

**MEMORANDUM FOR RECORD: Visit to Salmon River, CT Ice control structure
23 Jan. 2007**

Andy Tuthill visited the newly-completed Salmon River ice control structure on 23 Jan. 2007. Present at the meeting from the New England District (NAE) were:

Mike Tuttle	Project Manager
Ben Loyd	Planning Intern
Pat Devine	Construction Engineer
Ray Goff	Construction Engineer
John Kennelly	Chief of Planning

Also present was the job supervisor John Sirvio from Charter Environmental, the construction contractor.

The finished project looks excellent. Many obstacles were overcome along the way, including a 10-year discharge event in October 2005 that destroyed the cofferdam eroded much of the island, shutting down the project down until the following spring. The fall of 2006 also saw several 2-year plus flow events that the re-constructed cofferdam and bed and bank protection withstood. The total construction costs came to \$1.8 million, with the setbacks and delays resulting from the extreme flow events costing an additional \$140,000.

CRREL has collaborated with NAE and the state of Connecticut in the development of ice control on the Salmon River since 1995. In addition to a desire to see the completed project, the visit was prompted in part by concerns expressed by local resident Greg Daigle. Greg lives just downstream of the Leesville Dam and has witnessed many ice jam floods over the years. He was concerned that ice might enter the upstream end of the relief flow channel once the main channel becomes ice-filled. He described a similar phenomenon below the dam where ice floes enter and block the channel to the west of the island near his house. The ice and water flow then pass into the east side channel next to his yard. Greg also expressed concern about a "drainage swale" below the point where the piers meet the boulders. He wondered if flow might concentrate there resulting in erosion.

We inspected the upstream end of the flow relief channel and discussed the possibility of ice floes entering once the main channel became ice-filled. The consensus was to observe performance of the structure for several winters and, if necessary place some ice retention structures across the channel inlet. These could consist of boulders (natural or concrete) or jack-like structures made of structural steel. Steel structures of this type have been used to prevent ice from passing onto floodplains and also to retain pack ice off the coast of northern Japan. Depending on the erosion resistance of the underlying material at the channel inlet, bed protection may or may not be needed around the structure footings (Pat Devine would have a better idea on this).

Regarding Greg Daigle's concern about erosion between the eastern-most pier and the first concrete boulder, Pat Devine pointed out that the boulders are bedded in a 2-ft-thick layer of armor stone so erosion and undermining are unlikely. Also, the structure has withstood several high discharge open water events without damage in this location.

We discussed the possibility of monitoring the site using a web camera. The site is well equipped for this with power available at the fish ladder and a phone line about 60 ft away at the location of the temporary construction shed. The light pole at the fish ladder would provide an ideal location for the web camera (or cameras, since it might require two to take in the entire field of view). It is not anticipated that the web cam installation and maintenance would be extremely costly. The idea of sharing the cost among various entities NAE, CRREL and CT-DEP was discussed.

In summary the Salmon River ICS is well-constructed and looks very good. The effort represents a significant step forward in the development of low cost ice control structure design.

A series of captioned photos are attached.

Respectfully Submitted,

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Salmon River ice control structure viewed from downstream on 23 Jan. 2007



ICS site and downstream, showing Island and Daigle property.



View of ICS looking upstream from the proposed web camera location at the fish ladder light pole.



Outlet of relief flow channel showing stone armor.



Inlet to relief flow channel.