



# FDOT Every Day Counts Training Website

**ROADMAP FOR TODAY**

**ROADMAP**

FDOT Every Day Counts  
Training Website

Thomas A. Andres P.E.  
Assist. State Structures  
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- FDOT's Accelerated Bridge Philosophy
- April 5, 2011 Structures Design Bulletin C11-04
  - Bridge Development Report (BDR) methodology for including user costs into decision making process
  - Methodology for whether to use an accelerated bridge construction (ABC) strategy for a given project
  - Need for additional design guidance on:
    - developing viable prefabricated bridge alternates in the BDR
    - developing cost comparisons for prefabricated bridge alternates in the BDR

☺☺☺ Good afternoon. Let's go ahead and get started. We have a lot of information to cover in this session. It is a pleasure to be with you today. My name is Tom Andres. I work in the Structures Design Office in Tallahassee where I oversee the Bridge Plans Review Group.

The title of this training session is: "FDOT Every Day Counts Training Website". "Every day counts" or "EDC" for bridges and the term "accelerated bridge construction" or "ABC" are one in the same.

Our roadmap for today is as follows:

☺ First, I am going to talk about the Department's Accelerated Bridge Philosophy

☺ Next, I am going to show you a video outlining the April 5, 2011 Structures Design Bulletin where we introduce user costs in the Bridge Development Report (BDR) bridge assessment.

- We also developed a methodology for when to consider accelerated bridge construction (ABC) based on project constraints

- In the Bulletin, we also acknowledged to need for additional future guidance regarding how to estimate costs and develop prefabricated bridge options.

The slide features a blue vertical bar on the left with the word "ROADMAP" in green. The main content area is white and contains the following text and graphics:

- 2012 Design Training Expo** logo (top left)
- FDOT Every Day Counts Training Website** (top right)
- ROADMAP FOR TODAY (CONT.)** (top right)
- Two bullet points:
  - FDOT Every Day Counts Training Website
  - Future Design Guidance to be Added to Training Website
- FDOT Every Day Counts Training Website* (middle left)
- Thomas A. Andres P.E.  
Assist. State Structures  
Design Engineer (middle left)
- 2012 Design Training Expo** logo (bottom left)

- ☺ I am next going to talk about the EDC training website – its main intent is to fill in some of the gaps raised by the Bulletin and give designer more guidance. We consider the training website as a work in progress – we have just posted a new case study last week and plan to post another one later this year.
- ☺ And lastly, I will discuss some current and future work products that will be added to the training website. These will include:
  - Development of additional cost comparison case studies
  - Development of FDOT prefab connection details
  - Development of ABC implementation strategies when the ABC alternate is not the lowest hard dollar cost option. Strategies will cover both design-build and design-bid-build procurement methods

**FDOT 's  
Accelerated  
Bridge  
Philosophy**

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## FDOT's Accelerated Bridge Philosophy

**OUR PHILOSOPHY IS BASED ON SOME  
FUNDAMENTAL TRUTHS**

- Balance of Quality-Speed-Costs - doing something better and faster will likely cost more (ABC hard dollar costs are 20% - 30% more than conventional projects according to recent cost history from other states).
- Funding challenges have never been more difficult and public demands have never been higher.
- User impacts and user costs can vary greatly from project to project –

**one solution does not fit all projects.**

Okay, let's talk about FDOT's accelerated bridge philosophy which is based on some fundamental truths.

- ☺ Usually doing something faster costs more. Although that is not always the case, ABC hard dollar costs are about 20% - 30% higher than conventional construction based on recent cost history from other states.
- ☺ Funding challenges have never been more difficult and public demands have never been higher.
- ☺ User impacts and user costs can vary greatly from project to project –
- ☺ **one solution does not fit all projects.**

# FDOT's Accelerated Bridge Philosophy

OUR PHILOSOPHY IS BASED ON SOME FUNDAMENTAL TRUTHS (CONT.)

- Reducing user costs on a temporary basis may mean not being able to afford a capacity project in the future. The balance of short term user-impacts versus long-term user impacts has to be weighed.

**Reporting both soft and hard dollars in the BDR when comparing prefabricated and conventional alternates allows management to make the best bridge selection decision based on the needs of the overall transportation program.**

FDOT 's Accelerated Bridge Philosophy

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☺ There can also be a lost opportunity cost associated ABC construction - whereby reducing short term user impacts that cost more now may mean not building that capacity project down the road. So the balance of short term user-impacts versus long-term user impacts has to be weighed.

☺ **Therefore our current policy requires that when the project satisfies certain feasibility questions, that both soft and hard dollars be reported in the BDR. This allows management to make the best bridge selection decision based on the needs of the overall transportation program.**

**FDOT 's  
Accelerated  
Bridge  
Philosophy**

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## FDOT's Accelerated Bridge Philosophy

### OUR PHILOSOPHY IS BASED ON SOME FUNDAMENTAL TRUTHS (CONT.)

- Lessons learned in segmental bridges can be equally applied to ABC.
  - Economy of Scale
    - Contractor's Learning Curve
    - Amortizing the cost of the casting-yard into the cost of the project
    - Amortizing the cost of specialized equipment into the cost of the project
    - Remobilization of specialized equipment can drive up costs (timing of reuse)
  - Attention to Connections -The Pieces Have to Fit Together
  - Lifting Weights, Crane Size and Crane Access drive costs

- ☺ Another fundamental truth is that Lessons learned in segmental construction can equally be applied to ABC.
- Things like the economy of scale of a project.
    - Contractor's learning curve
    - Amortizing the cost of the casting-yard into the cost of the project
    - Amortizing the cost of specialized equipment into the cost of the project
    - Remobilization of specialized equipment can drive up costs (timing of reuse)
  - Attention to connections -the devil is in the details. How do the pieces fit together?
  - Then you have this huge issue with lifting weights, and crane sizes and what these requirements do to the Contractor's overhead costs. So all of these rules that we have used on segmental projects, splitting pier segments to keep weight manageable, introducing in-situ pours when elements get to large, etc,

**FDOT's Accelerated Bridge Philosophy**

**OUR PHILOSOPHY IS BASED ON SOME FUNDAMENTAL TRUTHS (CONT.)**

- ABC is a powerful tool when applied to the right project, for the right reasons; the benefits can be significant.

**We do it where it makes sense.**

*FDOT Every Day Counts Training Website*

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2012 *Design Training Expo*

☺ ABC is a powerful tool when applied to the right project, for the right reasons; the benefits can be significant. Examples may include a large waterway crossing where insurance and labor rates associated with working from barges are high, where crane access is good, and where you have economy of scale and uniformity within a given project. I will try to give you some specific examples later in the presentation.

☺ **Bottom line is we do it where it makes sense.**

# April 5, 2011 Structures Design Bulletin C11-04



April 5, 2011  
Structures Design Bulletin  
C11-04

FDOT Every Day Counts  
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**Case Studies: Comparisons for Prefabricated ABC Approach**

Case	Description	Presentation Method	Estimated Construction Cost (\$)	Estimated Construction Cost (\$)
11	Case 11: 1000' x 40' Precast Concrete Bridge	3D Model	1000000	1000000
12	Case 12: 1000' x 40' Precast Concrete Bridge	3D Model	1000000	1000000
13	Case 13: 1000' x 40' Precast Concrete Bridge	3D Model	1000000	1000000
14	Case 14: 1000' x 40' Precast Concrete Bridge	3D Model	1000000	1000000
15	Case 15: 1000' x 40' Precast Concrete Bridge	3D Model	1000000	1000000

**Case Studies: Cost Comparisons between Conventional Versus Prefab Construction**

Case	Description	Presentation Method	Estimated Construction Cost (\$)	Estimated Construction Cost (\$)
11	Case 11: 1000' x 40' Precast Concrete Bridge	3D Model	1000000	1000000
12	Case 12: 1000' x 40' Precast Concrete Bridge	3D Model	1000000	1000000
13	Case 13: 1000' x 40' Precast Concrete Bridge	3D Model	1000000	1000000
14	Case 14: 1000' x 40' Precast Concrete Bridge	3D Model	1000000	1000000
15	Case 15: 1000' x 40' Precast Concrete Bridge	3D Model	1000000	1000000

[Design Bulletin C11-04 Training Video](#)

☺ Okay. Let's go ahead and watch this short video on Structures Design Bulletin C11-04 and then we will discuss it.

## SHOW VIDEO

A few points to note from the video.

- We anticipate that only about 10-15 percent of FDOT bridge projects will warrant a full-blown precast versus conventional option assessment in the BDR based on the responses from the feasibility questions.
- The evaluation matrix selection tool allows for the best decision based on imperfect knowledge. When comparing options, what is most important, is the relative differences.
- The key to estimating user cost accurately is to be able to estimate detour durations which may require specialized knowledge from CEI members of your firm or input from industry.
- The purpose of the EDC training website is to provide guidance in developing and assessing accelerated bridge options per the steps outlined in the design bulletin.



# History and Purpose

**Structures Design Office - Every Day Counts**

**EVERY DAY COUNTS - Prefabricated Bridge Elements & Systems**

Plan Preparation Manual (PPM), Vol. 1, Section [18.1.1.4](#) and Structures Design Bulletin 13-07 [PDF](#) provide expanded direction for investigating prefabricated bridge alternates during the Bridge Development Report (BDR) phase of design. The referenced section of the PPM formalizes the process for evaluating whether prefabricated options should be considered based on feasibility questions, then, when warranted, how to develop and select prefabricated options through an assessment matrix. An assessment matrix methodology allows for alternate selection based on less than perfect knowledge. Both direct and indirect costs for prefabricated and conventional options are to be reported in the BDR. See Structures Design Bulletin C1-1-4 [PDF](#) and Exhibit 25-1 [PDF](#) for additional background information. See Training video [VIDEO](#) and notes [PDF](#).

This website is intended to provide design guidance for developing prefabricated bridge alternates and gives examples on how to estimate both direct and indirect costs. To date, the FDOT does not have sufficient historical bid data for prefabricated bridge alternates in order to develop reasonable cost estimates from average unit material costs. To fill this gap, the Structures Design Office has developed several training videos for the purpose of educating designers on factors for consideration related to use of PBEC for accelerated Bridge Construction (ABC). Sample contractor estimates are provided to show how project costs may be developed to compare conventional construction methods versus a prefabricated ABC approach.

**Case Studies: Considerations for Prefabricated ABC Approach**

Case Study	Description	Presentation Video	Presentation Notes	Alternate Comparison Outline
1	Bridge Replacement in Close Proximity to Major Interstate-to-Interstate Interchange	<a href="#">WMM (9:04)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
2	Major Interchange Waterway Crossing Bridge Replacement	<a href="#">WMM (8:43)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
3	Replacement Bridge Serving as Ingress/Egress Route to Major Port	<a href="#">WMM (9:27)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
4	Graded Ramp Over Ingress into International Airport	<a href="#">WMM (6:30)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
5	Spanning of Long Over-cover Bridge Located Over a Floodplain and a Navigable River	<a href="#">WMM (8:04)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
6	Construction of a Long Bridge Viaduct Located in the Median of an Existing Interstate	<a href="#">WMM (7:37)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
7	Construction of a Fairly Long Bridge Viaduct Located in the Median of an Existing Bypass Roadway	<a href="#">WMM (12:47)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>

**Case Studies: Cost Comparisons between Conventional Versus Prefab Construction**

Case Study	Description	Presentation Video	Presentation Notes	Estimator's Notes	
				Prefabricated Alternate	Conventional Alternate
1	Interstate Bridge Replacements over Local Road in Urban Environment	<a href="#">WMM (10:55)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
2	Interstate Bridge Replacements over Proposed Rail Transit Corridor	<a href="#">WMM (11:05)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
3	Multiple Bridge Replacements over Proposed Rail Transit Corridor	<a href="#">WMM (9:48)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
4	Bridge Replacements over Interstate with Proposed Rail Transit Corridor	<a href="#">WMM (7:27)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
5					
6					

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- The introductory paragraph at the top gives a brief history and purpose of the website.
- This website is intended to provide design guidance for developing prefabricated bridge alternates and gives examples on how to estimate both direct and indirect costs.
- Sample contractor estimates are provided to show how project costs may be developed to compare conventional construction methods versus a prefabricated ABC approach.

# Case Studies: Considerations for Prefabricated ABC Approach

**Florida Department of Transportation**

Structures Design Office - Every Day Counts

**EVERY DAY COUNTS - Prefabricated Bridge Elements & Systems**

**Case Studies: Considerations for Prefabricated ABC Approach**

Case Study	Description	Presentation Video	Presentation Notes	Alternate Comparison Outline
1	Bridge Replacement in Close Proximity to Major Interstate-to-Interstate Interchange	<a href="#">WVU (9:04)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
2	Major Interchange Waterway Crossing Bridge Replacement	<a href="#">WVU (8:43)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
3	Replacement Bridge Serving an Ingress/Egress Route to Major Port	<a href="#">WVU (9:27)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
4	Graded Ramp Over Ingress into International Airport	<a href="#">WVU (6:30)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
5	Spanning of Long over-cover Bridge Located Over a Floodplain and a Navigable River	<a href="#">WVU (8:04)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
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2	Interstate Bridge Replacements over Proposed Rail Transit Corridor	<a href="#">WVU (11:05)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
3	Multiple Bridge Replacements over Proposed Rail Transit Corridor	<a href="#">WVU (9:48)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
4	Bridge Replacements over Interstate with Proposed Rail Transit Corridor	<a href="#">WVU (7:27)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>

- The group of case studies in the top table are intended to show considerations for prefabricated ABC approach based on specific project constraints.
- These case studies are not real FDOT projects. The project sites have been selected because of their unique project constraints and ability, from a training point of view, to show various prefabricated accelerated bridge construction options.
- In each case, assumed constraints will be stated, from which possible design options involving prefabricated ABC approaches can be discussed.
- The main emphasis is to demonstrate the factors influencing the bridge components that could be prefabricated. Also discussed will be the overall prefabricated ABC strategies and implications.

# Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Presentation Video	File Location	Alternate Component Outline
1	Bridge Replacement & Close Proximity to Major Interchange (Interchange 10)	<a href="#">Video</a>	SSD(09-04)	ISC
2	Open Intermediate Gateway Crossing Bridge Replacement	<a href="#">Video</a>	SSD(08-40)	ISC
3	Replacement Bridge Span in Expressway Ramps	<a href="#">Video</a>	SSD(08-27)	ISC
4	Replacement of Long Concrete Bridge Spanned Over a Freeway and Interchange	<a href="#">Video</a>	SSD(08-26)	ISC
5	Replacement of Long Concrete Bridge Spanned Over a Freeway and Interchange	<a href="#">Video</a>	SSD(08-04)	ISC
6	Construction of a Long Bridge Spanned Over a Freeway and Interchange	<a href="#">Video</a>	SSD(07-25)	ISC
7	Construction of a Long Bridge Spanned Over a Freeway and Interchange	<a href="#">Video</a>	SSD(06-07)	ISC

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EDC  
Case Studies

Case Study #1



These case studies are not real FDOT projects. The project sites have been selected because of their unique project constraints and ability, from a training point of view, to show various prefabricated accelerated bridge construction (or ABC) options.

In each case, assumed constraints will be stated, from which possible design options involving prefabricated ABC approaches can be discussed.

The main emphasis here is to demonstrate the sort of factors influencing which bridge components may be prefabricated. Also discussed will be the overall prefabrication ABC strategies and implications.

Every Day Counts  
Case Studies

Department of Transportation  
Structures Design Office

- You will notice in the table that three columns with links appear.
- The first column link is to the presentation video for the case study.

# Case Studies: Considerations for Prefabricated ABC Approach

**Case Studies: Considerations for Prefabricated ABC Approach**

Case Study	Description	Publication Month	Availability	Alternate Comparison Outline
1	Bridge Replacement & Close Proximity to Major Interchange on Interstate 94	2002 (9/04)	ISE	ISE
2	Span Replacement (Interchange Connecting Bridge Replacement)	2002 (9/04)	ISE	ISE
3	Replacement Bridge Service on Expressway Route to State Road	2002 (8/27)	ISE	ISE
4	Replacement of Long, Low-Low Bridge Located Over a Freeway and Interstate River	2002 (8/28)	ISE	ISE
5	Replacement of a Long Bridge Located in the Center of a Freeway	2002 (8/28)	ISE	ISE
6	Construction of a Long Bridge Located in the Center of a Freeway	2002 (7/25)	ISE	ISE
7	Construction of a Long Bridge Located in the Center of a Freeway	2002 (10/07)	ISE	ISE

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**EDC  
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Case Studies*  
Department of Transportation  
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- In each case, assumed constraints will be stated, from which possible design options involving prefabricated ABC approaches can be discussed.
- The main emphasis is to demonstrate the factors influencing the bridge components that may be prefabricated. Also discussed will be the overall prefabricated ABC strategies and implications.

- The second column link is to a PDF of the notes pages for that presentation.

# Case Studies: Considerations for Prefabricated ABC Approach

**Structures Design EDC Training Website**

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Case Study	Description	Preconstruction Approach	ABC Alternates	Alternate Comparison Outcome
1	Bridge Replacement in Close Proximity to Major Interchange on Interstate Interchange	SDO (#144)	ISE	ISE
2	Span Replacement (Alternative Concrete Bridge Replacement)	SDO (#143)	ISE	ISE
3	Replacement Bridge Service as Express/Express Truck	SDO (#17)	ISE	ISE
4	Steel Deck, Cast Concrete on Reinforced Concrete	SDO (#130)	ISE	ISE
5	Placement of a Long, Low Span Bridge Located Over a Freeway and Freeway Drive	SDO (#144)	ISE	ISE
6	Construction of a Long Bridge Located in the Center of a Existing Interchange	SDO (#13)	ISE	ISE
7	Construction of a Long Bridge Located in the Center of an Existing Interchange	SDO (#147)	ISE	ISE

**In this section, include project constraints and user impact considerations:**

Conventional Construction Approach

**Bridge Demolition:** Generally demolishing the existing bridge spans requires a minimum 2-3 day duration per span. Crossovers are typically employed to move traffic from under these work operations. Also the existing local road R/W constraints will likely require phased bridge construction which necessitates crossovers for each span as well as for each phase. However, the close proximity of the bridge to the interstate interchange makes employing crossovers extremely difficult. In fact it is unlikely that traffic coming off of the north-south interstate onto the eastbound interstate could be accommodated and would likely have to be rerouted to the west with a u-turn at the next interchange and then back east.

Also the existing east-west interstate accommodates three lanes in each direction (6 lanes total). Each existing span at the local road, however is only long enough to accommodate two lanes in each direction (4 lanes under 1 span). Therefore when crossovers are in place, only two lanes in each direction can be accommodated.

**Beam Placement:** Beams may be placed at night using either crossovers or rolling road blocks (paving) in order to move traffic from under beam placement work operations. However if rolling road blocks were to be employed, the traffic coming off of the north-south interstate onto eastbound interstate would not be able to be accommodated. While the rolling road block is in place, this traffic would likely have to be rerouted to the west with a u-turn at the next interchange and then back east.

Prefabricated Construction Approach

**Near Site Casting:** There does appear to be sufficient space within the existing interstate right-of-way to set up a near site casting yard as well as sufficient space to demolish the existing spans outside of the interstate footprint. There does appear to be a reasonable SPMT access between possible near-site casting site and the existing bridge location. The BDR could also consider shored construction and composite dead loads in order to increase structural efficiency.

**SPMT Costs:** In order to decrease SPMT mobilization and reutilization costs, it would be desirable to utilize a shallow foundation concept which would allow the existing spans to be removed and the new spans (either two simple spans or one continuous two span unit) to be placed in the same day.

**Every Day Counts Case Study Number and Description: CS #1 – Bridge Replacement in Close Proximity to a Major Interstate-to-Interstate Interchange**

	Conventional Alternate (Yes/No/NA)	Prefab. Alternate (Yes/No/NA)	
1. Prefabricated Beam	Yes	Yes	Given the span lengths, the BDR should consider FIB's for the conventional alternate. For the prefabricated alternate, consider both simple span precast FIB's and more-likely two-span continuous steel plate girder unit option.
2. Prefabricated Piles	Yes	Yes	The BDR should consider both drilled shaft and prestressed piling for both the conventional and prefabricated alternates.
3. Precast Footing	No	No	Under SPMT option described below, footings would be constructed outside of roadway and outside of the existing bridge footprint. Precast Footing not deemed to be beneficial for prefabricated option because footing construction is not on the critical path (substructure and superstructure constructed concurrently with near-site casting start-up time).
4. Prefabricated Bent Cap	No	No	Not deemed to be beneficial because end bent construction is typically easy to construct in-situ and the number of components is small to justify precast steel and construction learning curve.

- Then lastly, the third column link is to a PDF that briefly describes the project specific constraints for each case study and a summary of which bridge components would likely benefit from prefabrication.

## Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Publication Month	File Available	Alternate Comparison Outline
1	Bridge Replacement in Close Proximity to Major Interchange on Interstate Interchange	SSU (9/14)	ISE	ISE
2	Open Intermediate Overpass Crossing Bridge	SSU (8/10)	ISE	ISE
3	Replacement Bridge Service in Express/Green Lanes	SSU (8/27)	ISE	ISE
4	Open Bridge	SSU (9/10)	ISE	ISE
5	Replacement of Long Concrete Bridge Structure in a Freeway	SSU (8/14)	ISE	ISE
6	Construction of a New Bridge Located in the Vicinity of an Existing Bridge	SSU (7/25)	ISE	ISE
7	Construction of a New Long Bridge Located in the Vicinity of an Existing Bridge	SSU (10/1)	ISE	ISE

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**EDC Case Studies** | Case Study #1

**Bridge Replacement in Close Proximity to a Major Interstate-to-Interstate Interchange**

*Project Constraints*

*Every Day Counts Case Studies*

Department of Transportation Structures Design Office

- Okay, let's talk about some of the representative case studies presented on the site.
- Case Study #1 for instance, is a bridge replacement close to a major interstate-to interstate interchange.
- See the existing bridge location circled in red.
- The challenge outlined in this case study is how to replace the bridge without affecting the interchange-to-interchange connection ramps noted by the red arrows.
- The case study attempts to answer questions such as:
  - How will traffic movements be accommodated during bridge demolition?
  - What about during beam placement?
  - How long do these sorts of construction operations take?
  - What are the likely detour routes?
  - What are some possible ABC solutions to reduce user impacts?

# Case Studies: Considerations for Prefabricated ABC Approach

**Case Studies: Considerations for Prefabricated ABC Approach**

Case Study	Description	Publication Month	ABC Solution	Alternate Construction Option
1	Bridge Replacement & Close Proximity to Major Interchange on Interstate Interchange	SDO (09-04)	ISC	ISC
2	High Interchange Gateway Concrete Bridge Replacement	SDO (08-03)	ISC	ISC
3	Replacement Bridge Service in Expressway Project in	SDO (01-07)	ISC	ISC
4	SDO (01-07)	ISC	ISC	ISC
5	Replacement of Long Concrete Bridge Located Over a	SDO (01-08)	ISC	ISC
6	Replacement of Long Concrete Bridge Located Over a	SDO (01-08)	ISC	ISC
7	Construction of a Long Bridge Located in the	SDO (01-08)	ISC	ISC
8	Construction of a Long Bridge Located in the	SDO (01-08)	ISC	ISC
9	Construction of a Long Bridge Located in the	SDO (01-08)	ISC	ISC

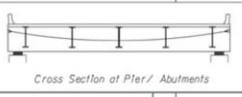
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**EDC Case Studies**



*Cross Section of Pier/ Abutments*



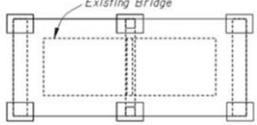
*Bridge Replacement Option*



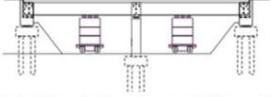
*Every Day Counts Case Studies*

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**Case Study #1**



*Existing Bridge*



**Straddle Existing Foundations (mono-shafts or pile groups). Use Integral Frame Straddle Piers and End Bents.**



- In this case, the use of full superstructure near-site casting ABC solution and self-propelled modular transporters (SPMTs) is discussed.
- Some of the questions addressed by this case study include:
  - What are the costs associated with SPMT remobilization?
  - What are design details and ABC strategies that could eliminate/reduce SPMT remobilization?
  - Whether the designer could take advantage of shored construction? Making all of the dead loads composite.

# Case Studies: Considerations for Prefabricated ABC Approach

**Case Studies: Considerations for Prefabricated ABC Approach**

Case Study	Description	Approximate Value	ABC Approach	Alternative Construction Method
1	Bridge Replacement & Close Proximity to Major Interchange on Intracoastal Waterway	\$500 (R-44)	ISD	ISC
2	Open Intra-coastal Waterway Crossing Bridge Replacement	\$500 (R-43)	ISC	ISC
3	Replacement Bridge Service in Transverse Direction	\$500 (R-27)	ISC	ISC
4	Replacement of Long Span Concrete Bridge on Intracoastal Waterway	\$500 (R-38)	ISC	ISC
5	Replacement of Long Span Concrete Bridge on Intracoastal Waterway	\$500 (R-34)	ISC	ISC
6	Construction of a Long Bridge Spanned Located in the Middle of an Existing Bridge	\$500 (R-37)	ISC	ISC
7	Construction of a Long Bridge Spanned Located in the Middle of an Existing Bridge	\$500 (R-47)	ISC	ISC

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**EDC Case Studies Case Study #2**

**Bridge Layout**

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- Case Study #2 is an example of major intracoastal waterway crossing bridge replacement.
- Where:
  - Project is large enough to benefit from economy of scale
  - Labor and Insurance rates of working on the water, from barges are high
  - The proposed bridge is fairly uniform
  - Water depths allow for good water access throughout

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# Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Publication Month	File Available	Alternate Comparison Outline
1	Bridge Replacement & Close Proximity to Major Interchange on Interstate 4	2002 (04/04)	DC	DC
2	Open Intermediate Spanway Concrete Bridge Replacement	2002 (04/03)	DC	DC
3	Replacement Bridge Service on Expressway Route in Rural Area	2002 (02/27)	DC	DC
4	Replacement of Long Span Concrete Bridge on Interchange	2002 (02/26)	DC	DC
5	Replacement of Long Span Concrete Bridge on Interchange	2002 (04/04)	DC	DC
6	Construction of a Long Bridge Viaduct Located in the Center of an Existing Viaduct	2002 (02/27)	DC	DC
7	Construction of a Long Bridge Viaduct Located in the Center of an Existing Viaduct	2002 (02/27)	DC	DC

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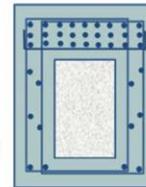
Case Study #2



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Ways of Reducing Weight  
in Lieu of Cap/Column  
Carve-outs

- Flowable Concrete Mixes w/ Embedded Polystyrene Blocks
- Lightweight Concrete



- This case study attempts to answer the following questions :
  - What bridge components should be prefabricated in order to reduce the Contractor's time on the water?
  - How do lifting weights and crane sizes influence the preferred ABC solution? What substructure elements to precast based on project constraints?
  - What are some strategies for reducing lifting weights?

## Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Publication Month	Publication Agency	Alternate Component Details
1	Bridge Replacement & Close Proximity to Major Interchange on Interstate 75	2002 (9/04)	ISE	ISE
2	Open Intermediate Spanway Concrete Bridge Replacement	2002 (8/03)	ISE	ISE
3	Replacement Bridge Span in Expressway Viaduct	2002 (8/27)	ISE	ISE
4	Replacement Bridge Span in Expressway Viaduct	2002 (8/28)	ISE	ISE
5	Replacement of Long Concrete Bridge Span on a Freeway	2002 (8/04)	ISE	ISE
6	Construction of a Long Bridge Viaduct Located in the Center of an Existing Viaduct	2002 (7/25)	ISE	ISE
7	Construction of a Long Bridge Viaduct Located in the Center of an Existing Viaduct	2002 (10/01)	ISE	ISE

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**EDC Case Study #2**

- This case study also attempts to answer the following questions :
  - What are some strategies for addressing pier aesthetic demands?
  - How is component-to-component fit-up ensured? Especially when prefabricated elements are to be connected to cast-in-place components where match-casting is not possible or where locating grouted coupler to ensure fit-up is more difficult.

## Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Publication Month	File Location	Alternate Comparison Option
1	Bridge Replacement & Closure Process to Major Interchange on Interstate 75	ISSU (9/94)	ISS	ISC
2	Major Interchange Widening Using Bridge Replacement	ISSU (8/95)	ISC	ISC
3	Replacement Bridge Service on Expressway Ramps to Major Interchange	ISSU (8/97)	ISC	ISC
4	Replacement of Long Concrete Bridge on Expressway	ISSU (8/98)	ISC	ISC
5	Replacement of Long Concrete Bridge on Expressway	ISSU (8/98)	ISC	ISC
6	Construction of a Long Bridge Viaduct Located in the Center of an Existing Interchange	ISSU (7/99)	ISC	ISC
7	Construction of a Long Bridge Viaduct Located in the Center of an Existing Interchange	ISSU (10/99)	ISC	ISC

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**EDC Case Studies**

**Case Study #4**





*Project Constraints*

*Every Day Counts Case Studies*

Department of Transportation Structures Design Office

- Case Study #4 involves widening the interstate which will impact a braided ramp.
- The braided ramp goes over the major interstate off-ramp into the airport, any disruption to the route must be minimized to allow for regular flow of traffic into the airport.
- The braided ramp is fairly new and could be relocated rather than demolished.

## Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Project Location	ABC Application	Alternate Construction Option
1	Bridge Replacement & Closure Access to Major Interchange on International Drive	SR90 (934)	ISC	ISC
2	Major Interchange Widening	SR90 (440)	ISC	ISC
3	Replacement Bridge Structure on Expressway	SR90 (27)	ISC	ISC
4	Replacement of Long Span Concrete Bridge	SR90 (30)	ISC	ISC
5	Replacement of Long Span Concrete Bridge	SR90 (44)	ISC	ISC
6	Construction of a New Bridge	SR90 (73)	ISC	ISC
7	Construction of a New Bridge	SR90 (41)	ISC	ISC

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**EDC Case Studies Case Study #4**

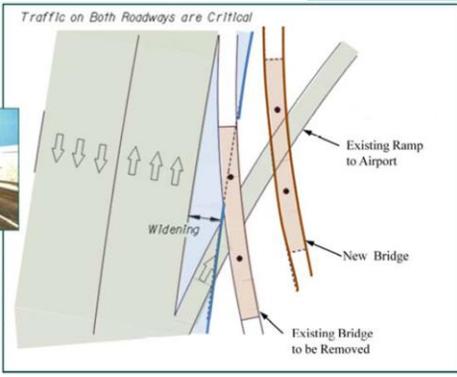
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

*Traffic on Both Roadways are Critical*

**Project Constraints**



*Every Day Counts Case Studies*  
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Existing Ramp to Airport

New Bridge

Existing Bridge to be Removed

Widening

- Here is an overview showing the interstate widening and the relocated ramp.
- Some of the questions addressed by this case study include:
  - What are the user impacts associated with constructing a new braided ramp over an active on-ramp leading into a busy international airport?
  - What are the user impacts associated with demolishing the braided ramp?
  - What are the costs savings associated with relocating the braided ramp superstructure using SPMT technology?
  - What are the user impacts associated with a single roll-in approach?
  - What are other applications for using SPMT technology for reusing existing bridges by simply moving them to a nearby location?

## Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Approximate Value	ABC Evaluation	Alternative Comparison Outcome
1	Bridge Replacement & Clear Access to Major Interchange on Interstate 10	\$500 (9-94)	ISD	ISD
2	Major Interchange (Interchange) Concrete Bridge Replacement	\$500 (8-45)	ISD	ISD
3	Replacement Bridge Service on Expressway Project	\$500 (8-27)	ISD	ISD
4	Bridge Replacement on Expressway Project	\$500 (8-28)	ISD	ISD
5	Replacement of Long Low Level Bridge Located Over a Navigable and Floodable River	\$500 (8-94)	ISD	ISD
6	Construction of a Long Bridge Viaduct Located in the Center of a Floodable River	\$500 (7-25)	ISD	ISD
7	Construction of a Long Bridge Viaduct Located in the Center of a Floodable River	\$500 (10-47)	ISD	ISD

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**EDC Case Studies**

**Case Study #5**





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- Here is another example.
- This case study involves the widening of a long low-level bridge “viaduct” located over a floodplain and a navigable river.
- Project Constraints are as follows:
  - Project is large enough to benefit from economy of scale
  - The proposed bridge widening is fairly uniform
  - Impacts due to flood events introduce construction access risks
  - Potential environmental impacts are high

# Case Studies: Considerations for Prefabricated ABC Approach

Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Publication Month	AVI Available	Alternate Construction Option
1	Bridge Replacement & Close Proximity to Major Interchange on Interstate 75	SSU (09-04)	ISD	ISD
2	Open Intermediate Gateway Crossing Bridge Replacement	SSU (08-05)	ISD	ISD
3	Replacement Bridge Service in Forested Area	SSU (01-07)	ISD	ISD
4	SSU (01-07)	SSU (01-07)	ISD	ISD
5	Replacement of Long Span Concrete Bridge with a Steel Deck and Precast Box	SSU (08-04)	ISD	ISD
6	Construction of a Long Bridge Spanned in the Presence of an Existing Structure	SSU (07-07)	ISD	ISD
7	Construction of a Very Long Bridge Spanned in the Presence of an Existing Structure	SSU (05-07)	ISD	ISD

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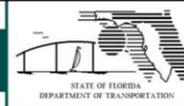
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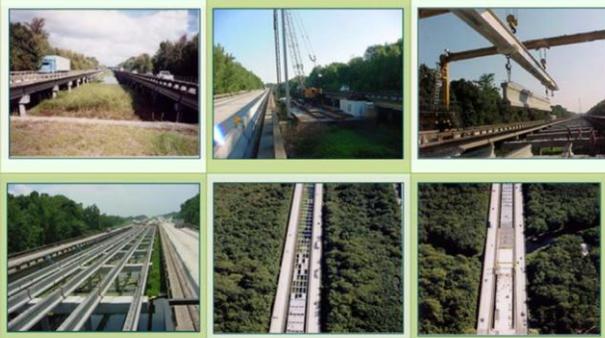


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## Case Study #5



### Top-down Construction Example Utilizing Tire Mounted Straddle Cranes



- This case study also attempts to answer the following questions :
- How the cost of specialized equipment can be amortized into the cost of a large project?
  - How specialized equipment can be efficiently utilized in the delivery of all materials and prefabricated bridge components?
  - How leap-frogged substructure construction methods can reduce environmental impacts?
  - How top-down superstructure construction methods can reduce environmental impacts?

# Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Approximate Value	Key Considerations	Alternative Construction Options
1	Bridge Replacement & Close Proximity to Major Interchange on Interstate	\$500 (R-94)	ISC	ISC
2	Open Intermediate Interstate Concrete Bridge Replacement	\$500 (R-40)	ISC	ISC
3	Replacement Bridge Service on Expressway	\$500 (R-27)	ISC	ISC
4	Replacement of Long Concrete Bridge on Interchange	\$500 (R-30)	ISC	ISC
5	Replacement of Long Concrete Bridge on Interchange	\$500 (R-30)	ISC	ISC
6	Construction of a Long Bridge Viaduct Located in the Median of an Existing Interstate	\$500 (R-37)	ISC	ISC
7	Construction of a Long Bridge Viaduct Located in the Median of an Existing Interstate	\$500 (R-47)	ISC	ISC

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**Case Study #6**





- This case study features construction of a long bridge viaduct located in the median of an existing interstate.
- Project Constraints are as follows:
  - Project is large enough to benefit from economy of scale
  - The proposed bridge viaduct is fairly uniform
  - The potential impacts to adjacent interstate traffic is high
- The challenge of this project is to determine how to construct the long viaduct while minimizing the traffic impacts on the existing at-grade facility.

# Case Studies: Considerations for Prefabricated ABC Approach

Case Studies - Considerations for Prefabricated ABC Approach

Case Study	Description	Publication Month	File Available	Alternate Comparison Option
1	Bridge Replacement & Closure Process to Minimize Disruption to Interstate	SB01-0144	ISD	ISD
2	Open Intermediate Gateway Crossing Bridge Replacement	SB01-0143	ISD	ISD
3	Replacement Bridge Service in Transit/Green Roadway	SB01-0127	ISD	ISD
4	SB01-0126	SB01-0126	ISD	ISD
5	SB01-0125	SB01-0125	ISD	ISD
6	Construction of a Long Bridge Spanned in the Center of a Existing Bridge	SB01-0124	ISD	ISD
7	Construction of a Long Bridge Spanned in the Center of a Existing Bridge	SB01-0123	ISD	ISD
8	Construction of a Long Bridge Spanned in the Center of a Existing Bridge	SB01-0122	ISD	ISD
9	Construction of a Long Bridge Spanned in the Center of a Existing Bridge	SB01-0121	ISD	ISD
10	Construction of a Long Bridge Spanned in the Center of a Existing Bridge	SB01-0120	ISD	ISD

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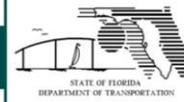
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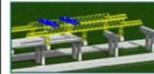


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Case Study #6

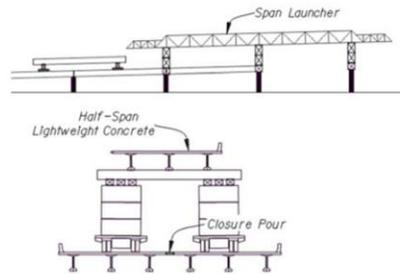


Strategies for Overcoming Project Constraints



Every Day Counts Case Studies

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SPMT's used as a span delivery system for top-down construction.

- This case study also attempts to answer the following questions :
- How the cost of specialized equipment can be amortized into the cost of a large project?
  - How specialized Every Day Counts equipment can be efficiently utilized in the launching of completed superstructure spans?
  - How top-down construction technique can greatly reduce impacts on the traffic below?
  - How such a concept could be lightning fast - approximately 2 spans per day or up to 1 mile of bridge per month?

# Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Publication Month	File Available	Alternate Comparison Option
1	Bridge Replacement & Closure Access to Major Interchange on Interstate 75	SB07-09-04	ISC	ISC
2	Major Interchange Gateway Connecting Bridge Replacement	SB07-08-03	ISC	ISC
3	Replacement Bridge Service on Expressway	SB07-02-27	ISC	ISC
4	Replacement of Long Span Concrete Bridge on Expressway	SB07-02-28	ISC	ISC
5	Replacement of Long Span Concrete Bridge on Expressway	SB07-02-28	ISC	ISC
6	Construction of a Long Bridge Viaduct Located in the Median of an Existing Roadway	SB07-02-29	ISC	ISC
7	Construction of a Fairly Long Bridge Viaduct Located in the Median of an Existing Roadway	SB07-02-29	ISC	ISC

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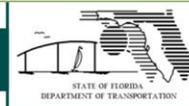
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## Case Study #7

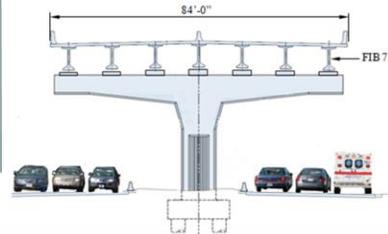


- Project Design Assumptions:
- Viaduct is three-quarters of a mile long
  - Viaduct is 84'-0" wide (uniform width)
  - Viaduct is to consist of Florida-178 Beams
  - Viaduct is supported by 25 piers
  - The underlying roadway consists of three lanes in each direction

Project Constraints

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- This case study features the construction of a fairly long bridge viaduct located in the median of an existing busy roadway.
- Of particular interest in this case study is the importance of minimizing traffic disruptions during daytime hours.
- Project Constraints are as follows:
  - Project is large enough to benefit from economy of scale
  - The proposed bridge viaduct is fairly uniform
  - The potential impacts to the underlying roadway traffic is high

# Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Publication Month	PI Available	Alternate Comparison Details
1	Bridge Replacement & Close Proximity to Major Interchange (Interchange Interference)	SDU (9-94)	ISD	ISD
2	Open Intermediate Subway Crossing Bridge Replacement	SDU (4-03)	ISD	ISD
3	Replacement Bridge Span in Transit/Access Road	SDU (12-07)	ISD	ISD
4	SDU (12-07) Case Study on Intermediate Span	SDU (4-03)	ISD	ISD
5	Replacement of a Long Span Bridge Located in a Remote Area	SDU (4-04)	ISD	ISD
6	Construction of a Long Span Bridge Located in the Center of a Building Footprint	SDU (7-05)	ISD	ISD
7	Construction of a Long Span Bridge Located in the Center of a Building Footprint	SDU (10-07)	ISD	ISD

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Case Study #7

*Strategies for Overcoming Project Constraints*

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**PHASE 2**

1. ERECT LEFT WING SUPPORTING WITH CRANE. EXTEND PT BARS WITH MECHANICAL COUPLERS. PLACE EPOXY ON THE MATCH CAST FACES.
2. FULLY STRESS PT BARS.
3. AFTER EPOXY CURES OPEN LEFT SIDE TO TRAFFIC.

LEFT SIDE NIGHT CLOSURE.

- This case study also attempts to answer the following questions :
- How segmental construction techniques and details can be used for conventional bridge ABC applications?
  - Why a hybrid precast solution may be preferred when component lifting weights, traffic restrictions, and Contractor production rates are considered?
  - How an ABC prefabricated pier wing concept can greatly reduce impacts on the traffic below?
  - How this hybrid precast substructure concept could be used with the top-down superstructure concept outlined in Case Study #6?

# Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

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May 22, 2012

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EVERY DAY COUNTS - Prefabricated Bridge Elements & Systems

Plans Preparation Manual (PPM), Vol. 1, Section [18.1.1.4](#) and Structures Design Sublet 13-07 [PDF](#) provide expanded direction for investigating prefabricated bridge alternatives during the Bridge Development Report (BDR) phase of design. The referenced section of the PPM formalizes the process for evaluating whether prefabricated options should be considered based on feasibility questions, then, when warranted, how to develop and select prefabricated options through an assessment matrix. An assessment matrix methodology allows for alternate selection based on less than perfect knowledge. Both direct and indirect costs for prefabricated and conventional options are to be reported in the BDR. See Structures Design Sublet C1.1.4 [PDF](#) and Sublet 25.1 [PDF](#) for additional background information. See Training video [VIDEO](#) and notes [PDF](#).

This website is intended to provide design guidance for developing prefabricated bridge alternatives and gives examples on how to estimate both direct and indirect costs. To date, the FDOT does not have sufficient historical bid data for prefabricated bridge alternatives in order to develop reasonable cost estimates from average unit material costs. To fill this gap, the Structures Design Office has developed several training videos for the purpose of educating designers on factors for consideration related to use of PBEs for accelerated Bridge Construction (ABC). Sample contractor estimates are provided to show how project costs may be developed to compare conventional construction methods versus a prefabricated ABC approach.

Case Studies: Considerations for Prefabricated ABC Approach

Case Study	Description	Presentation Video	Presentation Notes	Alternate Comparison Outline
1	Bridge Replacement in Close Proximity to Major Interstate-to-Interstate Interchange	<a href="#">WMM (9:04)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
2	Major Interchange Waterway Crossing Bridge Replacement	<a href="#">WMM (8:43)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
3	Replacement Bridge Serving as Ingress/Egress Route to Major Port	<a href="#">WMM (9:27)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
4	Graded Ramp Over Ingress into International Airport	<a href="#">WMM (8:30)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
5	Spanning of Long Over-Cover Bridge Located Over a Floodplain and a Navigable River	<a href="#">WMM (8:04)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
6	Construction of a Long Bridge Viaduct Located in the Median of an Existing Interstate	<a href="#">WMM (7:37)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
7	Construction of a Fairly Long Bridge Viaduct Located in the Median of an Existing Bypass Roadway	<a href="#">WMM (12:47)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>

Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

Case Study	Description	Presentation Video	Presentation Notes	Estimator's Notes	
				Prefabricated Alternate	Conventional Alternate
1	Interstate Bridge Replacements over Local Road in Urban Environment	<a href="#">WMM (10:55)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
2	Interstate Bridge Replacements over Proposed Rail Transit Corridor	<a href="#">WMM (11:05)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
3	Multiple Bridge Replacements over Proposed Rail Transit Corridor	<a href="#">WMM (9:48)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
4	Bridge Replacements over Interstate with Proposed Rail Transit Corridor	<a href="#">WMM (7:27)</a>	<a href="#">PDF</a>	<a href="#">PDF</a>	<a href="#">PDF</a>
5					

The next group of case studies located in the bottom table of the website are intended to provide two main objectives as follows:

- The first objective is to develop a viable prefabricated accelerated bridge construction scenario to compare with a conventional construction approach.
- The second objective is to demonstrate a logical procedure for estimating both direct and indirect costs for the prefabricated alternative.

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## Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

Case Study	Description	Presentation Video	Conventional Alternative	Prefabricated Alternative
1	Vertical Slip Repairs on I-4 Local Road Over Structure	<a href="#">0000-00-00</a>	CS	CS
2	Precast Bridge Repairs on I-4	<a href="#">0000-00-00</a>	CS	CS
3	Precast Bridge Repairs on I-4	<a href="#">0000-00-00</a>	CS	CS
4	Precast Bridge Repairs on I-4	<a href="#">0000-00-00</a>	CS	CS
5	Precast Bridge Repairs on I-4	<a href="#">0000-00-00</a>	CS	CS

**EDC Case Studies | BDR Cost Estimation**

STATE OF FLORIDA  
DEPARTMENT OF TRANSPORTATION

These BDR cost estimation case studies are not real FDOT projects.\*  
The project sites have been selected because of their unique project constraints and ability, from a training point of view, to show various prefabricated accelerated bridge construction (or ABC) options.

There are two objectives for the case studies:

1. Develop a viable prefabricated ABC alternative to compare with conventional construction.
2. Demonstrate a logical procedure for estimating both direct and indirect costs for the prefabricated alternative.

\* Case studies developed by: **PARSONS BRINCKERHOFF**

**Structures Design EDC Training Website**

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- You will notice in the table that four columns with links appear.
- The first column link is to the presentation video for the case study.

# Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

Case Study	Description	Preparation Value	Construction Value*	Conventional Alternative	Estimated Value
1	Vertical Slip Repairs on I-10 Local Road A Area Construction	\$320,000.00	\$22	\$22	\$22
2	Concrete Bridge Repairs on I-10 Highway 171.40	\$220,000.00	\$22	\$22	\$22
3	Steel Bridge Repairs on I-10 Highway 171.40	\$220,000.00	\$22	\$22	\$22
4	Steel Bridge Repairs on I-10 Highway 171.40	\$220,000.00	\$22	\$22	\$22
5	Steel Bridge Repairs on I-10 Highway 171.40	\$220,000.00	\$22	\$22	\$22

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EDC Case Studies

BDR Cost Estimation

\* These BDR cost estimation case studies are not real FDOT projects.\*  
The project sites have been selected because of their unique project constraints and ability, from a training point of view, to show various prefabricated accelerated bridge construction (or ABC) options.

There are two objectives for the case studies:

1. Develop a viable prefabricated ABC alternative to compare with conventional construction.
2. Demonstrate a logical procedure for estimating both direct and indirect costs for the prefabricated alternative.

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BDR Cost Estimation  
Case Studies  
Department of Transportation  
Tallahassee Bridge Office

\* Case studies developed by: **PARSONS BRINCKERHOFF**

- These bridge development cost estimation case studies are not real FDOT projects. The project sites have been selected because of their unique project constraints and ability, from a training point of view, to show various prefabricated accelerated bridge construction (or ABC) options.
- There are two objectives for the case studies:
  - The first objective is to develop a viable prefabricated accelerated bridge construction scenario to compare with a conventional construction approach. The prefabricated alternative will demonstrate the factors which influence its selection and determine which bridge components are well-suited for prefabrication.
  - The second objective is to demonstrate a logical procedure for estimating both direct and indirect costs for the prefabricated alternative.

- The second column link is to a PDF of the notes page for the presentation.

# Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

**Case Studies: Cost Comparisons between Conventional Versus Prefab Construction**

Case Study	Description	Precedent Value	Conventional Alternate	Prefabricated Alternate
1	Removal of Pier Substructure over Local Road & Area Encroachment	\$329,177.46	522	522
2	Removal of Bridge Substructure over Highway and Roadway	\$229,177.46	522	522
3	Steel Deck Replacement over Highway and Roadway	\$689,046.33	522	522
4	Steel Deck Replacement over Highway and Roadway over Roadway	\$329,177.46	522	522

Page 1  
3/28/2012 4:09 PM

**Cost Estimating Spreadsheet Report**  
Prefabricated Alt. CS 1

**Every Day Counts Case Study 1**

Project name: Prefabricated Alt. CS 1  
Fla.

Labor rate table: Labor 2011

Equipment rate table: Equip 2011

Notes:

- Pricing is 2011 \$.
- Construction Schedule of 12 mos.
- Rates reflect majority of work performed days with the exception of actual installation of bridges.
- 2 Bridges
- Labor Cost/Unit - This reflects the cost of Labor to put one unit of measure of work in place. This is comprised of a typical crew with associated productivity required to perform the activity. Labor is priced.

Page 2  
3/28/2012 4:09 PM

**Cost Estimating Spreadsheet Report**  
Prefabricated Alt. CS 1

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
<b>Additional Cost Additional Cost SPMT's</b>								
* unassigned *								
01-54-23.00 Temporary Scaffolding And Platforms								
01-54-23.70 Scaffolding								
Scaffolding, steel tubular, heavy duty, including for steel slab forms, floor area, reinforcement of complete system, to 14'4" x 14'								
	300.00 ccf	-	51.42	-	-	-	51.42	15,425
								13,425
								12,425
02-43-00.00 Structure Moving								
02-43-13.13 Bridge Relocation								
	1.00 tot	-	-	526,139.46	-	-	526,139.46	526,139
Remove Existing Bridges Out & Install New Bridges								
	1.00 tot	-	-	263,069.73	-	-	263,069.73	263,070
Remove Existing Bridges Out & Install New Bridges								
								789,209
								789,209

Structures Design EDC Training Website

FDOT Every Day Counts Training Website

Thomas A. Andres P.E.  
Assist. State Structures Design Engineer

- The third and fourth columns are links is to the estimator's notes for the precast alternate and the conventional alternate, respectively for each case study.
- The first page of the estimator's notes gives the estimator's assumptions used in the case study.
- The rest of the pages give a breakdown of direct costs for each alternate broken down by task item. The breakdown of equipment costs, labor costs, and material costs associated with each task item is given.

30

# Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

Case Study	Description	Preparation Value	Construction Value	Conventional Alternative	Prefabricated Alternative
1	Vertical Edge Reinforcement over Local Road A Area Enclosures	\$320,000.00	\$200,000.00	EDC	EDC
2	Vertical Edge Reinforcement over Highway 504 Road Enclosures	\$200,000.00	\$100,000.00	EDC	EDC
3	Vertical Edge Reinforcement over Highway 504 Road Enclosures	\$200,000.00	\$100,000.00	EDC	EDC
4	Vertical Edge Reinforcement over Highway 504 Road Enclosures	\$200,000.00	\$100,000.00	EDC	EDC
5	Vertical Edge Reinforcement over Highway 504 Road Enclosures	\$200,000.00	\$100,000.00	EDC	EDC

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**EDC Case Studies**

**BDR Cost Estimation**

STATE OF FLORIDA  
DEPARTMENT OF TRANSPORTATION

*Prefabricated Alternative*

*Every Day Counts BDR Cost Estimation Case Study #1*  
Department of Transportation Structures Design Office

**Prefabricated Alternative**

Step A – Questionnaire, Significant Responses

FDOT Structures Bulletin C11-04, Questionnaire:	
Question	Answer
Will prefabrication reduce traffic impacts?	Yes
Does project site have sufficient R/W for near-site fabrication yard?	Yes
Are lifting weights practical given assumed equipment, access, and construction method?	Yes

- Each Case Study in this section shows how the feasibility questions would be answered based on the project constraints.
- All of the sample case studies in this section warrant the development of a precast alternate in the BDR based on affirmative answers to the feasibility questions.

## Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

Case Study	Description	Preconstruction Value	Construction Alternative	Estimated Alternative	Estimated Alternative
1	Vertical Sign Replacement over Local Road A Over Structure	\$320,000,000	EDC	EDC	EDC
2	Vertical Sign Replacement over Highway 504	\$220,000,000	EDC	EDC	EDC
3	Vertical Sign Replacement over Highway 504	\$220,000,000	EDC	EDC	EDC
4	Vertical Sign Replacement over Highway 504 Project for Road Closure	\$220,000,000	EDC	EDC	EDC
5					

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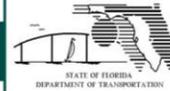
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EDC  
Case Studies

BDR Cost Estimation



Compare Alternatives



Every Day Counts  
BDR Cost Estimation  
Case Study #1

Department of Transportation  
Structures Design Office

### Cost Estimating

- Direct costs determination
  - Unit price and quantity method
  - “Bottom-up” procedure. Accounts for: equipment needs, production rates, man-power, supplier costs, etc.
- Examples benefiting “bottom-up” procedure
  - Contractor access and affect on schedule
  - MOT costs, not traditionally included in unit price method

- Each case study also attempts to answer the following questions :
- How a bottoms-up estimate for labor, equipment and materials would be performed for both precast and conventional options?

## Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

**Case Studies: Cost Comparisons between Conventional Versus Prefab Construction**

Case Study	Description	Preparation Value	Construction Method	Conventional Alternative	Prefabricated Alternative
1	Detour of Bridge Repairs on I-75 Local Road A Area Construction	\$320,000,000	DC	DC	DC
2	Detour of Bridge Repairs on I-75 Local Road B Area Construction	\$200,000,000	DC	DC	DC
3	Detour of Bridge Repairs on I-75 Local Road C Area Construction	\$100,000,000	DC	DC	DC
4	Detour of Bridge Repairs on I-75 Local Road D Area Construction	\$50,000,000	DC	DC	DC



STATE OF FLORIDA  
DEPARTMENT OF TRANSPORTATION

**Structures Design EDC Training Website**

FDOT Every Day Counts Training Website

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EDC Case Studies
BDR Cost Estimation

**Direct Cost Comparison**

Compare Alternatives

Summary of Direct Costs - Taken from "Bottom-Up" Cost Estimate

Item	Construction Type		Delta	Reason
	Conventional	Prefabricated		
Detour vs. SPMT	\$ 2,481,758	\$ 1,008,766	\$ (1,472,992)	Elimination of Detour
Contractor General Conditions	\$ 1,169,525	\$ 464,223	\$ (705,302)	Schedule Reduction
Walls & Approach Slabs	\$ 494,644	\$ 532,182	\$ 37,538	Higher Cost of Soil Nail Wall
End Bents	\$ 333,825	\$ 206,775	\$ (127,050)	Decreased Quantity
Piers	\$ 388,305	\$ 258,022	\$ (130,283)	Decreased Quantity
Superstructure	\$ 2,010,495	\$ 2,870,718	\$ 860,223	Integral Straddle, Steel Girders
<b>Direct Cost Total:</b>	<b>\$ 6,878,552</b>	<b>\$ 5,340,686</b>	<b>\$ (1,537,866)</b>	--

*Every Day Counts BDR Cost Estimation Case Study #1*

Department of Transportation Structures Design Office

- \$1.5M savings using prefabricated alternative even though bridge material costs are \$0.6M higher
- Attributed to eliminating detour bridge and reducing contractor schedule from 28 months to 12 months

Each case study will also answer the following questions :

- How Economy of Scale of a project effects direct costs? Amortizing Costs, Contractor's Learning Curve
- The costs associated with special equipment?
- How mobilization of special equipment can affect direct costs of a project?
- How production rates are affected by performing work outside the limits of the roadway?
- How equipment and labor costs are affected by time duration?

## Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

Case Studies: Cost Comparisons between Conventional Versus Prefab Construction

Case Study	Description	Preparation Video	Presentation Video	Conventional Alternative	Prefab Alternative
1	Interstate Bridge Repairs over Local Road A Area Construction	0302-10-01	0302-10-01	EDC	EDC
2	Interstate Bridge Repairs over Highway 504 Area Construction	0302-11-01	0302-11-01	EDC	EDC
3	Interstate Bridge Repairs over Highway 504 Area Construction	0302-04-01	0302-04-01	EDC	EDC
4	Interstate Bridge Repairs over Highway 504 Area Construction	0302-07-01	0302-07-01	EDC	EDC

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Design Engineer



EDC Case Studies

BDR Cost Estimation

Compare Alternatives

Every Day Counts  
BDR Cost Estimation  
Case Study #1  
Department of Transportation  
Structures Design Office

### Indirect Cost Comparison

Road User Cost Report	
Project ID	400000-1-02-01
Project Name	Interstate Bridge over Local Road
Facility Type	Urban/Access/Controlled
Value of Time Delay (VOT) \$	48,12.87
Vehicle Operating Cost (VOC) \$	6143.69
Accident Cost (AC) \$	1769.84
<b>Total Cost \$</b>	<b>12426.00</b>

SOFTWARE  
OUPUT

\$ 12,426 /day

Project Input Report			
District	7	County	Hillsborough
Construction Type	Heavy	Work Zone Length (miles)	0.555
Work Zone Type	Long Term	Pattern	CrossOver
Truck Percentage (%)	15.0	Impact Factor	1
Speed Reduction (mph)	20	Detour Time (min)	0
During Construction		After Construction	
Traffic Volume (e.g. ADT)	19,000	ADT	19,000
No. of Lanes	4	Lanes	5
Speed Limit (mph)	70	Speed Limit (mph)	70

SOFTWARE  
INPUT

Each case study will also answer the following questions :

- How the Department's Software can be utilized to determine user costs?
- How the duration of the lane closure or traffic detour influences user costs?
- How traffic volumes and detour lengths influence user costs?

# Helpful Links

**Structures Design Office - Every Day Counts**

**EVERY DAY COUNTS - Prefabricated Bridge Elements & Systems**

Plans Preparation Manual (PPM), Vol. 1, Section 26.3.2 and Structures Design Bulletin 12-01 (SDC) provide expanded direction for investigating prefabricated bridge alternatives during the Bridge Development Report (BDR) phase of design. The referenced section of the PPM provides the process for evaluating various prefabricated options through an assessment matrix. When "when warranted," how to develop and build prefabricated options through an assessment matrix. An assessment matrix methodology allows for alternate selection based on best value/performance. Both direct and indirect costs for prefabricated and conventional options are to be reported in the BDR. See Structures Design Bulletin C11-04 (SDC) and Exhibit 28-4 (SDC) for additional background information. See Training video [SDC](#) and video [SDC](#).

This website is intended to provide design guidance for developing prefabricated bridge alternatives and give examples on how to estimate both direct and indirect costs. To date, the FDOT does not have sufficient historical bid data for prefabricated bridge alternatives in order to develop accurate cost estimates from average unit material costs. To fill the gap, the Structures Design Office has developed an event training video for the purpose of educating designers on factors for consideration related to use of PBEs for Accelerated Bridge Construction (ABC). Sample alternative estimates are provided to show how project costs may be developed to compare conventional construction methods versus a prefabricated ABC approach.

**Case Studies: Considerations for Prefabricated ABC Approach**

Case Study	Description	Presentation Video	Presentation Notes	Alternate Construction Options
1	Bridge Replacement in Close Proximity to Major Interchange-Interchange Interchange	<a href="#">WMM (8-94)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>
2	Major Interchange Widening - Widening Bridge Replacement	<a href="#">WMM (8-48)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>
3	Replacement Bridge Serving as "Spine" to New Route to Super Road	<a href="#">WMM (8-27)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>
4	Graded Ramp Over Interstate into Interchange Approach	<a href="#">WMM (8-36)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>
5	Widening of Long and Level Bridge Located Over a Hoopspur and a Navigation Channel	<a href="#">WMM (8-94)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>
6	Construction of a Long Bridge Viaduct Located in the Median of an Existing Interchange	<a href="#">WMM (7-87)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>
7	Construction of a Fairly Long Bridge Viaduct Located in the Median of an Existing Busy Roadway	<a href="#">WMM (12-47)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>

**Case Studies: Cost Comparisons between Conventional Versus Prefab Construction**

Case Study	Description	Presentation Video	Presentation Notes	Estimate's Value	
				Prefabricated Structure	Conventional Structure
1	Interchange Bridge Replacement over Local Road in Urban Environment	<a href="#">WMM (10-06)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>	<a href="#">SDC</a>
2	Interchange Bridge Replacement over Proposed Rail Viaduct Corridor	<a href="#">WMM (11-06)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>	<a href="#">SDC</a>
3	Interchange Bridge Replacement over Proposed Rail Viaduct Corridor	<a href="#">WMM (8-48)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>	<a href="#">SDC</a>
4	Bridge Replacement over Interstate with Proposed Rail Viaduct Corridor	<a href="#">WMM (8-27)</a>	<a href="#">SDC</a>	<a href="#">SDC</a>	<a href="#">SDC</a>

**Abbreviations**

- ABC = Accelerated Bridge Construction
- BDR = Bridge Development Report
- EDC = Every Day Counts
- SDC = Structures Design Office
- SDC = Department of State
- SDC = Prefabricated Bridge Elements and Systems
- SDC = Plans Preparation Manual
- SDC = Bridge User Cost
- SDC = Best Practices Manual

**Future Releases!**

- Prefabricated Concrete Details for Precast Concrete
- Local Bridge PBEs Brochure
- Development of ABC Software for

**Helpful Links**

- [FHWA - Every Day Counts](#)
- [FHWA - Connection Details](#)
- [FHWA - Framework for Decision Making](#)
- [FHWA - Manual on Use of SPMs](#)
- [FHWA - PBEs Cost Study - ABC Success Stories](#)
- [FDOT Road User Cost Program](#)

Note: The FDOT RUC software is only available to consultants doing work for FDOT.

Florida Department Of Transportation

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May 22, 2013

Structures Design Office - Every Day Counts

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Structures Design Office - Every Day Counts

EVERY DAY COUNTS - Prefabricated Bridge Elements & Systems

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- [FHWA - Connection Details](#)
- [FHWA - Framework for Decision Making](#)
- [FHWA - Manual on Use of SPMs](#)
- [FHWA - PBEs Cost Study - ABC Success Stories](#)
- [FDOT Road User Cost Program](#)

Note: The FDOT RUC software is only available to consultants doing work for FDOT.

The website also gives reference links to many of FHWA's websites related to accelerated bridge construction.

**Structures  
Design EDC  
Training  
Website**

*FDOT Every Day Counts  
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**Helpful Links**

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- ▶ [FHWA - Connection Details](#)
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- ▶ [FHWA - PBES Cost Study ABC Success Stories](#)
- ▶ [FDOT Road User Cost Program](#)

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Helpful Links



The screenshot shows the FHWA Every Day Counts website. At the top, it features the FHWA logo and navigation links: Home, About EDC, Shortening Project Delivery, Accelerating Technology, Events, Contact Us, EDC Forum, and Communities of Practice. The main content area includes a large image of a worker measuring a road edge, with a caption 'Photo Source: FHWA'. Below this is a section titled 'The Every Day Counts Initiative' with a description of EDC's goals and a sub-section 'The Safety Edge' with a brief description. At the bottom, there are three columns: 'EDC Communities of Practice' with a 'Get Questions?' call to action, 'Who's making Every Day Count?' with a map of the United States highlighting Florida and New York, and 'EDC Innovation Box' with a call to share ideas. The footer includes 'EDC at' and 'Featured States in the Past'.

Here is the home page of the FHWA Everyday Count site.

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Website**

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**Helpful Links**

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Helpful Links

U.S. Department of Transportation  
Federal Highway Administration

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FHWA > [Every Day Counts](#) > [Accelerating Technology](#) > [Prefabricated Bridge Elements and Systems](#) > [Connection Details for PBES](#) > Table of Contents

Prefabricated Bridge Elements and Systems

[Back](#) >>

**Connection Details for PBES**

**Table of Contents**

[PDF Version](#) (8.5 mb)

**Foreword**

**Introduction**

**Chapter 1 — General Topics**

- 1.1 Benefits of Prefabrication
- 1.2 Accelerated Construction Overview
  - 1.2.1 When to Use Accelerated Construction
  - 1.2.2 Rehabilitation Projects
  - 1.2.3 Typical Accelerated Construction Approaches
    - 1.2.3.1 Short-term Full Closure Projects
    - 1.2.3.2 Weekend Closures
    - 1.2.3.3 Overnight Closures
  - 1.2.4 Examples of Prefabricated Elements
  - 1.2.5 Opportunities for Architectural



March 30, 2012

Published by FHWA/AF-12-012

**PREFABRICATED BRIDGE ELEMENTS AND SYSTEMS**

- Introduction
- Description
- Presentations
- Events
- Quick Facts
- Case Studies
- I-85 Project
- Innovative Projects
- Multimedia
- FAQs
- Helpful Resources
- Publications
- Connection Details for PBES
- [Manual on Use of Self-Propelled Modular Transporters to Remove and Replace Bridges](#)

**EMAIL NOTIFICATION**

Enter your E-mail

[<< Return to Bridge site](#)

Here is the home page of the FHWA Connection Details for the Prefabricated Bridge Elements and Systems Manual.

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- [FHWA - Manual on Use of SPMT's](#)
- [FHWA - PBES Cost Study - ABC Success Stories](#)
- [FDOT Road User Cost Program](#)

(Note: The FDOT RUC software is only available to consultants doing work for FDOT.)

Helpful Links

U.S. Department of Transportation  
Federal Highway Administration

FHWA > Bridge > PBES > Publications > Manual on Use of Self-Propelled Modular Transporters to Remove and Replace Bridges

ACCELERATED  
BRIDGE  
CONSTRUCTION

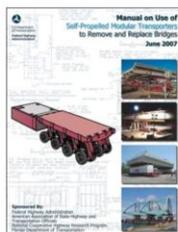
Project Planning   Foundation & Wall Elements   Rapid Embankment Construction   Prefabricated Bridge Elements & Systems   Structural Placement Methods



Manual on Use of Self-Propelled Modular Transporters to Remove and Replace Bridges

PDF Version (8.5 mb)

- Executive Summary
- Chapter 1. Introduction
  - 1.1. Background
  - 1.2. Description of Equipment
  - 1.3. Equipment Availability and Services
  - 1.4. List of Example Calculations, Diagrams, Plan Sheets, and Specifications
- Chapter 2. Benefits and Costs
  - 2.1. Impacts of Conventional Construction
  - 2.2. Benefits of SPMT Bridge Moves
    - 2.2.1. Reduced Onsite Construction Time
    - 2.2.2. Improved Quality of Construction
    - 2.2.3. Increased Contractor Options
  - 2.3. Costs of SPMT Bridge Moves
    - 2.3.1. Initial Construction Costs
    - 2.3.2. Delay-Related User Costs
- Chapter 3. Planning



**Manual on Use of Self-Propelled Modular Transporters to Remove and Replace Bridges**

June 2007

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**Events**

FM 1938 Concrete Pavement Innovations Showcase  
Westlake, TX  
May 1, 2012  
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**What's New**

ABC Manual ( pdf, 11 mb)

**More Information**

[Highways for LIFE](#)

**Related Information**

[Every Day Counts](#)

**Contact**

**Reggie Holt**  
Office of Bridge Technology  
202-368-4566  
E-mail Reggie

Here is the home page of the FHWA Self-Propelled Modular Transporters (SPMT) Manual.

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Website

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Training Website

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Design Engineer



## Helpful Links

**Helpful Links**

- [FHWA - Every Day Counts](#)
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- [FHWA - Framework for Decision Making](#)
- [FHWA - Manual on Line of SPMTs](#)
- [FHWA - PBES Cost Study - ABC Success Stories](#)
- [FDOT Road User Cost Program](#)  
(note: The FDOT RUC software is only accessible to consultants doing work for FDOT.)

### State Construction Office

Some of the links below are in PDF format and can only be viewed with [Adobe Acrobat Reader](#)

**Scheduling Engineer's Information**

Topics	File Type & Size
<p><b>FDOT RUC Software</b></p> <p>This FDOT RUC software was developed specifically for the State of Florida, the internal data tables are related to the conditions of Florida's regional characteristics. This software maybe used outside of the Department, but the default values would need to be changed to reflect that projects regional characteristics. The instructions will guide you to unzip the folder onto your local machine, from there when you open the program you will find a help button that includes the User Manual. <a href="#">Open Instructions</a></p> <p><b>QUEWZ98 - Analysis tool for planning and scheduling use in freeway work zone lane closures.</b></p> <p>Both the software available for download here and the manual are copyrighted by the Texas Transportation Institute. Support for this product is no longer available. The Florida Department of Transportation makes no representation as to the fitness, performance or accuracy of the software or manual for any intended use or purpose. <a href="#">Download Zip File</a></p>	
<p><a href="#">QUEWZ98 Manual</a></p>	<p>PDF File, 767kb</p>
<p><b>Arizona Department of Transportation Model</b></p> <p>The following Model program was created by the Arizona Department of Transportation and should not be modified and should be used in accordance with their guide. This Model program maybe used as an alternative to other programs for calculating road user cost.</p>	
<p><a href="#">A + B Guide</a></p> <p><a href="#">User Cost Model</a></p>	<p>PDF File, 211kb</p> <p>Excel File, 21kb</p>

Note: The FDOT RUC software is only accessible to consultants doing work for FDOT.

Here is link to the FDOT Road Users Cost (RUC) software. Note this software is only available to you if you have an infonet connection.



# Future Design Guidance

- Develop additional cost comparison case studies
- Develop FDOT prefab connection details
- Develop guidance for implementing ABC when the ABC alternate is not the lowest hard dollar cost option. Strategies need to include both design-build and design-bid-build procurement methods

Future Design Guidance

FDOT Every Day Counts Training Website

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Assist. State Structures  
Design Engineer



- Some Future Possible additions to the EDC website include:
  - ☺ Develop additional cost comparison case studies
  - ☺ Develop FDOT prefab connection details
  - ☺ Develop guidance for implementing ABC when the ABC alternate is not the lowest hard dollar cost option. Strategies need to include both design-build and design-bid-build procurement methods



# Acknowledgments

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- Dianne Perkins, State Production Support Office
- Matt Sexton, CADD Applications Support Specialist
- Brad Bradley, Assist. Area Engineer SDO
- Ashleigh Smith, Webmaster SDO

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I want to extend a special thanks for this presentation and the website content to:

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- Parsons Brinkerhoff
- Dianne Perkins of the State Production Support Office
- Matt Sexton, CADD Applications Support Specialist
- Brad Bradley, Assist. Area Engineer SDO
- Ashleigh Smith, Webmaster SDO

**THANKS**

**2012 Design Training Expo**

**FDOT Every Day Counts  
Training Website**

**THANK YOU FOR YOUR ATTENTION**

*FDOT Every Day Counts  
Training Website*

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- So in summary,
  - we have outline the FDOT accelerated bridge philosophy,
  - we have reviewed Design Bulletin C11-04,
  - we have spent some time reviewing the EDC training website,
  - and we have discussed a few current and future work products to be included on the site.
- Thank you for your attention.