HYDROLOGY AND HYDRAULICS REPORT

Overview-

      White's Bridge on the Standish/Windham town line is currently a three span steel girder bridge. The bridge allows traffic to pass over the connector from Sebago Lake to Sebago Lake Basin on the White's Bridge Road. Although the existing structure is adequate to handle the calculated flows, the existing structure is beginning to become structurally unsound and should be replaced.

Hydrology-

      This bridge is over the connector from Sebago Lake to Sebago Lake Basin. The Sebago Lake Basin outlets to the Presumpscott River. The hydrology is driven by more by lake levels and not Q values. The lake has tremendous storage capacity.

The 1999 Peak Flows Report has the following values for "Presumpscott River at Outlet of Sebago Lake":

$Q_{1.1*}$	=	355 ft^3/sec
Q_{10*}	=	2699 ft^3/sec
Q_{25}	=	3882 ft^3/sec
Q_{50}	=	4870 ft^3/sec
Q_{100}	=	6176 ft^3/sec
Q_{500*}	=	9301 ft^3/sec

*the values for these frequencies was found using the probability plot from the USGS regression equations and the know values above

Hydraulic Report-

      According to the 1984 Flood Insurance Rate Map (FIRM) of Standish shows a 100 year flood elevation of roughly 268 ft upstream and downstream of the bridge. The Flood Insurance Studies (1980 & 1981) also shows the lake elevations of roughly 267.045 ft for the 500 year and 266.745 ft for the 100 year, and 266.645 ft for the 50 year and 266.345 ft for the 10 year events.

      Due to the nature of this opening a simplified analysis was preformed. Using the Flow values from the Hydrology section and the Elevations from the FIS along with the section of the channel provided by our survey, Velocities were estimated by V=Q/A. While this is an extremely simplified analysis, a modeled analysis using HEC-RAS would take modeling both Sebago Lake and the Sebago Lake Basin. This amount of effort would only gain a marginally better result than our simplified method due to the huge storage available in both the lake and the basin.

      The existing structure was the only one analyzed, all proposed structures should have no significant effect on the hydraulics at the site, due to main channel not changing, the piers not changing locations, and the only change being the size of the pier piles which are located out of the main channel.

	Existing Structure	Proposed Replacement
Bottom of Superstructure(ft)	275.99	
Depth of Superstructure (ft)	3.55	
Ordinary High Water $Q_{1.1}$(ft)*	265.34	265.34
Headwater Elevation Q_{50}(ft)	266.645	266.645
Headwater Elevation Q_{100}(ft)	266.745	266.745
Control Depth Q_{100}(ft)	17.45	17.45
Freeboard Q_{50}(ft)	9.25	
Discharge Velocity $Q_{1.1}$(ft/sec)	0.347	0.347
Discharge Velocity Q_{50}(ft/sec)	4.162	4.162
Discharge Velocity Q_{100}(ft/sec)	5.227	5.227

Note: All elevations are in North American Vertical Datum 1988 (NAVD88). Elevations based on National Geodetic Vertical Datum 1929 (NGVD29) were converted to NAVD88 by the appropriate shift (0.955 ft) using the NGS Vertcon Program
* this elevation was found by using the probability plot from the USGS regression equations and the known values from the FIS

Scour-

The existing structure does not show signs of scour and does not seem to be scour susceptible. A preliminary analysis was done to check for scour. Only local scour at the piers was assumed due to the low velocities. No check was done on the abutments; since the existing bridge was built no scour has been observed, particularly around the abutments. The preliminary analysis shows minimal predicted scour at the piers in the range of less than 15 ft for all alternatives. A more detailed analysis will be preformed during the final design of the bridge.