TAPPAN ZEE BRIDGE/I-287
ENVIRONMENTAL REVIEW

New York State Department of Transportation
Metropolitan Transportation Authority Metro-North Railroad
New York State Thruway Authority

Presentation

Stakeholders' Advisory Working Group
Bridge Meeting 9

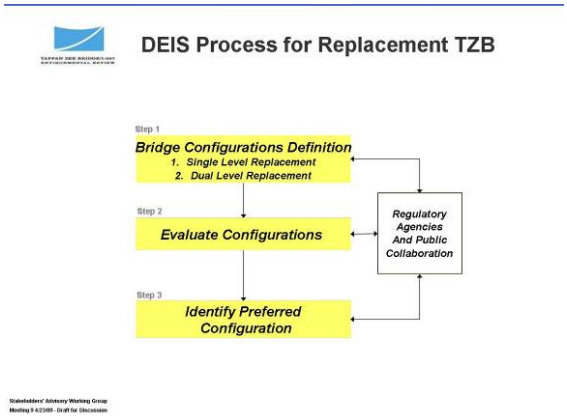
Tappan Zee Bridge/I-287 Corridor
Environmental Review

April 23, 2009

Part 1: Presentation

Slide 1

This is the 9th bridge SAWG held thus far. With scoping complete, development of the Bridge Options Definitions Report can commence. The goal over the next year is to recommend a single or dual level structure and its alignment.



Slide 2

Selecting a bridge option for the DEIS is a 3 step process. In step one, the assortment of bridge configurations is first narrowed based on engineering and operational constraints. At the end of the first step a report entitled *Bridge Options Definition Report* will be prepared.

Step 2 is the full evaluation of all remaining options in the DEIS.

Slide 3

This is the representative single level bridge option that was shown in the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report. The bridge is composed of a rail span and 2 decks for vehicles, each with 4 lanes, a BRT/HOV lane, shoulders, and a shared use path.

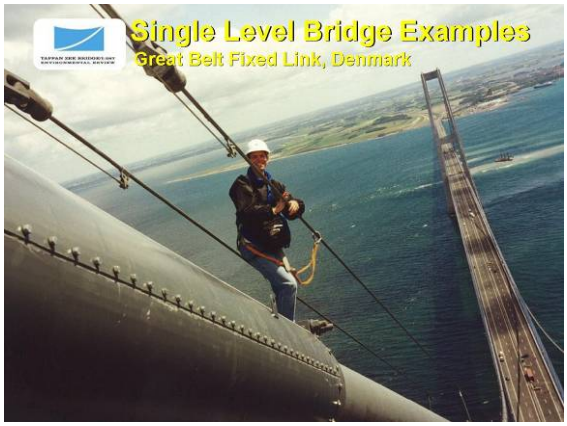
The following slides show examples of single level bridges from around the world as an indication of what is typical and possible.

	**Slide 4** The Coronado Bridge in San Diego, CA is single level bridge with 5 lanes. This bridge uses several design elements to solve the problem of attaining adequate clearance over the shipping channel near the naval base at the shore. Using a curve to add length and employing a 4.5% grade, the bridge was able to achieve a 200' clearance near the shore.
	**Slide 5** An additional view of the Coronado Bridge
	**Slide 6** The San Francisco-Oakland Bay Bridge is a single level bridge with two parallel structures replacing the existing dual level structure. The new bridge when completed will have 4 lanes and dual shoulders in each direction. A shared use path is included on the southern spans. With similar capacity requirements to TZB in terms of number of lanes, it's key to note that this bridge is being constructed as two separate spans. A single bridge of the required width would have been impractical and overly difficult to construct.

	**Slide 7** Of interest to note is that this bridge was designed to accommodate rail in the future as a replacement for one lane and one shoulder in each direction.
	**Slide 8** This three structure single level bridge is the proposed bridge over the Strait of Messina linking the main land of Italy to Sicily. The suspension bridge is being proposed to carry both highway and rail over a 2-mile main span.
	**Slide 9** The bridge utilizes a three-part cross section. Two decks carry two highway lanes each, and heavy rail tracks are in the center.

Slide 10

This bridge in Denmark consists of 2 separate bridges, a four-lane roadway structure and a railroad structure.
Notice that the rail segment was not carried over the main span in the distance. It would have been difficult to hang a rail span from the main bridge.



Slide 11

A view from the tower of the main span of the Great Belt Fixed Link bridge.

Slide 12

Another example of a single deck bridge in Medway, in the UK. Notice the span in the foreground is deeper than that of the one behind.

The bridge under construction is being built to support rail. Rail loads are significantly greater than highway loads and thus a deeper structure is usually needed.

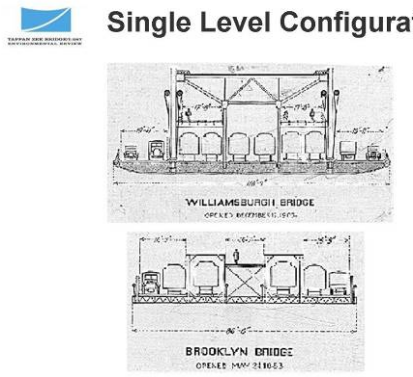
Slide 13

This slide shows the bridge at completion.

Slide 14

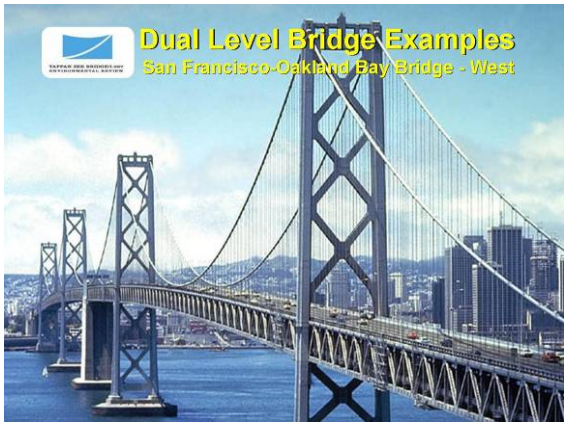
This Millau Viaduct is famous for its innovative construction method of sliding the prefabricated bridge into place while cantilevered from a pier.

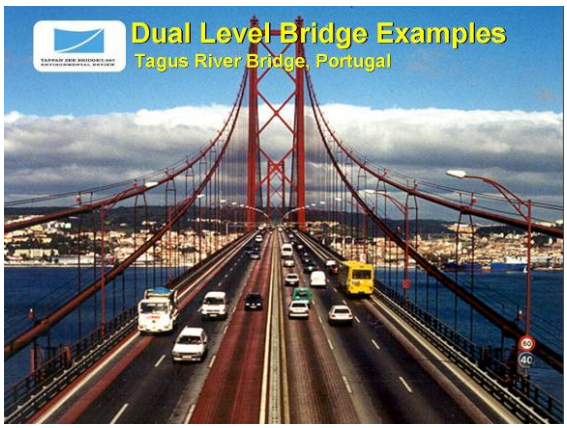
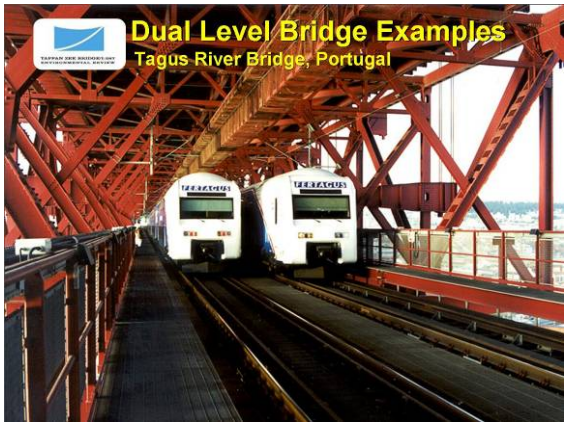
The viaduct is also a prime example of how site conditions can dictate the type of span. The roadway shown here is about 600 feet above the valley and because of the extreme height, the most practical solution was to minimize the number of piers.



Slide 15

These images are cross sections of two local NYC bridges, the Williamsburg and Brooklyn Bridge. Both bridges were designed for a combination of rail and carriages.

	**Slide 16** The following slides display different dual level bridges around the world. The one shown here is the schematic as shown at the end of Scoping as included in the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report. The bridge is composed of separate structures with highway and BRT lanes on the upper deck of each and two CRT tracks on one lower deck.
	**Slide 17** The west span of the San Francisco-Oakland Bay Bridge is a series of suspension bridges that carry a dual level roadway. The roadway is 5 lanes in each direction with the westbound on the upper levels and eastbound on the lower. While new spans are being constructed on the eastern half of the bridge, extensive retrofits have addressed seismic concerns on the suspension spans of the western half. Notably, on the new east spans, the dual level structure was replaced with 2 single level bridges, partly because of the dreariness associated with driving on the lower level of the bridge.
	**Slide 18** Dual level roadways are common on suspension bridges because they are inherently a practical width. Though the long spans of a suspension bridge are not necessary for TZB, a dual level structure could reduce drive discomfort from sun glare.

	**Slide 19** The Tagus River Bridge in Portugal was built as a two level bridge with highway on top and an allowance for rail on the lower level in the future. When the rail was added below the roadway, a second set of main suspension cables was also added carry the increased loads.
	**Slide 20** Another view of the Tagus River Bridge.
	**Slide 21** A view of the rail components on the lower level of the bridge.

Slide 22

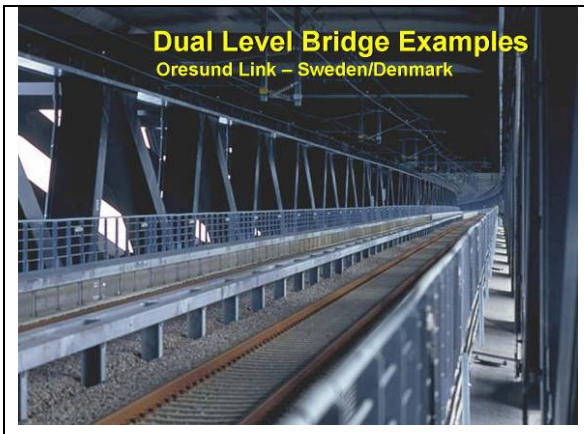
This next bridge in Hong Kong carries 6 lanes of traffic with 2 shoulders. Below the roadway level is commuter rail track en route to an airport.

Slide 23

Hong Kong is susceptible to frequent and intense typhoons. This prompted designers to enclose the lower level of the bridge. While the bridge can be designed to withstand typhoon forces, the enclosure allows trains to operate in windy conditions where they otherwise would have been sidelined.

Slide 24

The Oresund Bridge linking Sweden and Denmark is a dual level bridge with rail on the lower level. The bridge was constructed mostly by floating in precast sections and then hoisting them into position.



Slide 25

Rail on this bridge is on the lower level. This is the most common method of incorporating rail in conjunction with highway lanes. This arrangement results in symmetrical loads on the bridge structure resulting in the most efficient design.