Task1: Work Breakdown Structure

Based on the work statement approved in January's TAC meeting, the first task planned for the project was initiated. The plan for Task1 was further broken down into smaller steps. These steps are Summarized in Figure 1 as a work structure breakdown.

- **1 Task 1**
  - **1.1 Literature Review**
    - **1.1.1 Current state of ABC implementation**
      - 1.1.1.1 Collect all existing reports and presentations
      - 1.1.1.2 Current processes and criteria for decision making
      - 1.1.1.3 Current goals and barriers of using ABC to determine ABC maturity level
      - 1.1.1.4 summarization
    - 1.1.2 Reports on best practices associated with ABC projects
    - 1.1.3 Current propensity for using ABC due to organization culture and industry
    - 1.1.4 Recommendations from ASHTO, NCHRP, RGB, FHWA
    - **1.1.5 Cost estimation studies**
      - 1.1.5.1 Collecting all relevant papers and studies
      - 1.1.5.2 Review economic models and evaluation processes
      - 1.1.5.3 Preliminary ideas for cost estimation model
  - 1.2 Task1 Report

Figure 1. Work Structure Breakdown for Task1

In this step, we were able to perform a comprehensive literature review to study the current state of ABC. In this study, more than 40 documents including journal and conference publications, technical reports, theses, and presentations were collected and reviewed. These documents contain reports and presentations that identify the processes used by various state DOTs and other local agencies to implement ABC, summarize best practices associated with successful ABC projects, and confirmed economic models and/or evaluation processes for estimating both the hard and soft costs associated with general construction projects. Studies and recommendations from AASHTO, NCHRP, RBG, and FHWA were also collected. Complete citation information for all of the documents reviewed are summarized in Appendix 1. Summarized for each are included in Appendix 2. Four primary content area were identified:

- Decision making
- Successful ABC projects
- PBES techniques and innovations
- Cost estimation

Findings

1. Decision Making

Three different major approaches for ABC project decision making were identified in the literature. The first approach is based on framework developed for PBES decision making (Ralls, 2006). In this framework a flowchart and matrix incorporating a set of decision criteria are used to help decision makers choose between conventional or ABC construction alternatives (Salem, 2006). The flowchart assists the users in making a high-level decision on whether a prefabricated bridge might be an economical and effective choice for the specific bridge under consideration. The matrix provides users with a different format and more detail than the flowchart to also assist in making a high-level decision.

Figure 2 depicts an example of these flowcharts and matrices.

Figure 2. Decision Making Flowchart and Matrix
Source: Framework for Prefabricated Bridge Elements and Systems Decision-Making, FHWA, 2005

The matrix may be used in conjunction with or as an alternative to the flowchart. A more in-depth discussion of various factors may be conducted using the 'list of considerations' included in PBES Decision Making framework (Ralls, 2006).

The second approach presents a method for evaluating bridge construction plans (BCP). This technique helps designers balance the impact of bridge construction plans on project performance, traffic flow, and business activities. The model incorporates five major factors: safety, accessibility, carrying capacity, schedule performance, and budget performance (El-Diarabi et al., 2001). These factors were extracted through observation of actual construction projects and further validated by industry experts and application to new actual construction cases. Model factors are weighted by experts of the domain and are then used in an objective matrix. An example of such matrix can be seen in Figure 3.

Figure 3. BCP Objective Matrix (Source: El-Diarabi et al., 2001)

Factors were scored on a scale of 1 to 10 and the final score for each plan is calculated through a formula summarized in Equation 1.

$$F_i = (W_s X S_i) + (W_a X A_i) + (W_c X C_i) + (W_t X T_i) + (W_b X B_i) + (W_q X Q_i)$$

Equation 1: Total Score

The described methods have two major drawbacks. First, every project is unique and has its own specific requirements. Specific numerical values to the importance of various factors cannot be universally applied. Second, both methods are missing a systematic and justifiable method for criteria weighting. A third approach taken from the literature addressed these issues.

In the third approach, the decision making process is based on Analytical Hierarchy Process (AHP). This approach provides the decision maker with a tool to evaluate various alternative construction strategies by considering both quantitative and qualitative criteria (Arurkar, 2005). AHP quantifies not only the criteria, but also quantifies the qualitative trade-offs and relationship between the criteria using a hierarchy of criteria.

The method uses pair wise comparisons to compare the relative importance of each factor with other factors using both a numerical and verbal scale. Figure 4 shows the structure of criteria breakdown in an AHP decision study. Since AHP is able to consider both tangible and intangible decision factors, it can be used as a powerful and reliable technique for ABC decision making.

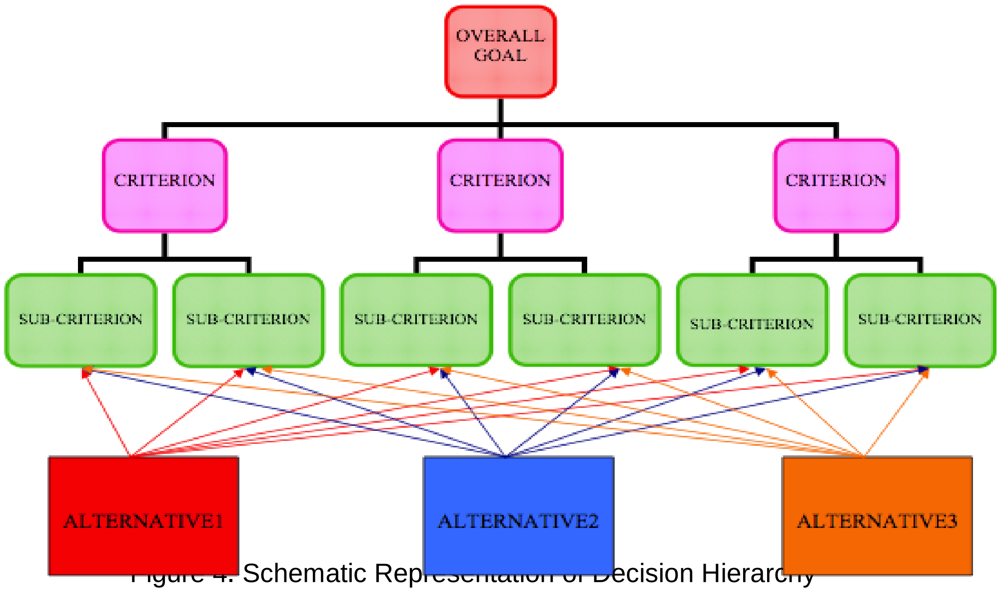


Figure 4: Schematic Representation of Decision Hierarchy

2. Successful ABC Projects

A large number of successfully performed ABC projects are reported in the literature. More specifically, Table 1 lists documents that contain a considerable amount of information on successful projects.

1. Accelerated Bridge Construction Success Stories (FHWA, 2006)
2. Final Report Highways for Life Report (ODOT, 2009)
3. California and Washington strategic plans, UDOT white paper on benefits and costs of PBES
4. Scan reports from Europe and Japan introducing accelerated construction projects conducted using innovative accelerated technologies

Table 1: Outstanding examples from the literature about successful projects

ABC Maturity Level

Through the literature review, ABC maturity levels were also investigated. Primary goals and barriers identified for using ABC techniques based on a review of the literature are summarized in Table 2.

Primary ABC Goals	Barriers to use ABC
• Deliver projects earlier to traveling public • Reduce the impacts of on-site construction • ABC to become Standard Practice	• Traffic detour issues • Technical issues related to seismic design, structure durability and reliability • Poor communication and coordination between stakeholders • Lack of technology for rapid bridge construction and replacement technologies for extreme events • Development needed in design methodologies, contracting approaches, material supply chain management

Table 2. Primary Goals and Barriers of ABC

There is a propensity from both community and industries involved in construction projects and Federal Organizations towards standardization of ABC. Community members want to deliver bridge construction projects quickly to reduce congestion and improve safety (Ralls, 2007). September 11 and subsequent threats to U.S. transportation system emphasized the need to develop emergency response plans to quickly react to consequences of extreme events (Bai & Burkett, 2006).

Federal organizations has also conducted several plans to develop, implement, and promote ABC. Because of the success of accelerated bridge construction projects to date, the FHWA has increased its support and provided resources to further advance the development of these systems into more conventional practice nationwide (Ralls, 2007). The FHWA framework for prefabricated bridge elements and systems (PBES) decision-making is another outstanding effort to ensure cost-effective use of prefabricated bridges.

The literature also indicates recommendations from AASHTO and FHWA for updating highway emergency response plans for extreme events. It includes recommendations from NCHRP for the design of bridges for extreme events (Bai & Kim, 2007). The focus of recent national initiatives by AASHTO and FHWA is on newer, innovative prefabricated bridge elements and systems, e.g. bent caps, abutments, full-depth deck panels, and totally prefabricated superstructure and substructures (Prakash, 2005).

3. PBES Techniques and Innovations

Prefabricated bridge systems include superstructure systems (composite units, truss spans), substructure systems (abutments, caps/columns, piers) and totally prefabricated bridges. Using prefabricated bridge elements and systems has many advantages such as (PBES Marketing Plan, 2007). Some of these advantages are:

- Reduced on-site construction time
- Minimized traffic impacts of bridge construction projects
- Increased construction work zone safety
- Less disrupt to the environment
- Improved constructability
- Increased quality and lowers life cycle costs

Figure 5 shows a representation of ABC techniques. This figure tries to categorize ABC techniques based on the available methods.

Figure 5. Source: Successful use of accelerated bridge construction techniques in UTAH, New Jersey DOT, 2009

The literature also suggests the use of management techniques along with technical methods and practices to accelerate construction projects. The management practices taken from the literature are:

- Staged construction
- Changing normal operational procedures along with A+B contracting
- Changing normal operational procedures I/D contracting
- Lane Rentals
- New design techniques and materials

4. User Cost Estimation

Three categories of user costs are generally used in the literature for an economic analysis or lifecycle costs analysis. These include vehicle operational costs (VOC), delay costs, and crash costs or safety related costs. The logic behind user cost analysis is to assess the value of time lost in congestion and vehicle operating costs resulting from congestion.

A large amount of data on costs related to transportation delays is available in the literature. For example, since 2003, the Urban Planning Office has performed annual updates to the cost of delay values based on the prior year data such as ADT, travel cost, delay times, etc (Urban Planning Office and Freight Systems Division, 2009). Figure 6 shows an example of such data.

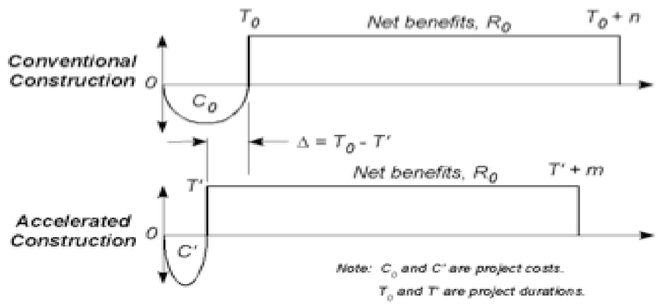
The data provided in these tables can be used in the estimation of vehicle operation costs, delay costs, and safety costs. An example of this estimation can be found in *'Assessing Cost of Travel Annual Update'* (Urban Planning Office and Freight Systems Division Washington State Department of Transportation, 2009).

	$/mile	$/hour
Vehicle-Based		
Fuel cost (excluding taxes)	0.121	5.44
Fuel taxes	0.023	1.05
Engine oil change	0.012	0.53
Repair and maintenance	0.049	2.205
Tire cost	0.007	0.315
Tolls	0	0
Sub Total	**0.21**	**9.53**
Driver/Passenger-Based		
50% of average wage rate	0.25	11.19
Sub Total	**0.25**	**11.19**
Total Expense	**0.46**	**20.72**

Cost Category	Age (yrs)	Baseline Pavement Service Life (11 years)	As Built (PCfC) Pavement Service Life (20 years)
Preliminary Design and Engineering, Construction, Construction Engineering, and Incentives	0	$3,792,056	$5,161,128
Delay-Related User Costs		$2,064,185	$ 346,816
Crash-Related User Costs		$ 67,667	$ 0
Preventive Maintenance (MDOT Manual) 11.12 lane-mile @ $27,192 per lane-mile	5 (baseline) 6 (as-built)	$ 302,375	$ 302,375
Preventive Maintenance (MDOT Manual) 11.12 lane-mile @ $44,891 per lane-mile	9 (as-built)		$ 499,188
Reconstruction or HMA Overlay (Preliminary Design and Engineering, Construction [Roadway Pay Item, Mobilization, Traffic Control, Contingencies], Construction Engineering)	11 (baseline)	$ 102,043 $2,551,065 $ 127,553 $ 178,575 $ 76,532 $ 165,819	
Delay-Related User Costs		$2,064,185	
Crash-Related User Costs		$ 67,667	
Salvage Value (2 of 11 years remaining life for baseline pavement)	20	- $ 582,107	$ 0
Total Actual Costs		**$ 10,977,615**	**$ 6,309,507**
Net Present Value of All Costs		**$ 9,679,453**	**$ 6,116,503**

Figure 6. Cost of Delay Values

Many agencies are investigating economic tools such as life-cycle cost analysis (LCCA) to help them choose the most cost-effective alternatives and communicate the value of those choices to the public. To compare the alternatives, future expenditures of the project and the benefits to the public after completion are analyzed and compared (Trejo & Reinschmidt, 2005).



$$NPV = Initial\,Cost + \sum Future\,Cost * \left[\frac{1}{(1+i)^n} \right]$$

Figure 7. Economic Analysis of Conventional and Accelerated Construction Timelines (Trejo & Reinschmidt, 2005)

Figure 7 compares the net flow of initial costs and future benefits for a project using both conventional and accelerated methods. The project consists of an initial investment cost, followed by operational costs. Benefits of the project are shown as positive values that start after the completion of the project.

During the literature review, the research team also tried to discover about the existing tools and softwares for ABC analysis. To promote the development and deployment of applied research in roadway construction, the Federal Lands Highway (FLH) initiated the development of FLH-QuickZone to help estimate roadway construction soft costs. QuickZone is a Microsoft Excel based program that can be used to model various work zone configurations to estimate economic impacts of roadway construction. The FLH-QuickZone was tested and prototyped in six FLH construction projects (Hardy et al., 2007).

5. Next Steps

In the next step, research team will analyze eight ABC projects completed under the Highway for Life program. For this purpose, a data collection template will be developed. To categorize the studied projects and to classify ABC projects, Bridge Construction Impact (BCI) may be useful. BCI index is used to identify structure alternatives. Figure 8 shows the criteria and measures used in a BCI calculation.

- Facility Category
    - I. Residential community traffic
    - II. Local streets (business and residential).
    - III. State routes, major city arties, or minor utilities (water channel etc).
    - IV. Interstate or State Highways
    - V. Essential artery, major landmark facilities, utilities, or natural hazard (waterways, swamp lands, etc.)
- Mission Impact Type
    - Capacity Improvement/Restoration- Improve or restore capacity to relief existing traffic congestion due to an event, incident, or demand growth.

      C1- Lanes and shoulder widen, soundwall addition, and add/restore 1-30% of total lanes and/or shoulder widen.

      C2- Add/restore 31-66% of total lanes + shoulder widen.

      C3- Add/restore 67-100% of total lanes + shoulder widen.
- Traffic Impact Intensity
    - Traffic Delay- Due to temporary construction-related operations on traffic congestion (number of days).

      T1 - Reduce widths of lanes and shoulder, closure of 1-30% of total lanes and/or shoulder or lane realignment.

      T2 - Closure of 31-66% of total lanes + shoulder.

      T3 - Closure of 67-100% of total lanes + shoulder.
- Environmental Impact Levels- Due to temporary construction-related operations (number of days).

  E1- None to Mild

  E2- Moderate

  E3- Severe
- Impact Measures: in XX of YY-hour days (Z)

  XX= Number of days; YY= Number of hours; Z = Type of hours:

  PK= Peak, commuting and heavy traveled hours.

  OP=Off-Peak, non-commuting and moderate traveled hours.

  NS=Non-standard, light-traveled hours (e.g. midnight)

Figure 8. Bridge Construction Impact Criteria
Source: Caltrans ABC Strategic Plans, 2008

In addition, archival records and/or interviews may be used to collect data related to project characteristics, costs, and specific details of ABC that were applied.

Appendix 1: Literature Documents List

	Title	Author(s)	Year	Topics
1	Processes and Techniques for Rapid Bridge Replacement After Extreme Events	Yong Bai and Seong Hoon Kim	2007	Technical
2	Review of Work Zone Impact Mitigation Techniques: Achieving the Objective of Reducing Vehicle Emission	Suneerat Wongwitdecha, Ph.D., Kasetsart University Visiting Researcher, JSPS Core University Program 2004	2004	Work zone safety
3	Highways for LIFE Economic Analysis	Highway for Life	N/A	Cost Estimation
4	Assessing Cost of Travel - Annual Update	Urban Planning Office and Freight Systems Division, WSDOT	2009	Cost Estimation
5	Accelerated Construction Decision Making Process	Tejas Prakash Arurkar	2005	Decision Making
6	Accelerated Construction Decision-Making Process For Bridges	Sam Salem, PhD., P.E, CPC and Richard Miller, PhD., P.E	2006	Decision Making
7	Innovative Technology for Accelerated Construction of Bridge and Embankment Foundations in Europe	FHW A-PL-03-014	2003	Scan Report
8	Accelerated Bridge Construction	Mary Lou Ralls	2007	Technical
9	Rapid Bridge Replacement: Processes, Techniques, and Needs for Improvements	Yong Bai, Ph.D., M.ASCE and William R. Burkett, A.M.ASCE	2006	Technical
10	Benefits and Costs of Prefabricated Bridges White Paper	Utah Department of Transportation	2008	Cost Estimation

	Title	Author(s)	Year	Topics
11	Caltrans ABC Strategic Plan: Development of practice and policy for Future bridge projects	ABC- Advisory Council	2008	Strategic Plan
12	Get In, Stay In, Get Out, Stay Out.	Mistry, Vasant and Mangus, Al	2006	Technical
13	Standard question arise in DOT’s acceptance of SSC	Tom Kuennen	2006	Technical
14	Economic Evaluation Methods For Assessing Value Of Accelerated And Durable Construction Options In Early Design Stages	K. F. Reinschmidt and D. Trejo, Texas A&M	2005	Cost Estimation
15	WSDOT Strategic Plan Accelerated Bridge Construction (ABC)	WSDOT	2009	Strategic Plan
16	Applying LCCA to Bridges	Al-Wazeer, Adel, Harris, Bobby, Nutakor, Christopher, Public Roads	2005	Cost Estimation
17	Comparison of construction costs on motor way projects using measure and value and alternative tendering initiative contractual arrangements	D. A. LANGFORD, P. KENNEDY, J. CONLIN and N. MCKENZIE	2003	Cost Estimation
18	Estimating User Costs and Economic Impacts of Roadway Construction in Six Federal Lands Projects	Matthew H. Hardy, James J. Larkin, Karl E. Wunderlich, and A. J. Nedzesky	2007	Cost Estimation Tool
19	Framework for Prefabricated Bridge Elements and Systems (PBES) Decision-Making	FHWA	2005	Decision Making
20	Crash Analysis And Reporting Unit Continuos System Crash Listing	ODOT	2004	Report
21	Crash Analysis And Reporting Unit Continuos System Crash Listing	ODOT	2008	Report

	Title	Author(s)	Year	Topics
22	Final Report Highways for Life Report	ODOT	2009	Report
23	Evaluation of Life-Cycle Cost Analysis Practices Used by the Michigan Department of Transportation	Arthur Chan, Gregory Keoleian, and Eric Gabler	2009	Cost Estimation
24	Multi objective Linear Programming Model for Scheduling Linear Repetitive Projects	Pandelis G. Ipsilandis	2007	Decision Making
25	M115 economic analysis	MDOT	2009	Cost Estimation
26	Model for Analysis of Factors Affecting Construction Schedule in Highway Work Zones	Praveen Sukumaran, Mehmet Emre Bayraktar, TaeHoon Hong, and Makarand Hastak	2006	Decision Making
27	Innovative Features of this Project (Return on Investment)	ODOT	2009	Cost Estimation
28	Prefabricated Bridge Elements and Systems in Japan and Europe	Mary Lou Ralls, Ben Tang, Shrinivas Bhidé, Barry Brecto, Eugene Calvert, Harry Capers, Dan Dorgan, Eric Matsumoto, Claude Napier, William Nickas, Henry Russell	2005	Scan Report
29	PBES Cost Study: Accelerated Bridge Construction Success Stories	FHWA	2006	Report
30	Evaluating Public Transit Benefits and Costs - Best Practices Guidebook	Todd Litman, Victoria Transport Policy Institute	2010	Cost Estimation
31	Maine Demonstration Project: Reconstruction of Lamson and Boom Birch Bridges	Charlie Churilla, Jagannath Mallela, Gary Hoffman	2008	Report

	Title	Author(s)	Year	Topics
32	Benefits & Costs of Prefabricated Bridges	Mary Lou Ralls, P.E., UDOT	2008	Cost Estimation
33	THE 2007 URBAN MOBILITY REPORT	David Schrank and Tim Lomax, Texas A&M	2007	Report
34	Manual on Use of Self-Propelled Modular Transporters to Move Bridges	FHWA, AASHTO, NCHRP, FDOT	2007	Technical
35	Innovative Prefabrication in Texas Bridges	Ronnie Medlock, Michael Hyzak, and Lloyd Wolf	N/A	Technical
36	Proposed Doctrine for Accelerated Bridge	Joseph P. Hanus, PhD, PE Lieutenant Colonel, US Army United States Military Academy	N/A	Technical
37	National Perspective on Accelerated Bridge Construction	Vasant Mistry, FHWA	2007	Report
38	Construction and Testing of an Accelerated Bridge Construction Project in Boone County	IOWA DOT	2007	Technical
39	SPMTs: Your Guide to Accelerated Bridge Construction	FHWA-HRT-08-009	2007	Technical
40	Marketing Plan for Prefabricated Bridge Elements and Systems (PBES)	FHWA	2007	Cost Analysis
41	Accelerated Bridge Construction Applications in California - A lessons learned report	Caltrans	2008	Report
42	Innovative Bridge Design for Rapid Renewal	Kenneth Price, HNTB	2009	Report & Technical

Appendix 2: Document Summary

Document titles match the filenames uploaded on the research site:

Rapid Techniques

This paper talks about processes and techniques for rapid bridge replacement after extreme events. To achieve the research objectives, the research team studied three cases of previous bridge replacements following extreme events. These cases are the I-40 Webbers Falls Bridge in Oklahoma, the I-95 Chester Creek Bridge in Pennsylvania, and the I-87 New York State Thruway Bridge in Yonkers, New York.

Work zone impact mitigation techniques

This research focuses mainly on the two primary concerns of work zone impacts: delay and excess air pollution. The research objective is to explore techniques that are used by different road agencies in order to minimize traffic delay, and so as to minimize air pollution impacts during road construction. These include techniques that enhance the flow of traffic in work zones and/or accelerate the construction duration. Contracting and Administrative Techniques.

ABC_Full_CoverageEurope

FHWA scan team met in Europe with technical and industry leaders to identify and evaluate innovative European technologies in accelerated bridge construction.
Status of limit state design (Technical Barriers). The overall goal of the scan trip is to implement technologies of best practice in the United States. With this objective clearly in mind, team members developed an implementation ranking.

accelerate_bridge_spr07

Accelerated construction techniques with examples of successful projects.

Bai_2006

Rapid bridge replacement processes and techniques. Starting from contracting procedures, detouring, demolishing, etc. This paper contains separate sections for community and interagency cooperation and comments about necessary improvements or recommendations.

Benefits_and_Costs_of_Prefabricated_Bridges_05_30_08

Contains information about several projects conducted with prefabricated elements. Discusses both construction and user costs (with real numbers from previous projects). Includes Costs of Prefabricated Bridges (construction and delay-related user costs).

Caltrans_ABC_Strategic_Plan_V1-1

ABC decision criteria and type selection, lessons learned from past. Industry engagement and technical research. This paper summarized tasks needed to develop a conversation formula to calculate cost of traffic delays.

Get in Get out Stay out
The article discusses the effective use of accelerated bridge construction (ABC) solution by several state departments of transportation, related agencies and contractors in the U.S. One particular ABC method involves maximizing prefabrication.

Precast
Mainly talks about precast advantages and procedures.

Trejo_Economical_Evaluation
Economic evaluation methods for assessing value of accelerated construction options and life cycle costs. This paper presents simple, quick methods for evaluating the economical advantages of accelerating construction projects (reducing project durations).

WSDOT_ABC_Strategic_Plan
Washington DOT strategic plan for ABC. Contains ABC selection criteria, decision check list and matrix , cost benefit development, and technical aspects of ABC.

Bowers Boone
This paper presents the construction process, construction schedule, and laboratory testing for one of the first applications of an accelerated bridge project utilizing precast components in the state of Iowa. Through the FHWA Innovative Bridge Research and Construction program, a bridge in Boone County, Iowa was constructed using several different precast, high-performance concrete elements.

Guide
Guide to Accelerated Bridge Construction

Applying LCCA to Bridges
This paper is about an economic tool called LCCA. This economic analysis tool can help determine the best option for infrastructure projects by calculating the lowest cost over their life cycles. The paper also introduces other existing tools for bridges that use LCCA analysis.

Comparison of construction costs
This paper reports the outcome of an investigation into the construction costs in 11 motor way projects.

Estimating Cost of travel 4-14-2009 final draft
Congestion impacts distribution of goods and services, inflicts economic costs, and impacts quality of life. Travel Cost Estimation (travel, road closures, congestions).

estimating user delay costs

Estimating User Costs and Economic Impacts of Roadway Construction in Six Federal Lands Projects. As part of this study, FLH–QuickZone is developed to help estimate these soft costs of roadway construction.

Framework PBES Decision Making

This report presents a framework for the objective consideration of the above-mentioned issues. As such, the framework is a decision-making tool to help answer the ultimate question of whether a prefabricated bridge is achievable and effective for a specific bridge location.

Highways for Life Final.sim

This report is to document the program requirements as defined in the Highways for Life Grant Application, January 24, 2007. It has estimations for user saving costs due to traffic improvements.

LCCA in michigan

The primary purpose of this study is to evaluate the accuracies of the LCCA procedure used by MDOT in the pavement design stage in projecting the life-cycle costs and maintenance schedules of different pavement types, and thereby choosing the lowest-cost pavement type. Based on the four case studies, all the LCCA procedures in the case studies were able to predict the pavement type with lower initial construction cost, although the amount of the initial costs was subject to estimation error. It has a section devoted to FHWA guidance toward using LCCA.

M115 economic analysis section

For this economic analysis, MDOT supplied most of the cost figures for the as-built project. The assumptions for the baseline case costs were determined from discussions with MDOT.

model example

Model for analysis of factors affecting construction schedule in highway work zones. This paper presents a model that identifies various factors which have a potential to influence and impact the construction schedule in highway work zones. Also, a stochastic analysis of those factors is conducted by the model to determine probable changes, i.e., reduction or escalation, in the original estimated schedule for a given project.

OR Economic analysis

In this paper a discussion of the time savings associated with some of the mobility measures employed by the Contractor on Bundle 401 is presented. StratBENCOST was used to estimate the monetary value of those time savings.

PBES in Europe and Japan

In April 2004, a team of bridge engineers, sponsored by the Federal Highway Administration (FHWA), AASHTO, and NCHRP visited Japan and Europe to investigate innovations in prefabricated bridge building technology. A number of useful technologies were identified on that trip such as prefabricated bridge elements and systems that minimize traffic disruption, improve work zone safety, and lower life-cycle costs.

PBESfinal_report 2006

Accelerated Bridge Construction Success Stories.

Public Transit Benefits and Costs

This guidebook describes how to create a comprehensive framework for evaluating the full impacts (benefits and costs) of a particular transit service or improvement. It identifies various categories of impacts and how to measure them. It discusses best practices for transit evaluation and identifies common errors that distort results. It discusses the travel impacts of various types of transit system changes and incentives. It describes ways to optimize transit benefits by increasing system efficiency, increasing ridership and creating more transit oriented land use patterns. It compares automobile and transit costs, and the advantages and disadvantages of bus and rail transit. It includes examples of transit evaluation, and provides extensive references. Many of the techniques in this guide can be used to evaluate other modes, such as ride sharing, cycling and walking.

report_012309 maine

The Maine DOT submitted application and was approved for FY 2007 Highways for LIFE program funding. The Maine projects are two bridges.

UDOT White Paper on Benefits & Costs of Prefab Bridges_updated 07-14-08

A complete summary on construction costs and user related costs for prefabricate bridge construction.

2007 Urban Mobility Report

This paper contains urban mobility report for year 2007. The paper describes problems caused by congestion and discusses a number of solutions. The paper contains a comprehensive database for national congestion information.

FHWA Manual Self-propelled

This manual contains information on the equipment, benefits, costs, project selection criteria, planning, design, contracting issues, and example contract documents for using self-propelled modular transporters to move bridges. Self-propelled modular transporters are multi-axle devices that can be manipulated in very limited spaces to move complete prefabricated bridge systems into position. It also includes case studies and lessons learned from previous projects. The manual is intended for use by bridge owners, construction contractors, suppliers, and other professionals involved in bridge design and construction.

Technical_innovative_prefab

The paper is about innovative prefabricated systems and elements in Texas bridges.

pbes marketing plan May 2007

FHWA Marketing Plan published in 2007. The paper also have some good discussions on costs and barriers to ABC.

ABC_LessonsLearned_v1-1

This is a “Lessons Learned” report from Caltrans. It contains California’s successful ABC projects completed in the last 5 years.

SHRP2-R04 Chapter 4 Resubmission Clean

This reports contains results for surveys, interviews, and group discussions created to gain insight into the successful practices of bridge owners engaged in ABC and to learn about the challenges faced by bridge owners who have not been successful with ABC. The survey contains 40 questions which focus on ABC goals, practices, experiences, hindrances, and opinions. The advanced tools of the survey allow for questions to be shown or hidden according to the responder’s answers so only the questions determined to be applicable were answered.

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M.H. Hardy, J. J. Larkin, and K. E. Wunderlich, Estimating User Costs and Economic Impacts of Roadway Construction in Six Federal Lands Projects, Transportation Research Record: Journal of the Transportation Research Board, No. 1997, Transportation Research Board of the National Academies, Washington, D.C., 2007, pp. 48–55.

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