TAPPAN ZEE BRIDGE/I-287
ENVIRONMENTAL REVIEW

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

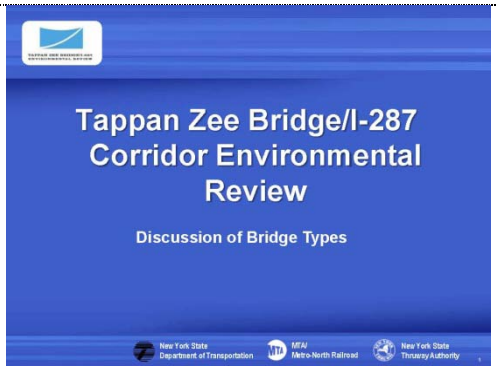
Presenetation

Stakeholders' Advisory Working Group

Bridge SAWG 20

Tappan Zee Bridge/I-287 Corridor Project

August 5, 2010

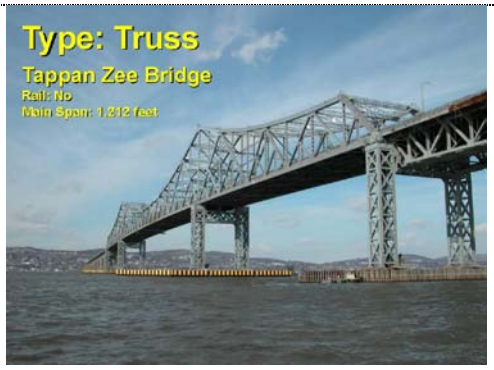


Slide 1

Mark Roche, Arup, welcomed everyone to the meeting and explained the agenda.

The number of bridge options has been reduced to six: three single level and three dual level options. A report has been written comparing the three single level bridges and the three dual level bridges, recommending that at least one single level and one dual level bridge be studied further in the DEIS. These recommendations are still under review by NYSDOT, NYSTA, and MTA Metro-North Railroad.

Presentations and images shown at earlier meetings focused on the approach spans because they make up 80 percent of the bridge. The first portion of the presentation focused on different bridge types that could be applied to the main span.



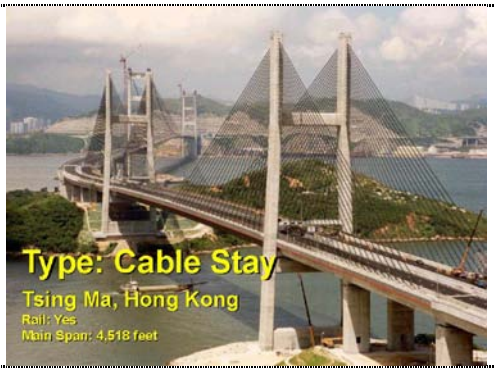
Slide 2

The existing Tappan Zee Bridge is a truss bridge, which is the old form of the cable stay. It is unlikely that this type of bridge would be built again as engineering has progressed beyond this type of bridge. In a truss bridge, the diagonal members carry the weight of the traffic.

Slide 3

The Millau Bridge in France is a recent (2004) example of a cable-stayed bridge. In a cable-stayed bridge, the towers are the primary load-bearing structure. Ultimately, only the vertical weight of the bridge reaches the foundations, an important consideration in soft soils such as those found in the Hudson River.

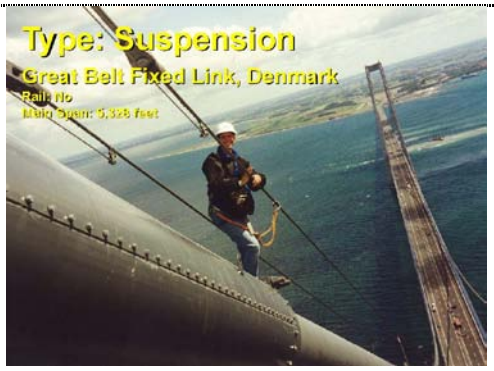
The Millau Bridge has one column per pier. We anticipate four columns for each pier of the replacement Tappan Zee Bridge.



Slide 4

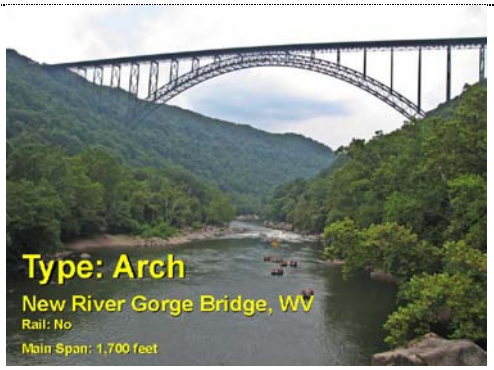
This cable-stayed bridge in Hong Kong accommodates both highway lanes and a rail system. The rail is on the bridge's lower level, which is enclosed to protect it from strong typhoon winds.

There could be differences among the remaining options in their ability to maintain constant rail service. This is dependent on rail's location on the replacement Tappan Zee Bridge, depending on whether the wind has direct or indirect access to rail.

	Slide 5 The cable-stayed Oresund Bridge, with highway and rail, connects Sweden and Denmark. This dual level bridge is open on the sides and is very similar to Options 5 and 6 proposed for the replacement Tappan Zee Bridge. However, the upper deck of the Oresund Bridge has four travel lanes, whereas the new Tappan Zee Bridge is proposed to have eight travel lanes and two lanes for shoulders. One of the major considerations for a dual level bridge with rail on the bottom is how to mitigate risks if a train derails. Part of the design is to build a bridge such that upper level traffic would be able to continue unimpeded should there be an incident with the rail on the lower level.
	Slide 6 A suspension bridge has a deck that is hung below suspension cables on vertical suspenders. The Messina Strait suspension bridge, which will connect mainland Italy and Sicily, will have both highway and rail, with a main span almost 11,000 feet (2 miles) long. In comparison, the main span on the George Washington Bridge is about 7,000 feet in length. The Messina Strait Bridge is designed to have rail in the middle, as high winds are a concern; gaps between highway and rail will allow wind to dissipate. This type of bridge would be difficult for the replacement Tappan Zee because of the Hudson River's weak ground/soil and is unlikely to be the type of bridge recommended.
	Slide 7 This is a view of the Great Belt suspension bridge in Denmark.
	Slide 8 The west span of the San Francisco-Oakland Bay Bridge is a dual level suspension bridge and has highway on both levels. Suspension bridges can hold rail as long as a stiff truss is provided. Again, the conditions at the replacement Tappan Zee Bridge site do not make this bridge type practical.

Slide 9

The 25 de Abril Bridge over the Tagus River in Lisbon, Portugal opened in 1966 and was modified in 1999 to allow two rail tracks on the bottom level of the bridge. Retrofitting the bridge for rail required extensive structural reinforcement including a second set of cables and the increase in height of the main towers.



Slide 10

Arch bridges work by transferring the weight of the bridge and its loads partially into a horizontal thrust restrained at either side.

The New River Gorge arch bridge is located in Fayetteville, West Virginia. The key to arch bridges is that they put a horizontal force on the ground. Usually, the arch pushes into the rock at each end. Arch bridges work well in large valleys with competent rock, which is where they are typically seen. The arch bridge is a very economical type of bridge if the ground can support it.

Slide 11

The Lupu Bridge opened in Shanghai in 2003. It is the longest highway arch bridge in the world. Built on very soft ground, the Lupu was designed so that the side spans of the arch and the deck resist the thrust of the main arch

This bridge was built only as a highway bridge, but it could accommodate rail if the deck were thicker.

Slide 12

A local example of an arch bridge is the Hell Gate in New York City. This four-track bridge carries some very heavy trains. While its main span is not as long as that of the replacement Tappan Zee Bridge would be, the Hell Gate Bridge demonstrates that rail is possible with an arch.

One of the major differences between the cable stay and the arch is the height of the main span above the deck. It is estimated that the main span of an arch replacement Tappan Zee Bridge would be about 120 feet high, while the towers of a cable-stayed replacement bridge would be about 400 feet high. This is in addition to the 150-foot clearance for the main span above the Hudson River. Currently, the Tappan Zee Bridge has 139-foot clearance at high tide plus 150 feet to the top of the tower. Note that the original design for the existing Tappan Zee was an arch, but it was deemed too expensive and difficult to build.

	Slide 13 These slides, shown at previous Bridge SAWGs, outline the various facilities and properties that present challenges to the Rockland landing of the replacement bridge.
	Slide 14 These slides, shown at previous Bridge SAWGs, outline the various facilities and properties that present challenges to the Westchester landing of the replacement bridge.