context, Chrislip (2002) provides some additional guidance. According to Chrislip, there are four keys areas that must come together for success in collaboration.

The first is a *constituency for change*. The concept of constituency is of a broad-based stakeholder group that brings together many different perspectives. If this group is well formed, then it will have credibility and influence to have its recommendations followed. In the context of a transportation mega project, another aspect that must be considered is the complex public—private partnership that must be established and nurtured throughout the implementation of a mega project. Often public mistrust based on previous experiences must be overcome. The public can be seriously affected during the course of the project so their buy-in is critical. If the public's needs and concerns are recognized and addressed, their support will be greater. The openness and credibility of the process is very important. There have to be real reasons for engaging in a project in the first place. Bad timing, for example during a period of economic downturn, can create tremendous obstacles for gaining public support for the project.

The second key area is *process expertise*. This concept recognizes that broad-based stakeholder groups will have varying levels of process or management expertise. Bringing in outside facilitators who can help train the group and guide discussions from a neutral position can be beneficial. It is also a good idea to consider including junior people in the various project teams. Training the next generation of project leadership takes time and experience.

The third area is *content expertise*. In a collaborative methodology, instead of having content experts prepare and present completed recommendations, content experts are brought in to present information to the stakeholder group. This gives the stakeholders continued control over the evolution of the project. In addition, this approach can result in innovative ideas and solutions. People often design solutions based on their area of expertise and comfort. Many organizations, including those who would participate in mega projects, have developed standard processes for developing and implementing projects. These processes are often bureaucratic and slow in implementation. Opening up the processes to innovation can lead to some creative and effective solutions that can result in faster completion of mega projects.

The final area is *strong facilitative leadership*. Leadership within the stakeholder group is critical. There must be several key players who are able to keep the group focused on the task especially during difficult phases. Choosing the right people to participate from the public agency side is very important. In addition, transportation mega projects can span many jurisdictions. As a result, there are many leaders at different levels who can stymie or facilitate a mega project. Getting commitment and support of the various key leaders affected by a mega project is critical.

(Please see Appendix A for Chrislip's four-phase guide to implementing collaborative leadership for mega projects. Another very useful tool is the Maryland State Highway Administration's *Field Guide to Partnering on MSHA Projects*. It is available online at http://www.mdqi.org/documents/SHA%20FieldGuide%20Partnering.pdf. With the permission of the Maryland State Highway Administration, the concepts in this document could be borrowed by the FHWA to provide a step-by-step guide to monitoring mega projects.)

The above projects reflect many different successful uses of a collaborative leadership approach. In an attempt to focus on the key elements that would be most beneficial for a transportation mega project, this graduate study group conducted several interviews with various former members of the above mega projects via e-mail, telephone, and in person during November 2004.

When we asked, "what is the single most important key to successful collaboration on mega projects and why", the answers from the experts pointed to the following areas:

- **Communication –** Be prepared for public scrutiny. The projects are huge and will naturally attract attention. Prepare to be audited. Manage expectations about impact – physical and financial. Good scope, cost, and schedule estimates help to maintain credibility.
- **Relationships/Collaboration –** Good interpersonal skills are needed. Co-location of teams from various agencies can facilitate communication and problem solving. Working relationships developed from daily interaction can result in open and honest discussions. This is the basis for solving the problems that a mega project inevitably encounters. Humility and willingness to hear and recognize solutions from others is necessary.
- **Recognition of complexity –** Mega projects are inherently complicated and resource intensive. Reusing past lessons can help save time and effort. Extensive upfront planning is needed. Recognition that a mega project is not just a big construction project is needed. The complexity lies also in the funding area. Flexibility and willingness to look at creative solutions is important.

> (P. Barnes, personal communication, November 22, 2004; J. Basso, personal communication, November 15, 2004; J. Broadhurst, personal communication, November 23, 2004; W. Dooley, personal communication, November 22, 2004; M. Huerta, personal communication, November 22, 2004; J. Kolb, personal communication, November 22, 2004; M. Morrow, personal communication, November 29, 2004; D. Platz, personal communication, November 22, 2004; J. Sinnette, personal communication, November 22, 2004; D. Wood, personal communication, November 23, 2004)

CONCLUSION

By definition, mega projects create a great amount of national interest with their scope or their $1 billion (plus) price tag. The interest of national leaders, the media, and the taxpayers in mega projects is heightened in this age of fiscal responsibility. Those individuals selected to be project managers for mega transportation projects must pay a lot of attention to the public opinion. The public's trust in the FHWA and mega projects is a delicate matter and must be cared for openly and honestly.

The project manager for the FHWA's future mega projects must remember Chrislip's four keys areas that come together for success in collaborative leadership; constituency for change, process expertise, content expertise, and strong facilitative leadership. Combined with his four phases for implementing collaborative leadership, the mega project manager should be well on their way to completing the project on time, under budget, and with the public trust still in tact. The quotes from some of the personnel involved in recent successful mega projects clearly indicate that extensive planning, a broad range of partnerships, and open and honest communication are vital to meeting the needs of the public and their transportation needs.

APPENDIX A

Keys to Implementing Collaborative Leadership for Future Mega Projects

Chrislip, in his book The Collaborative Leadership Fieldbook: a guide for citizens and civic leaders (2002), presents an outline of practical steps that can be used to move from the theoretical to the practical implementation of the planning needed to implement a project based on a collaborative leadership approach. The outline is divided into four phases with the first three dealing with planning and only the last phase being actual implementation.

Phase 1 – Getting started

- Analyzing the context for collaboration
    - Understanding the political dynamics
    - Understanding how citizens think about public issues
- Deciding on a collaborative strategy
    - Determining the feasibility of collaboration
    - Defining the purpose, focus, and scope

Phase 2 – Setting up for success

- Identifying and convening stakeholders
    - Understanding the principle and practice of inclusion
    - Finding the credibility to convene
    - Identifying stakeholders
    - Inviting, recruiting, and convening stakeholders
- Designing a constructive process
    - Defining the decision-making method

    - Establishing ground rules
    - Designing a constructive process
- Defining information needs
    - Defining information and education needs
- Defining critical roles
    - Selecting process experts
    - Selecting content experts
    - Identifying strong, facilitative leaders
- Managing the process
    - Establishing a steering committee
    - Staffing the effort
    - Documenting the process
- Finding the resources
    - Developing the budget
    - Funding a collaborative process

Phase 3 – Working together

- Building capacity
    - o Building relationships and skills
- Ways of engaging
    - o Engaging through dialogue
    - o Working with written information
- Informing the stakeholders
    - o Understanding the content

    - Understanding the context
        - Analyzing strengths, weaknesses, opportunities, and threats
        - Developing scenarios
- Deciding what needs to be done
    - Collaborative problem solving
    - Visioning
    - Strategic planning

Phase 4 – Moving to action

- Reaching out
    - Building a broader constituency
    - Engaging with decision makers and implementing organizations
- Managing action
    - Developing action plans
    - Organizing and managing implementation

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