TAPPAN ZEE BRIDGE/I-287
ENVIRONMENTAL REVIEW

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

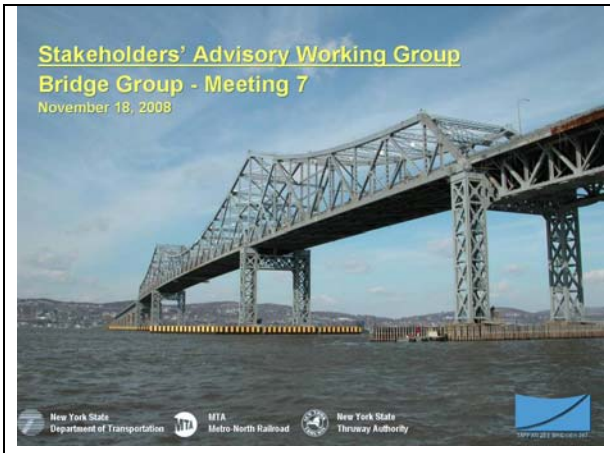
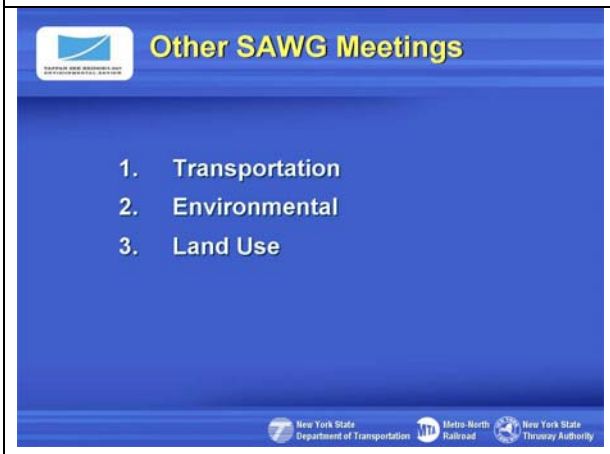
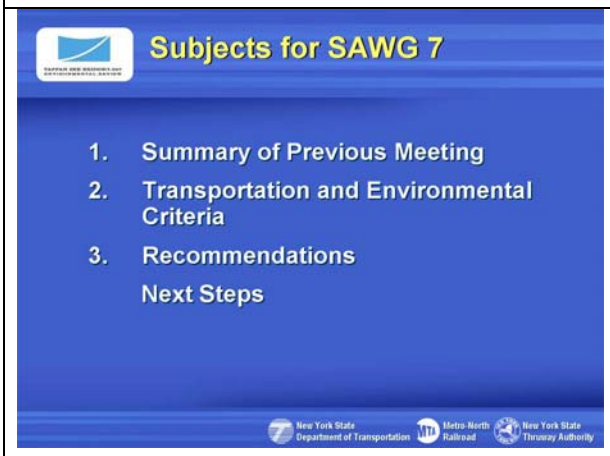
Presentation

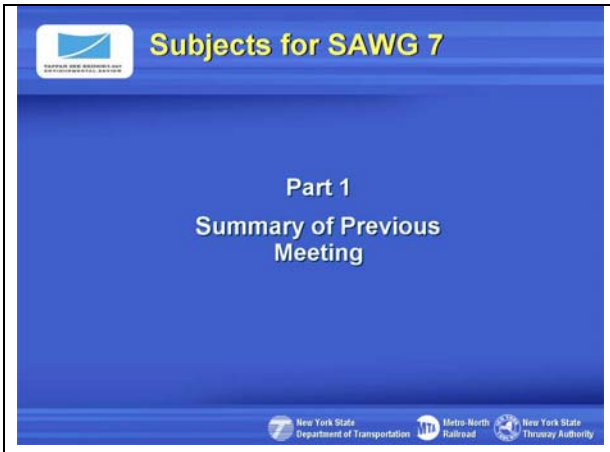
Stakeholders' Advisory Working Group

Bridge Meeting 7

Tappan Zee Bridge/I-287 Corridor
Environmental Review

November 18, 2008

	**Slide 1** Introductory slide.
	**Slide 2** With this slide the dates were given for the next meetings for the other SAWG groups. Members of this SAWG meeting could attend these other meetings if desired.
	**Slide 3** This SAWG meeting was about the results presented in the draft report *Alternatives Analysis for Rehabilitation or Replacement of the Tappan Zee Bridge*. Item 1 was a summary of the detail presented at the last bridge SAWG meeting including the results of the evaluation of the engineering criteria. Item 2 focused on the results for the transportation and environmental criteria. Item 3 outlined the recommendations presented in the report. The report is still draft with December 1 the last date for comment.



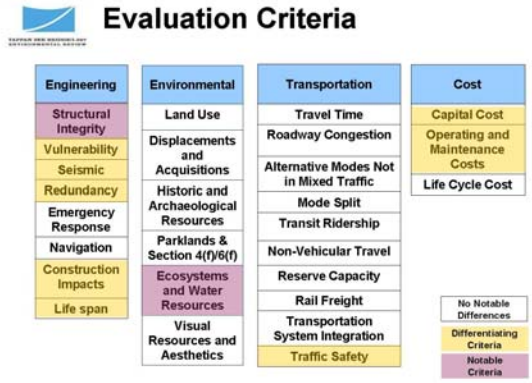
Slide 4

Title slide.

This part of the presentation summarized the evaluation of the Engineering Criteria presented at the last Bridge SAWG meeting. The results of the Cost Criteria were also presented.

Slide 5

The slide showed the arrangement of the seven bridge options being evaluated – four Rehabilitation Options and three Replacement Options.



Slide 6

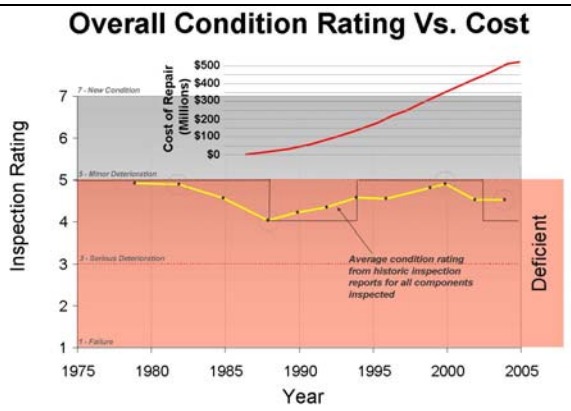
This slide showed the full list of criteria evaluated for the bridge options. Columns 1 and 4 list the criteria discussed at the last bridge SAWG meeting.

The highlighted cells indicated those criteria with notable results. The criteria identified in yellow were significant because of the differences between options. The red shade indicated those criteria that were notable because of the similarities between options.

Overall, the engineering criteria were the most notable. In particular, these criteria resulted in major changes to the TZB in the Rehabilitation Options. These changes were so substantial as to render the TZB in the Rehabilitation Options very similar to the TZB in the Replacement Options.

Slide 7

This slide showed the soil layers under the TZB that played a major role in the form and arrangement of the existing bridge. As a result of the limitations of the founding soil layers the existing bridge was built flexible, light and thin. As a result of those characteristics, the bridge is suffering today, with major maintenance required to keep the bridge in safe condition.

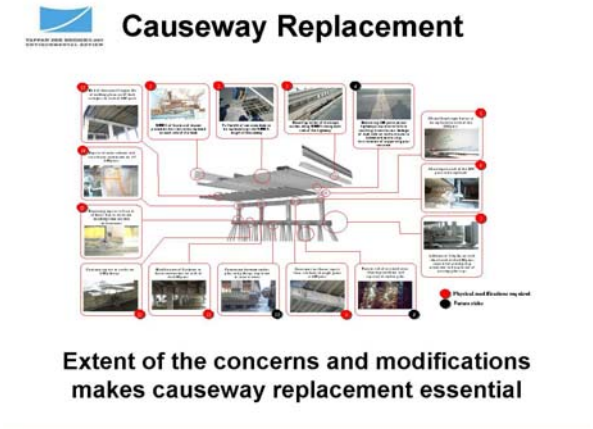


Slide 8

This slide showed the variation in inspection ratings for the TZB since 1975. It was explained that the inspection rating is a general measure of condition and is determined every two years after a complete inspection of the whole structure. A rating of 5 or above is desired. A rating of 3 indicates serious deterioration.

Since 1975 the TZB inspection rating has been between 4 and 5 with notable cyclical trends, as shown by the yellow line on the graph. In the decade through the 1980's the condition of the bridge deteriorated while in the 1990's, because of the repairs instigated by the NYSTA (see red line on graph), the condition improved. However, since the year 2000 the condition of the bridge has again declined with further repair expenditure required.

This up and down trend in condition is the future of the TZB with continuous investment required by the NYSTA to maintain safe conditions.

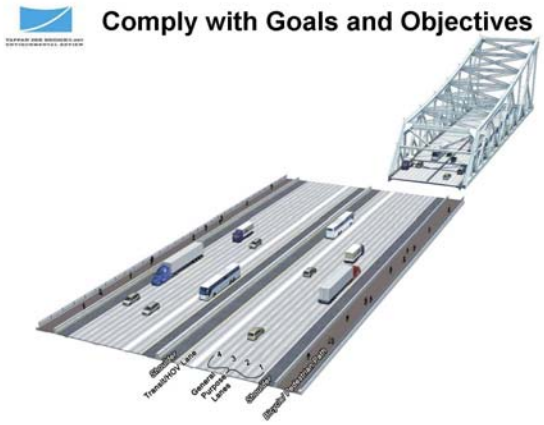
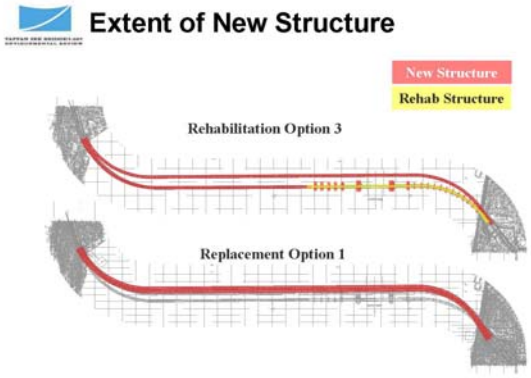


Slide 9

This slide, an extract from the report (*Alternatives Analysis for Rehabilitation or Replacement of the TZB*), showed a compilation of the modifications, maintenance challenges and future risks associated with the 166 Causeway Spans.

Because of the extent of the issues identified it is essential that the Causeway spans be replaced irrespective of whether the TZB is rehabilitated or replaced.

The Causeway represents approximately 55% of the overall length of the TZB.

	**Slide 10** This slide showed (in orange) those parts of the Main Spans structure that need to be modified or replaced to comply with current seismic standards. Each of the four buoyant foundations on the Main Spans, as well as the buoyant foundations on the other parts of the bridge, would need to be removed and replaced.
	**Slide 11** This slide showed a comparison of the width of the existing bridge to that required to comply with current standards as well as the goals and objectives of the study. The existing bridge is 91 feet wide with space for only seven narrow traffic lanes. To comply with the goals and objectives of the study, a rehabilitated or replacement bridge would need additional space for traffic shoulders, transit (BRT and CRT) and also pedestrian/cycleways. The overall increase in width would more than double the width of the existing TZB. Because the increase in width is so large, it could not be supported directly off of the existing bridge in the Rehabilitation Options. Hence, in the Rehabilitation Options, to comply with the Goals and Objectives, a new bridge would be needed parallel to and in addition to the existing bridge. This new supplemental bridge would be just over 3 miles long and would likely be located just to the north of the existing bridge.
	**Slide 12** This slide showed a comparison of the new structure required (in red shade) for comparable Rehabilitation and Replacement Options. Because of the extent of the changes in the Rehabilitation Options (replacement Causeway, replaced foundations, new Supplemental Bridge), over 80% of the bridge in the Rehabilitation Options would be new and would be exactly the same as what's in the Replacement Options. Only 20% of the final bridge in the Rehabilitation Options would differ from the Replacement Options. This 20% would retain some of the undesirable characteristics of the existing bridge as outlined in the following slides.

Slide Not Available The slide depicting a steel connection detail on the Main Spans has been removed in consideration of security requirements.	**Slide 13** This slide showed the open drains along the side of the Main Spans to facilitate discussion about the Vulnerability Criterion. These open drains have allowed water and road de-icing salts to pour on to very complex joints resulting in a major maintenance challenge for the NYSTA. While the open drains would be modified, the maintenance challenge would remain in the Rehabilitation Options because of 50 plus years of contamination. This maintenance challenge would be eliminated in the Replacement Options.
Slide Not Available The slide depicting a steel connection detail on Deck Truss Spans has been removed in consideration of security requirements.	**Slide 14** This slide showed a typical steel connection detail on the existing TZB to facilitate discussion about the Redundancy Criterion. The connection uses a gusset plate design similar to that of the I-35W bridge that collapsed in Minnesota in 2007. In the Minnesota collapse, it was the failure of one gusset plate that led to failure of the whole structure. Unlike the Minnesota bridge, the gusset plate for the TZB is adequate but the bridges have similar structural characteristics when considering redundancy - the failure of one single component can result in loss of the entire structure. This poor redundancy would remain a characteristic of the TZB in the Rehabilitation Options. In the Replacement Options, providing layers of redundancy would be a key design feature.
Lifespan Criterion Duration until major repairs are anticipated Component / Rehabilitation Options / Replacement Options Concrete Deck: 40-50 years / 100 years + Bearings: 40-50 years / 50-100 years Concrete Columns: 20 years / 100 years + Foundations: 100 years + / 100 years +	**Slide 15** Addressing the Lifespan Criterion, this slide showed a comparison of the anticipated lifespan before major repair of major components. Because of the inherent contamination, extensive joints and drainage arrangements of the existing TZB, the lifespan of the components that are retained in the Rehabilitation Options would not be as long as similar components in the Replacement Option. For example, major repairs to the concrete columns of the existing bridge are anticipated in approximately 20 years compared to 100 years for the Replacement Options.

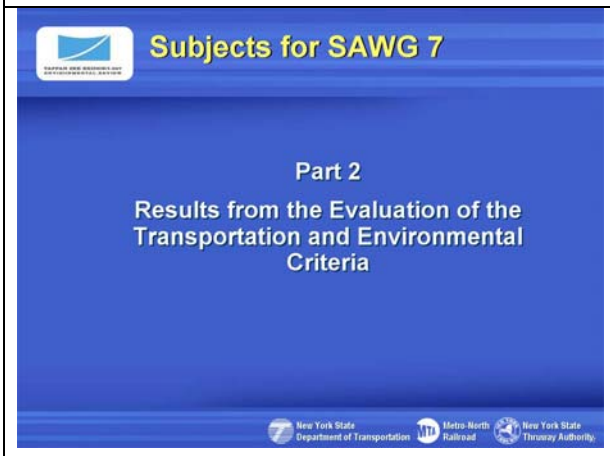
Slide 16

This Cost Criteria slide showed a comparison of the capital cost and maintenance cost for the seven options.

For Rehabilitation 3 and Replacement 1, with only BRT as the transit component, capital costs are almost exactly the same at $5.1 and $5.2 billion respectively.

Similarly, for those options that include CRT and BRT as the transit modes, (Rehabilitation Option 4 and Replacement Options 2 and 3) the capital costs are almost exactly the same at $6.3 to 6.6 billion.

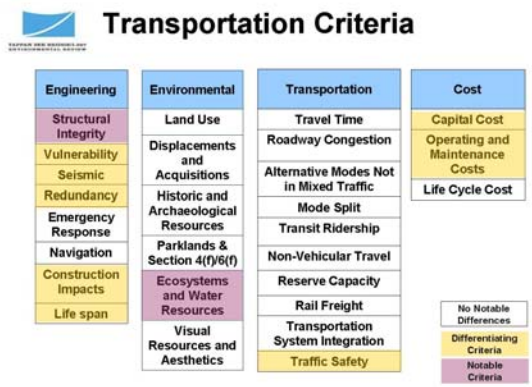
The maintenance costs for the Replacement Options are approximately half those of the Rehabilitation Options.



Slide 17

Title slide.

This part of the presentation outlined the key results of the evaluation of the Transportation and Environmental Criteria.



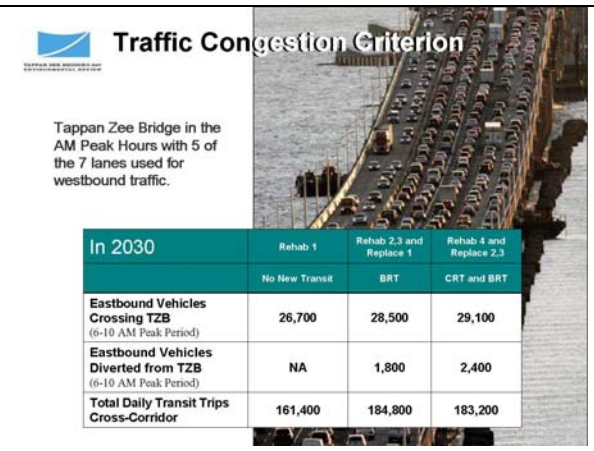
Slide 18

This slide showed the full list of all the criteria evaluated for the bridge options. Column 3 lists the Transportation Criteria discussed in this portion of the presentation.

Because of the similar accommodation of transit, rail freight, pedestrian, cycle and landing connectivity, very few differences between the options were identified. However, the results of the evaluation of two criteria warrant highlighting:

- Roadway Congestion
- Traffic Safety

The exception was Rehabilitation Option 1. Because of its absence of transit or rail freight and the retention of the movable barrier and only seven traffic lanes, the overall performance of this option was inferior to all other options.



Slide 19

This slide showed some of the results of the evaluation of the Traffic Congestion Criteria.

As a measure of traffic congestion, the evaluation determined the future traffic volumes on the TZB in the morning peak hours – from 6AM to 10AM. Currently, the average weekday AM peak period volume of traffic in all seven lanes of the bridge is approximately 21,500 vehicles. In the future, in 2030, it is predicted that that volume would increase to 26,000-29,000 vehicles – approximately the maximum capacity of the TZB over the four peak hours. This increase in traffic is predicted even if transit (BRT and /or CRT) is included.

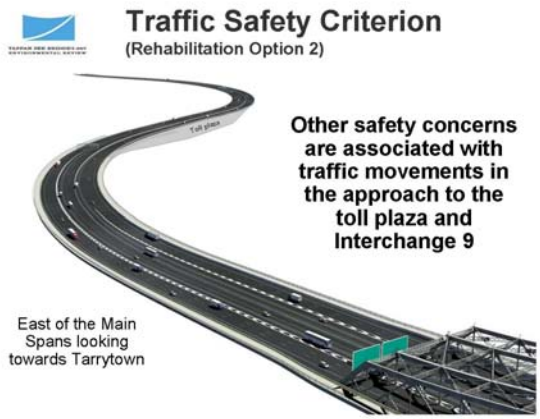
This prediction shows that traffic conditions on the bridge likely will not improve in the future. Instead, in common with many other studies, traffic would continue to grow to fill all available capacity. As a result, none of the options studied increase the number of traffic lanes, as it is not possible to build ourselves out of traffic growth. Instead, an increase in capacity over the crossing is achieved through the introduction of transit (BRT and CRT).

Slide 20

This slide of Rehabilitation Option 2 showed the TZB lane arrangement on the Rockland approach to the Main Spans. In this option, traffic lanes are split as they approach the Main Spans with traffic passing on each side of the center steel trusses.

The split of traffic lanes would occur in the approach to the Main Spans at the top of the incline where accident records have previously shown a concentration of traffic accidents. Drivers approaching the Main Spans would need to move between lanes while also negotiating the change in grade and making decisions regarding the toll plaza beyond the Main Spans.

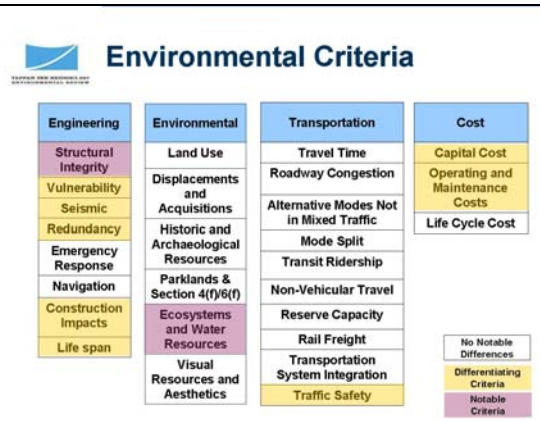
The number of decisions required and the maneuvering of traffic is considered to be potentially unsafe. These conditions together with the temporary unsafe conditions that would result during widening of the Main Spans are considered to be sufficient to eliminate this option from further consideration, particularly when compared to Rehabilitation Options 2 and 3.



Slide 21

Similar to the last slide, this slide of Rehabilitation Option 2 showed the traffic arrangement between the Main Spans and the Westchester Landing.

In this area, eastbound truck traffic switching lanes to access the high speed toll lanes on the left would conflict with cash paying traffic moving towards the toll plaza lanes on the right. The short distances available for these movements and the horizontal curvature compound the necessary driver decisions again leading to potentially unsafe conditions.



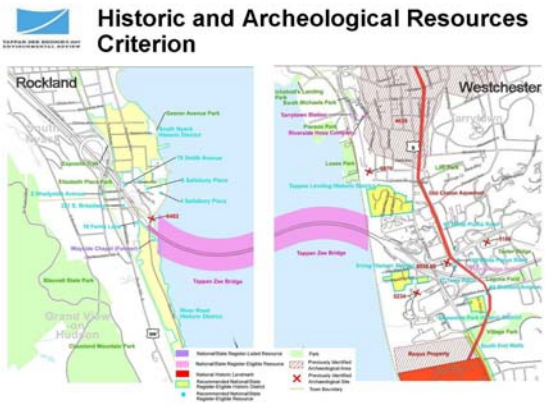
Slide 22

This slide showed the full list of all the criteria evaluated for the bridge options. Column 2 lists the Environmental Criteria discussed in the following portion of the presentation.

The following slides present details of the evaluation of four criteria:

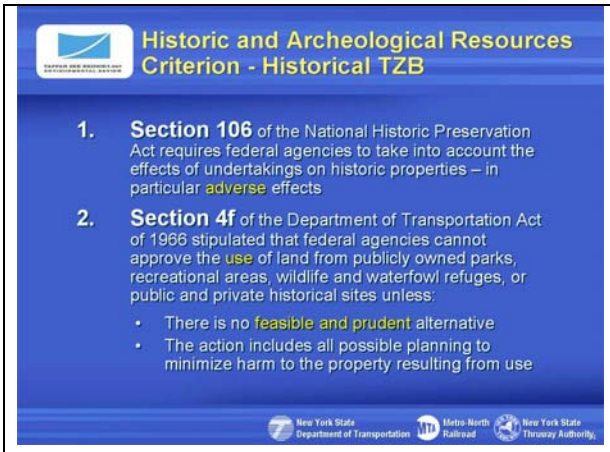
- Historic and Archeological Resources
- Section 4(f) and Section 106
- Displacements and Acquisitions
- Ecosystems and Water Resources

For the remaining criteria, the evaluation results did not identify substantive differences between the comparable modal options.



Slide 23

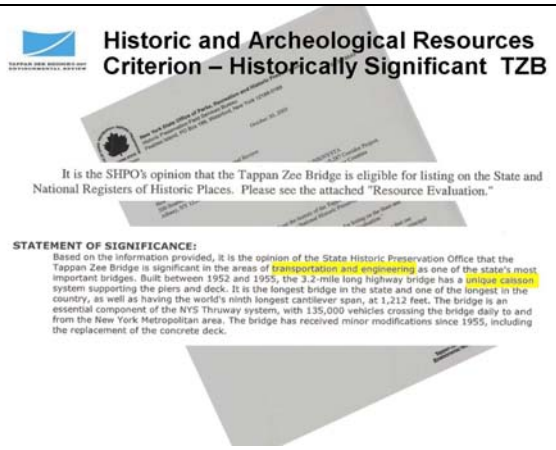
This slide showed the potential historic and archeological resources identified. No major resources were identified in the area of study for the report with the exception of the Tappan Zee Bridge itself.



Slide 24

For all parkland, historic and archeological resources there are particular regulations that govern their use and any potential modifications. These regulations, referenced as Section 4(f) and Section 106, require close consideration of potential adverse effects as well as feasible and prudent avoidance options.

The regulations are intended to tip the scale towards increased sensitivity of historic resources.

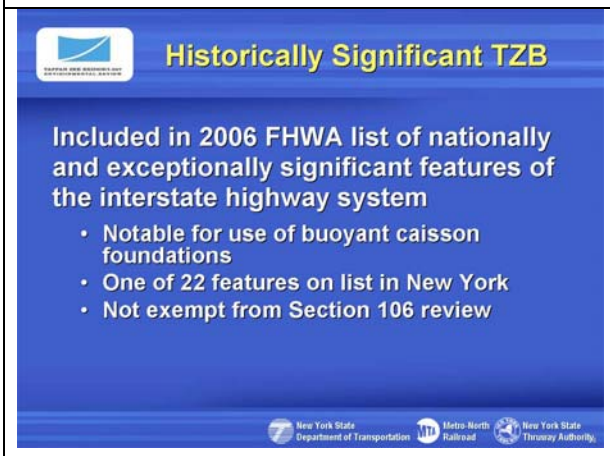


Slide 25

The Section 106 process begins with the identification of Historic Resources.

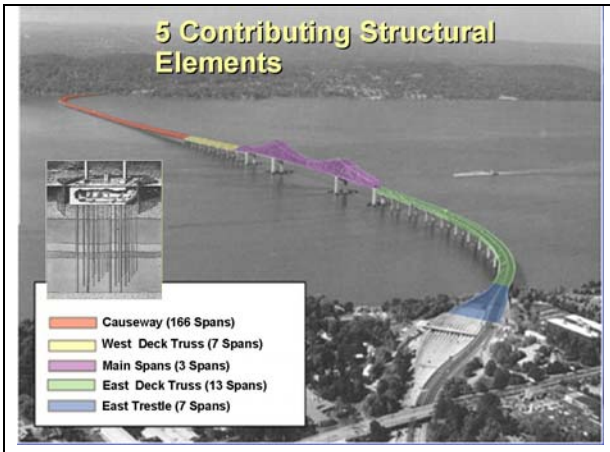
In 2003 the New York State Office of Parks, Recreation and Historic Preservation (SHPO) issued their opinion that the "Tappan Zee Bridge is eligible for listing on the State and National Register of Historic Places".

SHPO indicated that the bridge "is significant in the areas of transportation and engineering, as one of the state's most important bridges. Built between 1952 and 1955, the 3.2 mile long highway bridge has a unique caisson system supporting the piers and deck".



Slide 26

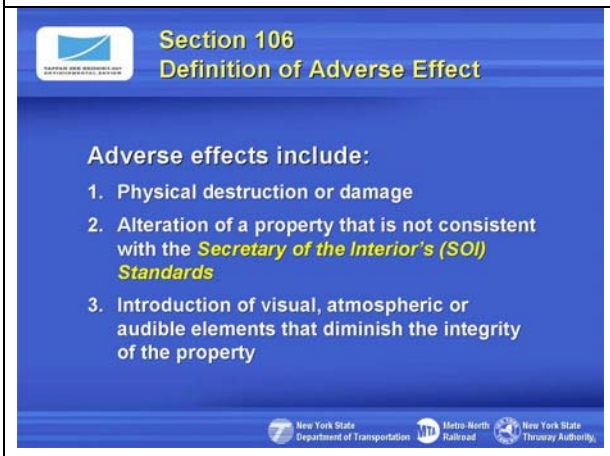
In addition, the TZB was included as one of 22 features in New York identified by the Federal Highway Administration (FHWA) as being of national and exceptional significance.



Slide 27

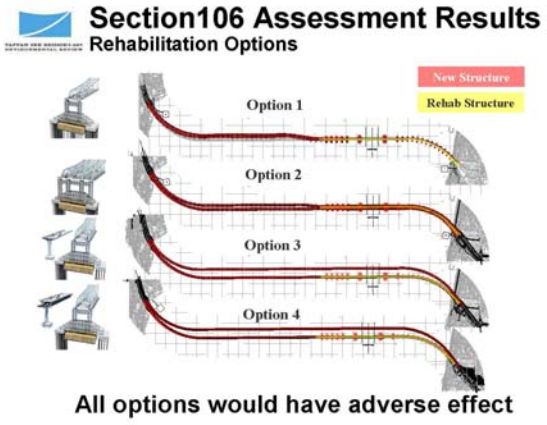
The Statement of Significance identified the elements of the bridge that contributed to its historic significance.

Generally speaking, these elements can be described as the five segments of the bridge with special significance given to the buoyant caissons. Each element was then evaluated separately.



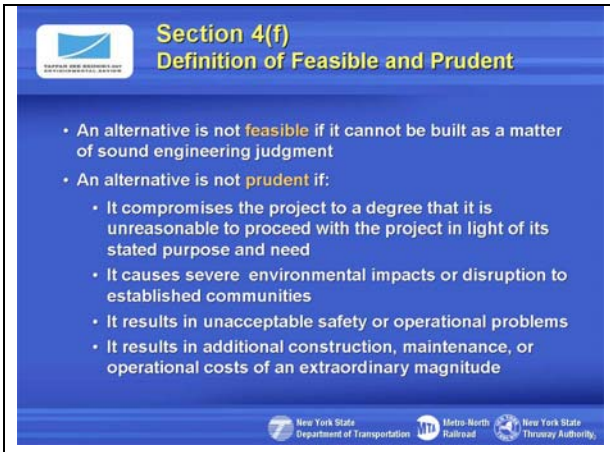
Slide 28

As described in *Appendix D* of the draft *Alternatives Analysis for Rehabilitation or Replacement of the Tappan Zee Bridge Report*, the criteria for adverse effect was applied to each of the rehabilitation and replacement options.



Slide 29

All four of the Rehabilitation Options would have an adverse effect on the existing TZB with major parts of the bridge removed or reconstructed. In particular, the need to remove and replace the buoyant foundations would be an unavoidable adverse effect.



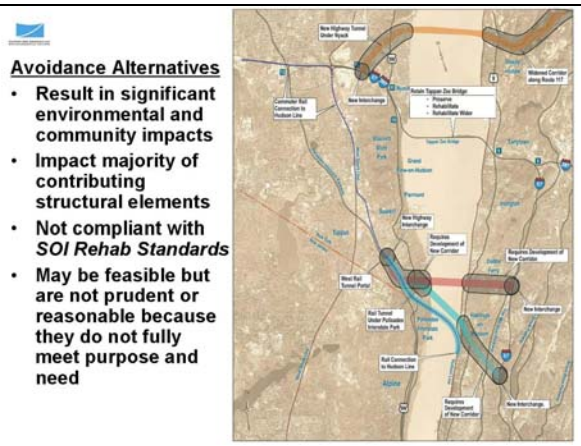
Slide 30

Section 4(f) states that federal agencies can not approve the use of an historic site unless there is no feasible and prudent alternative. Essentially, the regulation requires consideration of alternatives that avoid or minimize impact to the historic resource.

As included in the regulation, the terms 'feasible and prudent' have strict definitions as shown on the slide.

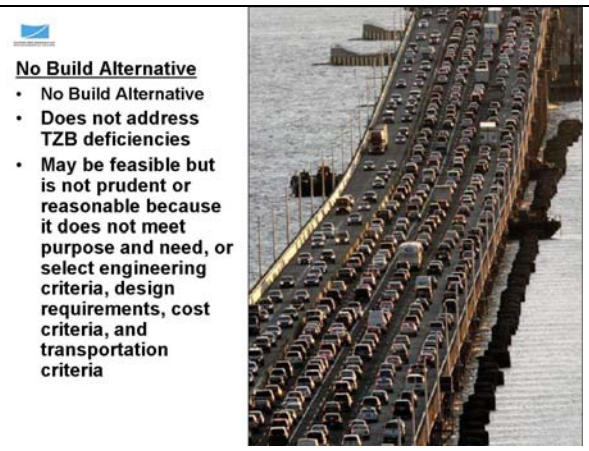
Slide 31

Because of the extent of the modifications to the TZB, all four rehabilitation options would alter the majority of the contributing elements of the bridge and are not prudent avoidance alternatives, though all are feasible with the exception of Rehabilitation Option 2.



Slide 32

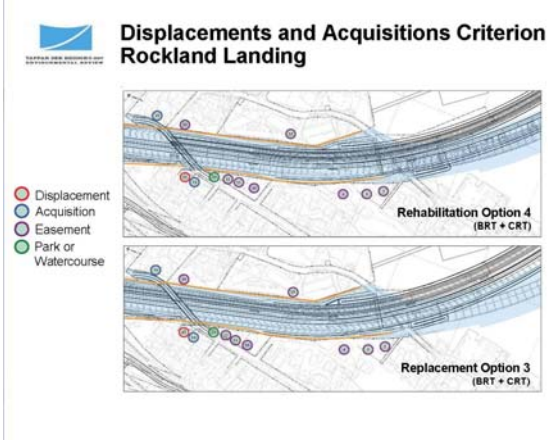
Similarly, potential new crossings at some distance north and south of the existing TZB are not prudent as their connection to the Thruway system would result in extensive environmental and community impacts in both Rockland and Westchester Counties.



Slide 33

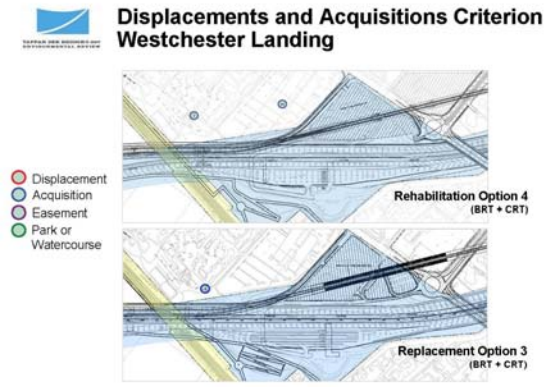
Similarly, a No Build option is not a prudent avoidance option as replacement of the buoyant foundations would still be required to keep the bridge safe into the future. In addition, this option would not comply with the project's Purpose and Need or select criteria.

Overall, no feasible and prudent avoidance alternative was identified.



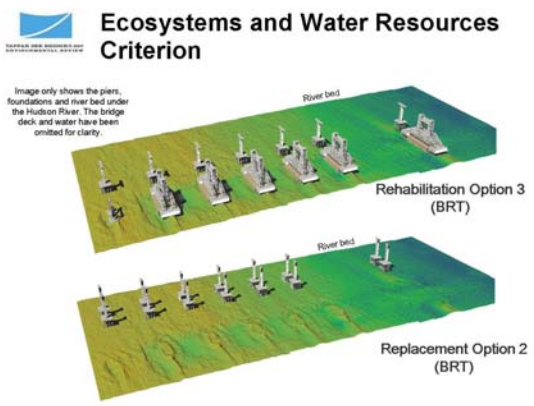
Slide 34

Addressing the Displacements and Acquisitions criterion, this slide shows a comparison of the property displacements and acquisitions at the Rockland landings for comparable (BRT + CRT) rehabilitation and replacement options. Because of the replacement of the Causeway in all options, the impacts for the comparable rehabilitation and replacement options are almost exactly the same.



Slide 35

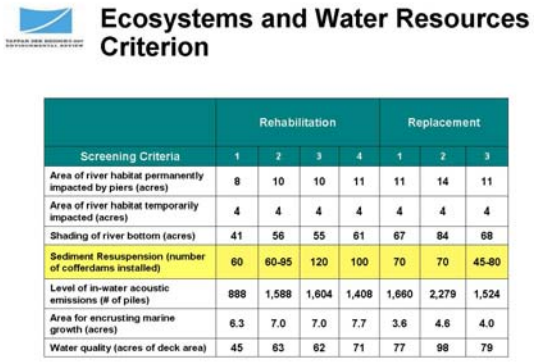
Similarly at the Westchester landing, the property impacts of comparable rehabilitation and replacement options were again almost exactly the same.



Slide 36

Regarding the Ecosystems and Water Resources Criterion, this slide showed a comparison of the river works required for comparable rehabilitation and replacement options. In the slide, the decks of the bridge and the river water are not shown to expose the riverbed sediment profile.

In both options, the extent of the work in the river is very similar with new cofferdams required in the river for new piers for both the rehabilitation and replacement options.



	Rehabilitation				Replacement		
Screening Criteria	1	2	3	4	1	2	3
Area of river habitat permanently impacted by piers (acres)	8	10	10	11	11	14	11
Area of river habitat temporarily impacted (acres)	4	4	4	4	4	4	4
Shading of river bottom (acres)	41	56	55	61	67	84	68
Sediment Resuspension (number of cofferdams installed)	60	60-95	120	100	70	70	45-80
Level of in-water acoustic emissions (# of piles)	888	1,588	1,604	1,408	1,660	2,279	1,524
Area for encrusting marine growth (acres)	6.3	7.0	7.0	7.7	3.6	4.6	4.0
Water quality (acres of deck area)	45	63	62	71	77	98	79

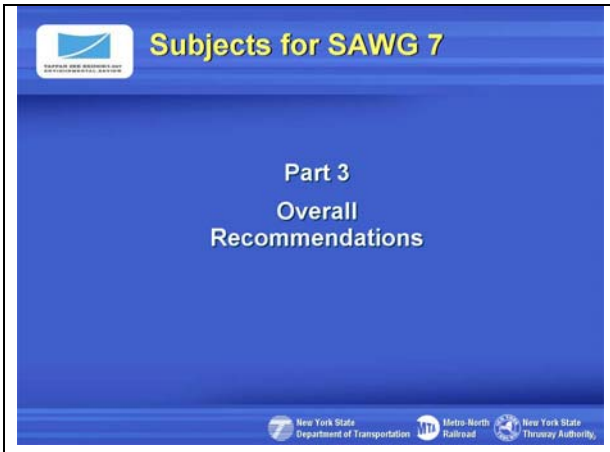
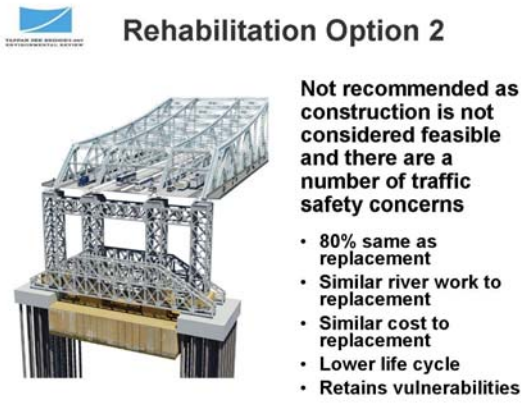
Slide 37

This slide showed an extract from the technical report.

The number of cofferdams required during construction was used as the measure of the riverbed disturbance. As can be seen from the table, the number of cofferdams is least for Replacement Option 3 and greatest for Rehabilitation Options 3 and 4.

Slide 38

This slide showed an example of a cofferdam with the water about to be pumped out of the enclosure. The sheet piles create a watertight working zone inside the cofferdam to allow construction of foundations and piers.

	**Slide 39** Title slide. This part of the presentation outlined the overall recommendations of the draft report for each of the seven options.
	**Slide 40** Rehabilitation Option 1 is not recommended as it does not comply with the Project Goals and Objectives. The option retains the existing seven lane arrangement with no provision for dedicated transit.
	**Slide 41** Rehabilitation Option 2 is not recommended as it is not considered feasible and there would be a number of traffic safety concerns during construction and in its operation.

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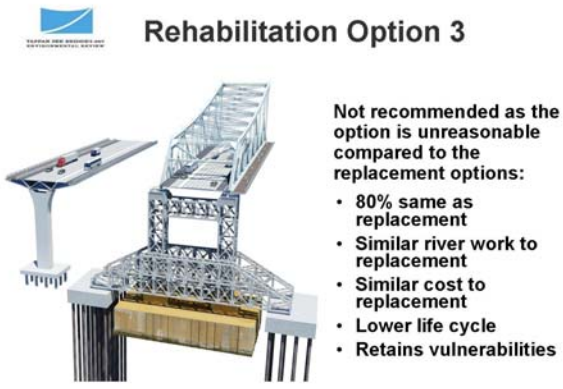
<td> 
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<td>Slide 42

Rehabilitation Option 3 is not recommended as it is unreasonable when compared to the replacement options. In this option, the bridge is 80% new and is exactly the same as the comparable (BRT) replacement option. As a result of this similarity, the option has the same cost and environmental impacts as the replacement option while preserving inferior engineering characteristics in the retained segments (vulnerabilities, redundancy and life cycle).</td>
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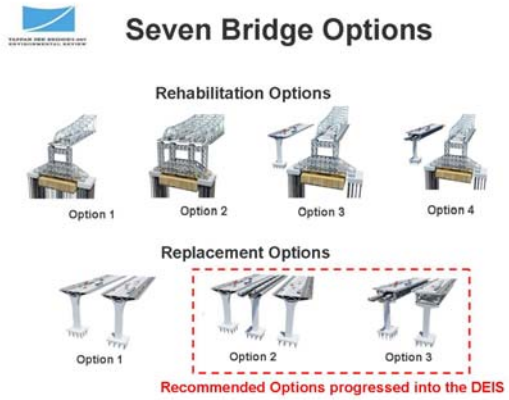
<td>Slide 43

Similar to Rehabilitation Option 3, Rehabilitation Option 4 is not recommended as it is unreasonable when compared to the replacement options. In this option, the bridge is 80% new and is exactly the same as the comparable (BRT + CRT) replacement option. As a result of this similarity, the option has the same cost and environmental impacts as the replacement option while preserving inferior engineering characteristics in the retained segments (vulnerabilities, redundancy and life cycle).</td>
</tr>
<tr>
<td> 
</td>
<td>Slide 44

Replacement Option 1 is not recommended as it does not include provision for both BRT and CRT, the recommended transit provision resulting from the draft Transit Mode Selection Report.</td>
</tr>
</table>

Slide 45

Overall, none of the four Rehabilitation Options are recommended. Replacement Option 1 is not recommended as it does not include both BRT and CRT.



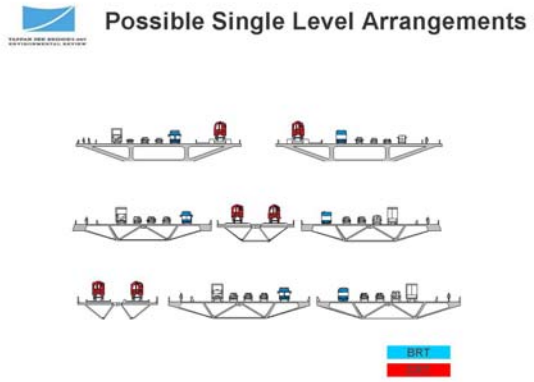
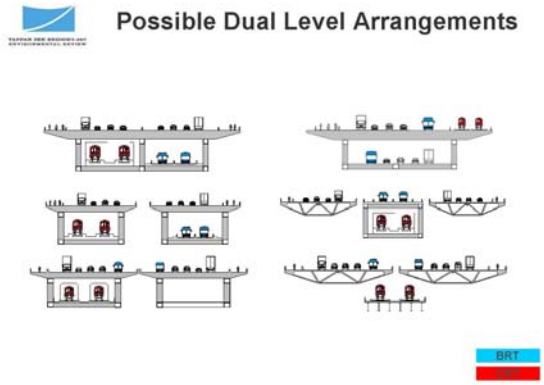
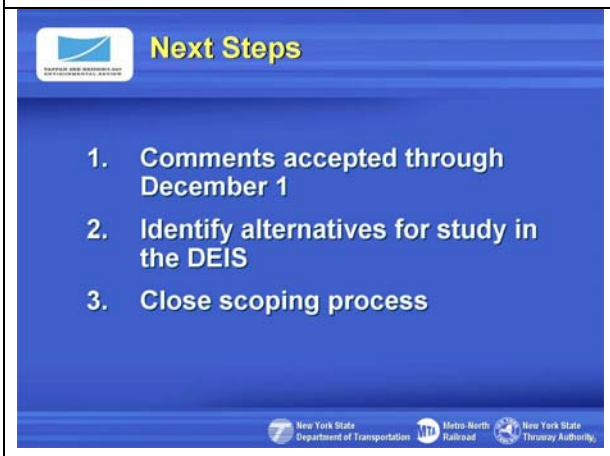
Slide 46

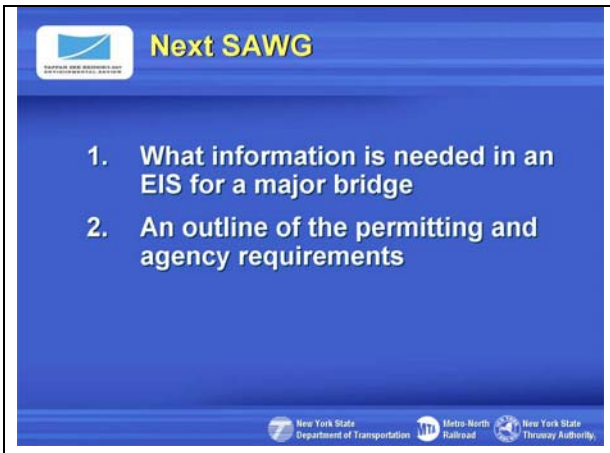
Replacement Option 2 and Option 3 are the remaining options and are recommended for inclusion in the DEIS. These options include both BRT and CRT and differ only in the location of transit on the bridge.

Slide 47

As outlined in the draft report *Alternatives Analysis for Rehabilitation or Replacement of the Tappan Zee Bridge*, all of the seven options were representative options only. The option arrangements were configured simply to ensure that the full range of potential environmental impacts was identified. The recommended options therefore do not represent the final arrangements of a replacement bridge.

In the DEIS, it will be necessary to reconsider the arrangement of the traffic lanes and transit on the replacement structure. This will include the full range of potential single and dual level options.

	Slide 48 This slide shows different single level arrangements possible for a replacement TZB. All of these options will be included in the evaluations to be conducted in the DEIS.
	Slide 49 This slide shows different dual level arrangements possible for a replacement TZB. All of these options will be included in the evaluations to be conducted in the DEIS.
	Slide 50 The draft report *Alternatives Analysis for Rehabilitation or Replacement of the Tappan Zee Bridge* is not final. Comments on the report and its recommendations will be accepted through December 1. Once all comments are received, the specific alternatives to the studied in the DEIS will be identified and the scoping process will be closed.



Slide 51

This slide outlined the suggested subjects for the next Bridge SAWG meeting.