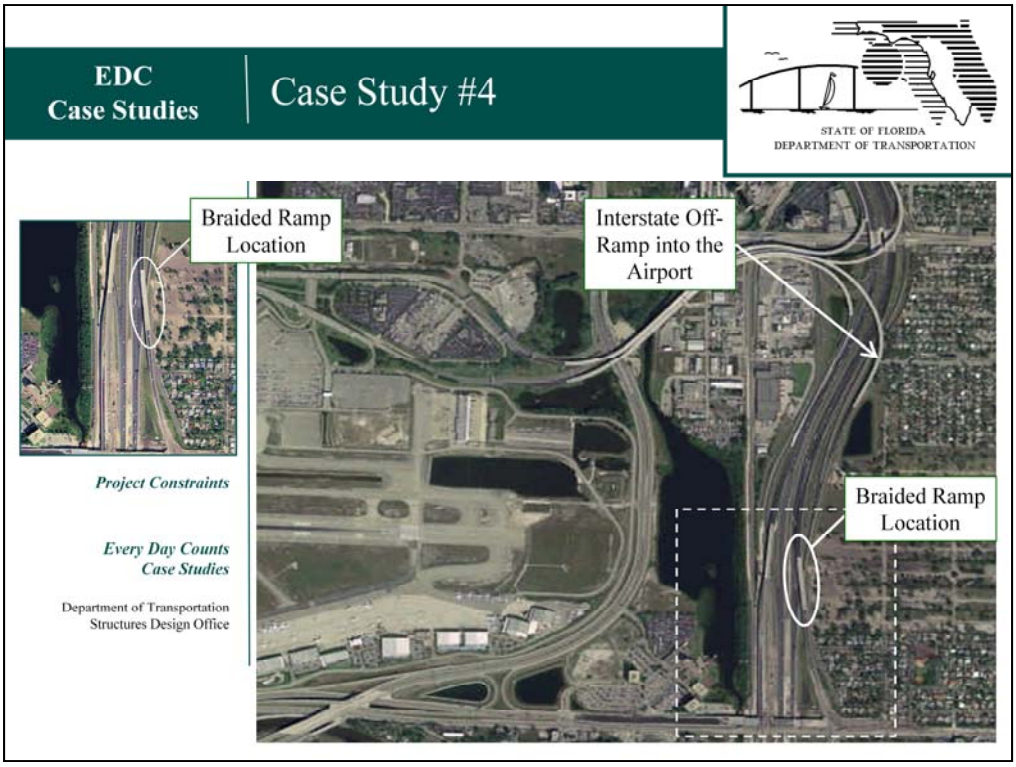
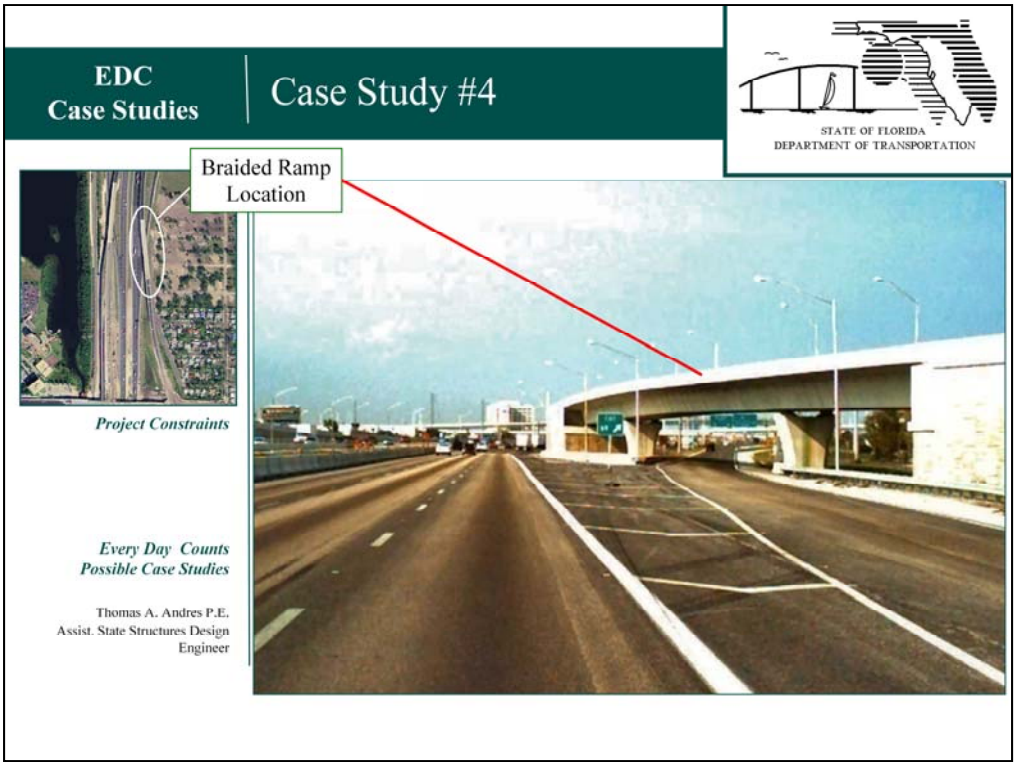
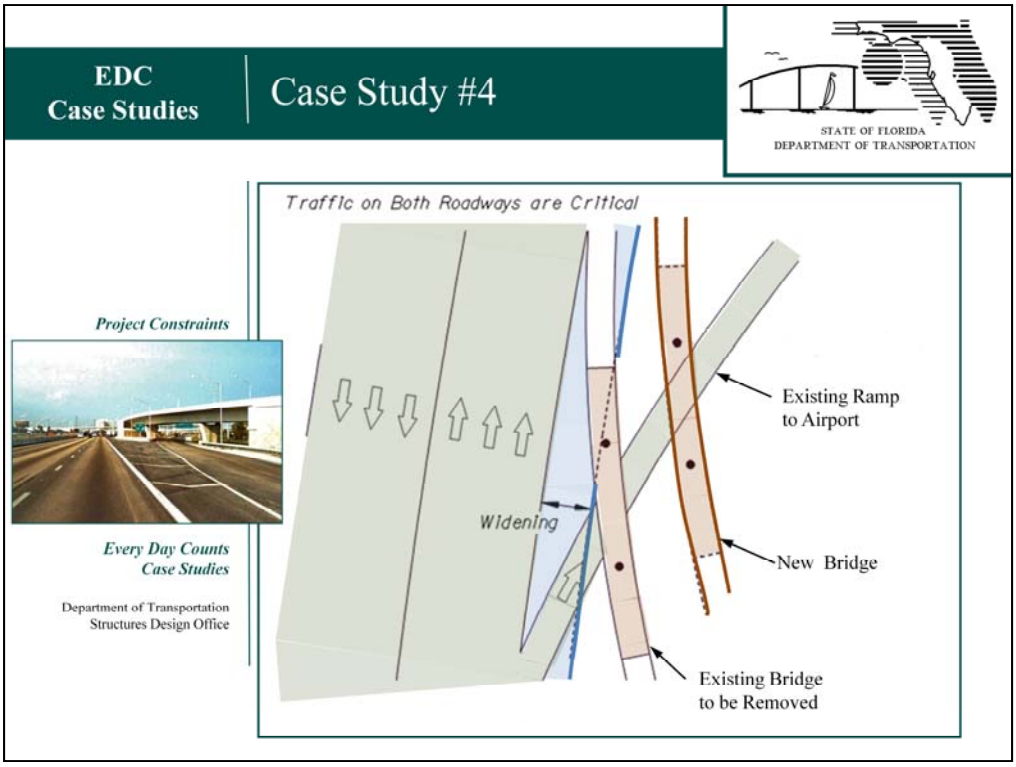
- The purpose of this presentation is to demonstrate the sort of factors influencing the decision to employ Prefabricated Bridge Elements and Systems for rapid project delivery. Bridges showcased in these case studies are not real FDOT projects, but the sites have been chosen because of their unique design constraints and ability to illustrate various accelerated bridge construction considerations. For each case, particular constraints will be assumed and then possible prefabricated ABC approaches will be explored.
- This case study involves widening the interstate which will impact a braided ramp.
- The braided interstate on-ramp is located over the interstate off-ramp into the international airport.
- The primary user impacts involve maintenance of traffic and access into the international airport.
- Significant delays to departing air travelers would cause major discontent among the traveling public.
- Alternate detours from the interstate into the airport would place large amounts of traffic onto the local roadway system.



- In this view, it can be seen that if the interstate is widened, the braided ramp which connects the local arterial road to the interstate must be demolished or moved because the bridge is in the way of interstate expansion.
- Since this 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.
- Any ramp closure would require airport traffic to be detoured onto the local roadway system in order to access the airport.



- A closer view of the braided ramp shows the 3 span braid.
- This picture shows the existing location of the braided ramp. It is clear from the photo that any substantial widening of the interstate would require relocation of the ramp.
- Also, ramp traffic could not likely be rerouted from under the center span during construction nor would this be practical given demolition of the existing continuous segmental bridge.



➢ Here is an overview showing the interstate widening and the relocated ramp.

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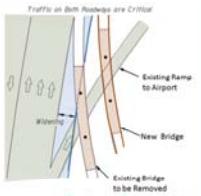


Project Constraints

Every Day Counts Case Studies

Department of Transportation
Structures Design Office

Conventional Construction Approach:

- Demolition – segmental bridges generally require 8-10 days per balanced-cantilever span due to demolition in reverse order as it was constructed
- Braided Ramp Relocation – traditional approach for relocating a bridge on land is to construct a bridge on the new alignment and then shift traffic to the new bridge and demolish the old bridge
- Existing Bridge – assume that the existing segmental bridge is in good condition
- The existing and proposed bridge has temporary glide path ceiling constraints given the close proximity to the end of the runway

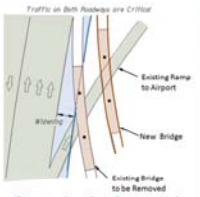
Some considerations for the conventional construction approach include:

- Demolition – segmental bridges generally require 8 to 10 days per balanced cantilever span due to demolition in reverse order as it was constructed.
- Bridge Relocation – the traditional approach for relocating a ramp bridge on land is to construct a bridge on the new alignment, shift the approach roadway to the bridge, then shift traffic to the new alignment and demolish the old bridge.
- Must consider maintenance of traffic and all user impacts including traffic heading to the airport for departure flights and the impact of the detour traffic to the airport on the local roadway system.
- The close proximity of the existing and proposed bridges to the end of the runway creates potential glide path ceiling interference by contractor's equipment. The requirement necessitates a low-head room solution.

EDC
Case Studies

Case Study #4

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION



Strategies for Overcoming Project Constraints

Every Day Counts Case Studies

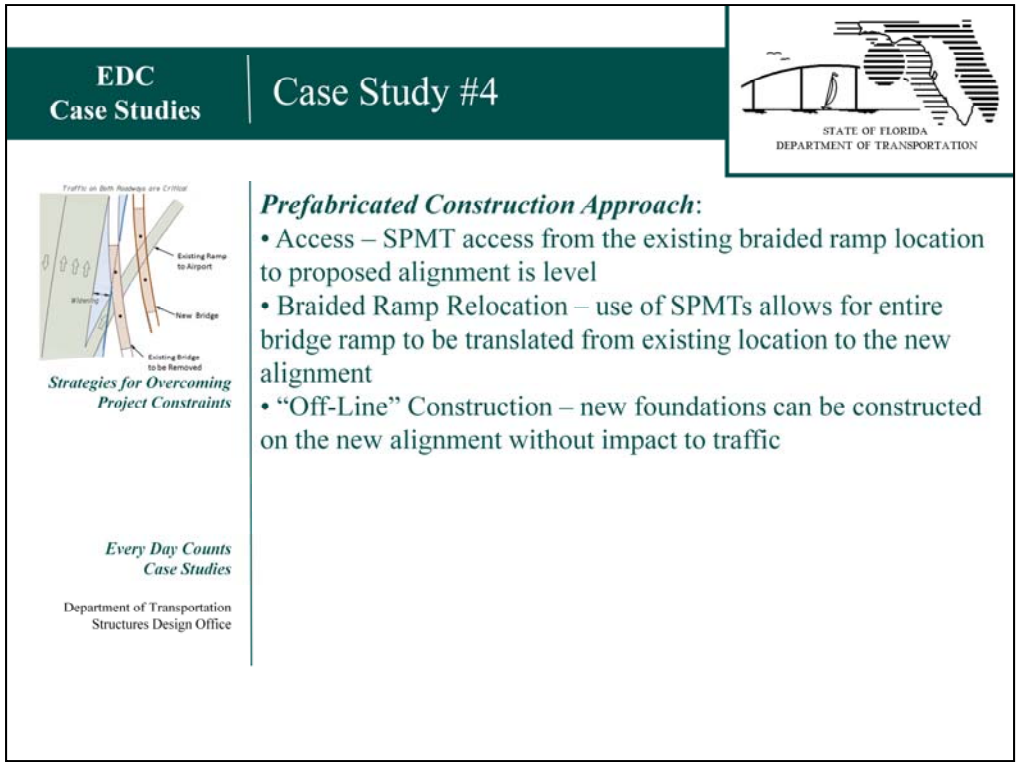
Department of Transportation
Structures Design Office

Problem Statement

What are ways to mitigate these user impacts and also reduce direct costs?

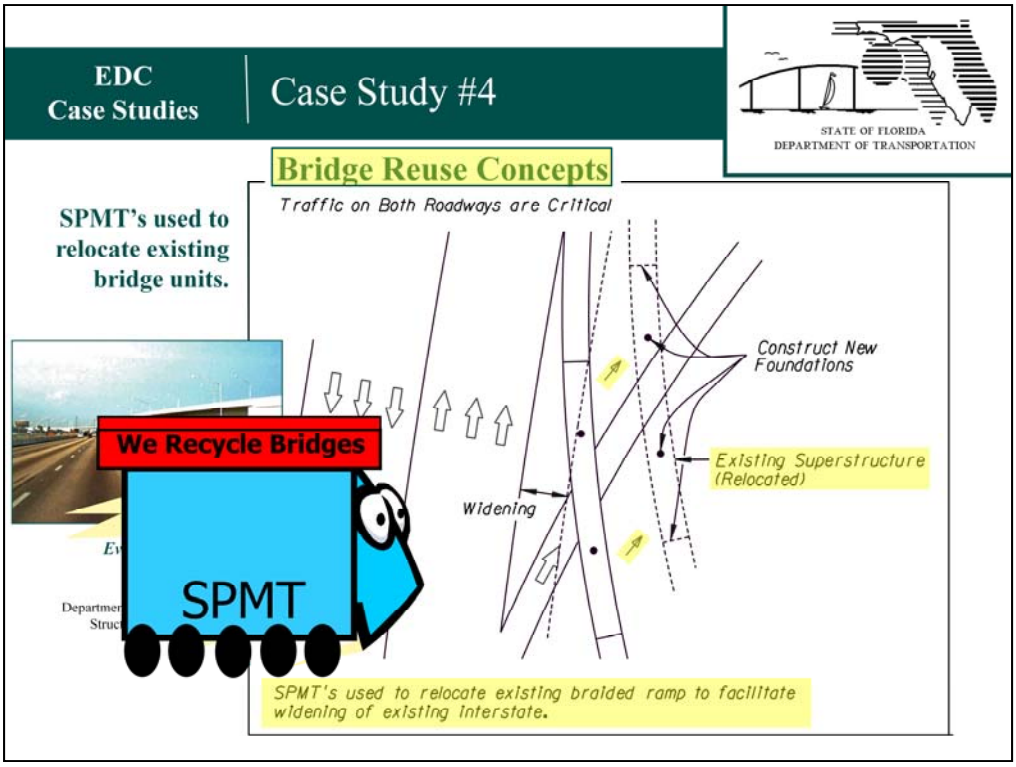
How can the aforementioned concerns be mitigated?

- If the bridge is in good shape, just move it over to the new location.
- Requires SPMT in a single move after new foundations are in place: lift bridge from old foundation, translate it to the new site at night while the airport is closed, set bridge down on new foundation, and shift traffic to the new alignment.
- Process goes from major impact to virtually no user impacts.
- The superstructure is simply recycled not replaced. Significantly reducing direct cost on the project.
- The bridge move is a one-time event with no SPMT re-mobilization costs involved.

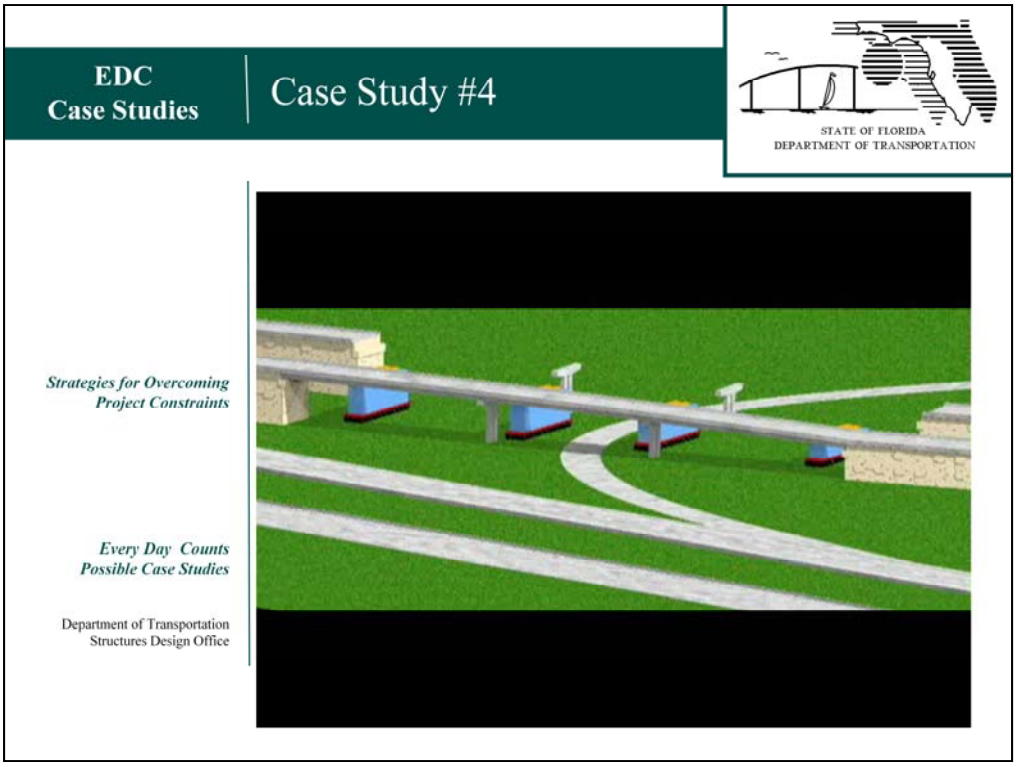


Some considerations for the prefabricated construction approach include:

- Access – SPMT access from the existing braided ramp location to the proposed alignment is level to allow smooth travel for the SPMT.
- Bridge Relocation – use of SPMTs allows for the entire braided ramp to be translated from existing location to the proposed alignment in a single "bridge move" at night when the airport is closed.
- The interstate on-ramp traffic currently crossing the bridge braid would only be impacted during the single night closure.
- "Off-Line" Construction – new foundations, walls, and approach roadway can be constructed outside the ramp footprint, without any impact to traffic.
- Existing Bridge – must investigate the condition of existing segmental bridge to ensure it makes sense to "re-use" the bridge.



- SPMT's can be used to relocate existing bridges that would otherwise be demolished. Here is a case where an existing braided ramp superstructure is relocated onto new foundations to facilitate widening of the mainline highway.
- There may be various ways to use SPMT technology to reuse existing structures within an interchange. The Owner needs to ask whether a reconfigured interchange can make use of these existing bridge units? Can the adjacent interchange be reconfigured to utilize these spans? Also, SPMT technology may allow the existing bridges to be used as temporary bridges during bridge construction.

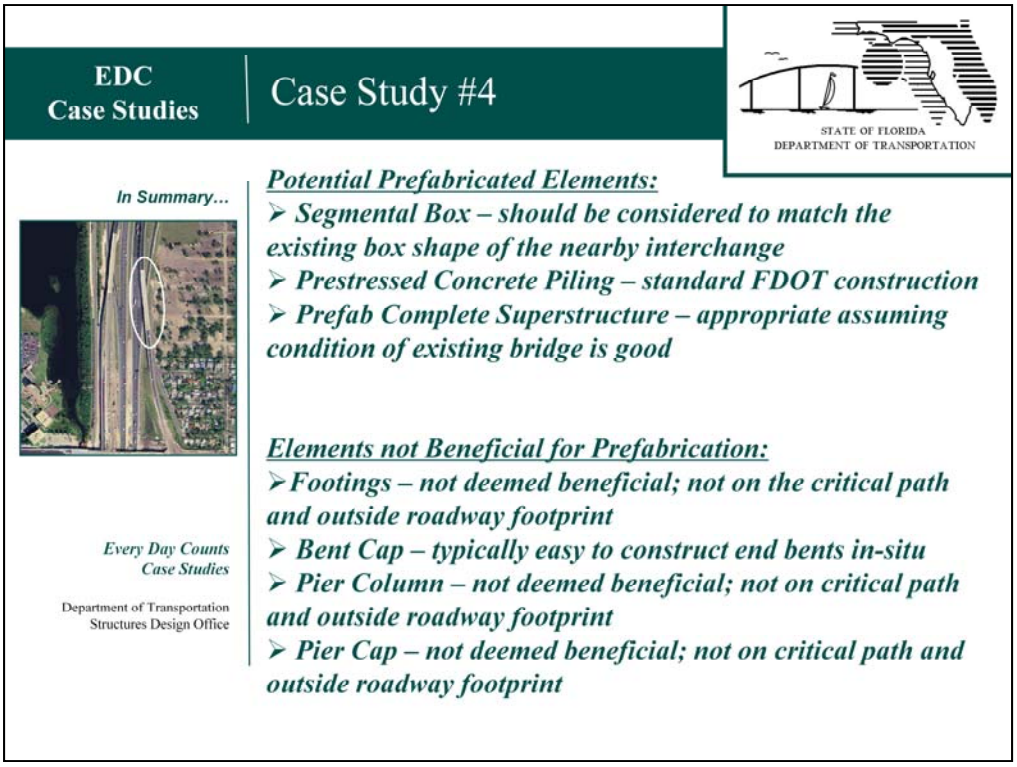


➢This video shows the construction sequence. First, the substructure and ramp approaches are constructed at their new location. Then the existing three-span unit is moved-in using SPMT's using a short closure to allow time to construct new bridge approach slabs and expansion joints and end bents.

➢ It may be necessary to place two SPMT's at each pier location depending on the weight and original balanced cantilever superstructure design.

➢ This concept results in virtually no impacts to either airport traffic or interstate on-ramp traffic except for the single night closure.

➢ But just as importantly, this concept makes use of a perfectly good bridge superstructure.



In Summary…

Potential elements for prefabrication include:

- Segmental Box – should be considered to match the existing box shape of the nearby interchange
- Prestressed Concrete Piling – already standard practice in Florida
- Prefab Complete Superstructure – is appropriate assuming condition of existing bridge is good

Elements not considered beneficial for prefabrication include:

- Footings – constructed outside roadway and not on critical path
- Bent Cap, Pier Columns, Pier Cap – constructed outside roadway footprint and not on critical path