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Memorandum

To: Elizabeth Novak, NYSTA

From: Robert Conway, Betsi Nemeth

Date: June 16, 2014

Re: Eligibility of Bridge Demolition

cc:

As discussed in the *Water Quality Protection Elements of the New NY Bridge Project: Clean Water State Revolving Fund Technical Memorandum,* the removal of the bridge structure by the selected method will assist in the development and implementation of several goals of the March 1996 Comprehensive Conservation and Management Plan (CCMP) and the revised 2011 Action Plan. These include Management of Habitat and Living Resources, Management of Toxic Contamination, and Management of Floatable Debris. Other alternatives, such as blasting the superstructure, were investigated. These methods would have substantial adverse effects on the environment. As discussed in detail below, the selected method of removing the existing structure is the most cost effective way to meet the goals and objectives of the CCMP.

The selected method of removing the existing structure is preferred from both an economic as well as environmental perspective. The selected method of removing large pieces of the bridge intact is made possible by the contractor's use of the Left Coast Lifter, a 1,000-ton crane which is the largest of its type currently operating in the U.S. This allows large pieces of the deck and truss sections to be cut and lifted off and placed onto barges for their removal. This is the most cost-efficient method of demolishing the superstructure since the required waterborne equipment is already intact for construction of the new bridge. The removal of the sub-structure requires additional effort to remove the pier caps and piles. Some method (impact hammering, controlled charges, etc.) is required to break the large concrete pier caps to allow for their removal and ultimate transport from the site. The cost is more related to the number of piers to be removed rather than the method of removal. There are over 197 piers in this 16,014-foot (3.2-mile) structure.

For the major portions of the bridge that are removed intact an important consideration is that they can then be dismantled on land allowing an easier effort in the recycling of certain materials. Where there are environmental concerns such as the removal of lead-based paint or asbestos containing materials this could be accomplished in a controlled environment and not on the river. Other bridges have been demolished with controlled blasting of the complete structure with subsequent removal of the debris from the river bottom. The selected method for the existing Tappan Zee Bridge has a number of environmental benefits over the more traditional method of demolition such as:

- Sediment disruption and transport when structural elements hit the bottom
- Heavy material will sink into sediment
- Removal of material is again dredging
- Habitat loss/loss of benthos
- Water quality concerns

In other locations where controlled blasting was used to demolish a bridge, sediment plumes extended a considerable distance from the site due to disaggregation of the bridge itself as well as from the impact of the structure falling into the sediment. In the soft sediments surrounding the Tappan Zee Bridge, a large plume of material will be released into the water column and transported off site when the heavier elements of the bridge strike the mud-line. This will result in a loss of habitat and benthic material in the immediate area of the bridge but will also result in adverse effects further afield due to sediment transport. This will have direct effects on benthic organisms in that larger area as well as indirect adverse impacts on a number of species that forage in the bottom sediments.

After the initial disturbance, there will be considerable bottom-disturbing activity as the demolished bridge material is removed from the river bed. Compounding the removal issue is the presence of soft sediments in much of the area where dense elements of the demolished structure will sink deeply into the muddy sediment. This will require a larger removal operation akin to a rather large dredging operation again disturbing the surrounding environment and most likely requiring only limited work windows for this activity. Furthermore, it can be expected that some materials, such as lead based paint and asbestos may not be totally removed from the river bed leading to possible long-term adverse ecological effects in the marine environment. The selected method of disposal would eliminate these contaminants and would therefore be consistent with the goal of the CCMP: Management of Toxic Contamination.

This area of the Hudson River contains sensitive ecological resources including oyster beds, Essential Fish Habitat, Atlantic and shortnose sturgeon and the benthos that support them, and peregrine falcons nest on the existing structure itself. In coordination with the agencies having jurisdiction over these resources – the New York State Department of Environmental Conservation (NYSDEC) and the National Marine Fisheries Service (NMFS) – the selected method of removal and associated Environmental Performance Commitments (EPCs) were developed to protect these sensitive resources. The selected method of demolition also complies with NMFS conservation recommendations, which specify the use of seasonal dredging windows, limiting the amount of re-suspension and dispersal of fine sediment, monitoring of the dredged areas following the completion of dredging, using only paints and other substance appropriate for use in or adjacent to aquatic habitats, demolition of the existing bridge in the most environmentally sensitive manner practicable and the material removed disposed properly. Therefore, the selected method of removal is consistent with the goal of the CCMP: Management of Habitat and Living Resources.

Under a blasting scenario, wooden structural elements of the bridge (e.g., pilings for the western causeway section, platform structures) would be introduced into the River as floatables, which would require removal from the river post-demolition. The selected method of removing the bridge in large sections provides for controlled removal of these elements in order to prevent the introduction of floatables to the River. Therefore, the selected method of removal is consistent with the goal of the CCMP: Management of Floatable Debris.

In summary, the selected method of removing the existing structure, which includes removing large pieces of the bridge in a controlled manner along with the associated EPCs, support and assist in the development of the CCMP.