

CEERD-RE

MEMORANDUM FOR RECORD: Inspection of Ice Jam at Athol, Ma. 22 January 2004

Customer: David W. Schafer, CENAE 978-318-8274

Project: FY04 Monitoring New England Ice Jams

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1. On Thursday 22 January Troy Arnold and I drove to Athol Mass. at the request of Dave Schafer, Emergency Operations Center, New England District. The purpose of the visit was to meet with local officials, and to make ice thickness measurements and observations of the freeze up ice jam on the Millers River. The following is a description of the conditions that we observed.
2. We met with Athol Fire Chief Jim Wright at 10:00 hrs. and discussed the sequence of events leading to flooding and also the best access points to the Millers River. Chief Wright recalled that the last two severe cold spells resulted in backyard flooding, with the most significant being on the weekend of 17 January. We decided to make our first measurements at the intersection of Union Street and Shore Drive. This was the closest access point to the recent flooding of the Wheeler property at # 149 Pequig Avenue. Table 1 contains ice thickness measurements indicated a substantial amount of frazil ice in the channel. The width of the active channel from right to left bank was 96 feet. Figure 1 shows conditions at the ice thickness measurement site. Figure 2 shows the actual drilling. An aerial view of the site is given in Figure 3.

Table 1. Ice thickness measurements in the vicinity of Shore Drive.

Hole #	Total depth (ft)	Dist. To Lt. Bank (ft)	Solid ice (ft)	Frazil ice (ft)	Water level below top of ice (ft)
1	9	17	1.2	3.4	-----
2	8.5	25	1.4	3.7	-----
3	2.6	38	1.1	0.2	-----
4	4.4	58	1.0	2.7	0.3
5	3.7	73	0.9	1.8	-----



Figure 1. View looking upstream at the exchange street bridge from intersection of Shore Drive and Union Street where ice thickness measurements were taken.



Figure 2. Assistance drilling ice by Athol Fire Department on Shore Drive

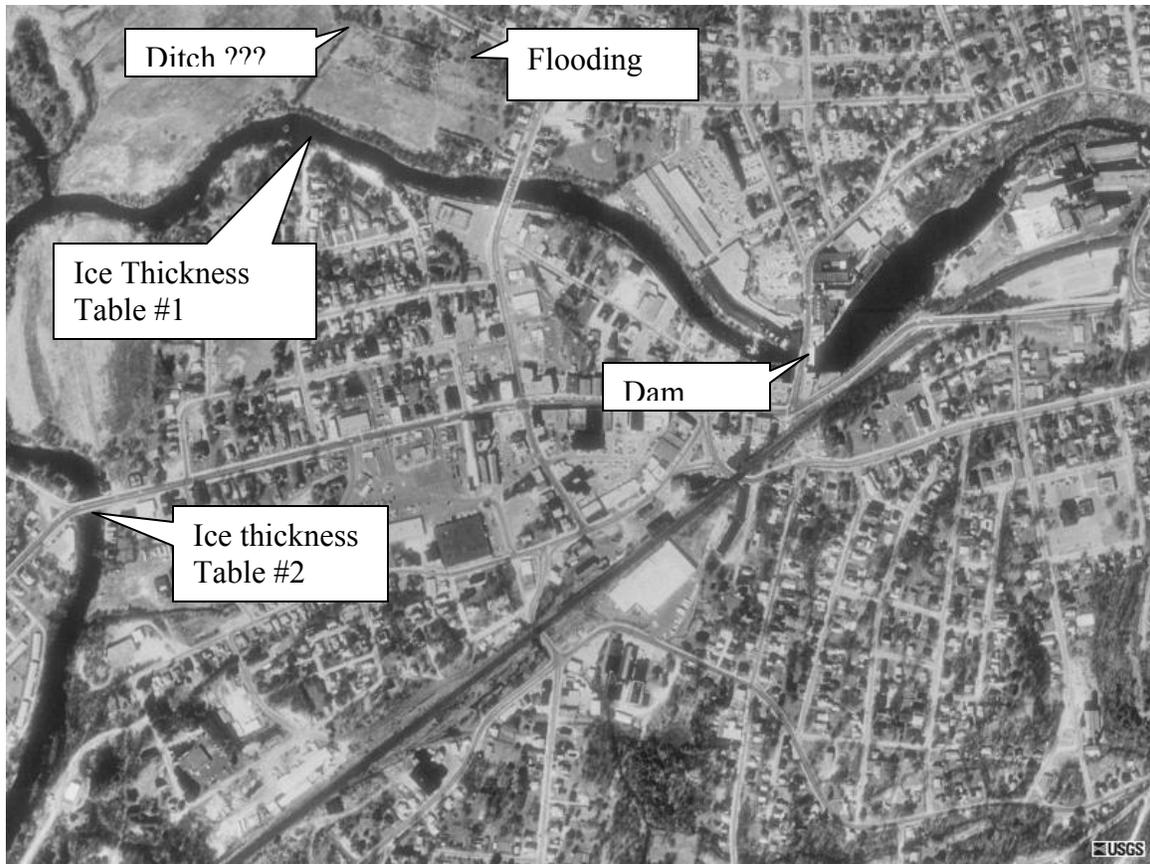


Figure 3. USGS Air Photo, Flow is right to left.

3. We then talked with Mrs. Wheeler a resident at #149 Pequig Avenue (Figure 4). She stated they have been at this location for 6 years and never been flooded. She also mentioned a ditch between their backyard and the river. A review of the USGS Air Photo (Figure 3) shows what may be a drainage ditch that could contribute to the backyard flooding via backwater from the Millers River, where water levels had been increased due to frazil ice accumulation. Further inspection of this area and the slope of the terrain could prove useful.



Figure 4. Backyard flooding at #149 Pequoig Avenue

4. Measurements of the ice thickness at #149 Pequoig Avenue (Figure 4) indicated two layers of ice from the two flooding events. The first event left an ice thickness of 0.7 foot frozen to the existing ground. The second cold event added an additional 1.8 feet of water with a 0.6 feet thick floating ice sheet on top. The fact that the water level was still at this level indicates that the restriction in the channel still remains and could get worse with the forecast of additional cold weather this weekend. Temperatures in January have been colder than normal (Figure 5).
5. We then took ice thickness measurements at the downstream side of the Main Street Bridge (Table 2). In Figure 6, the staff gauge at the bridge is visible in the background on the bridge face. Flow is primarily in the center of the channel with noticeable variations in the ice surface as a result of heavy frazil deposits along both sides of the channel.

Table 2. Ice thickness measurements at Main Street Bridge.

Hole #	Total depth (ft)	Dist. To Lt. Bank (ft)	Solid ice (ft)	Frazil ice (ft)	Water level below top of ice (ft)
1	7.0	21	1.3	6.0	1.1
2	7.5	34	1.1	0.0	.6

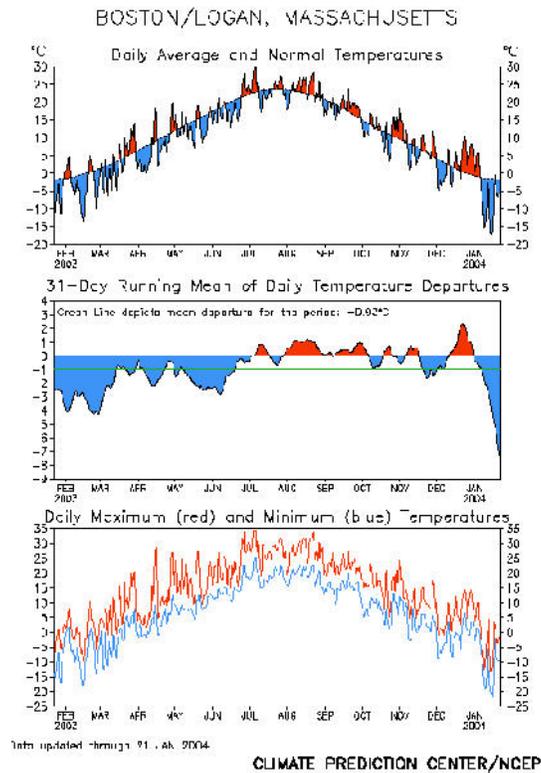


Figure 5. Air temperature record at Boston, MA. Note extremely cold temperatures in January 2004.



Figure 6. Ice thickness measurements downstream of the Main Street Bridge. Staff gauge in the background on the bridge face.

6. We then stopped on North Orange road downstream of where the Tulley River flows into the Millers River and observed the drop in water level of several feet. This would indicate that the freeze up jam restriction is between this location and the Union Street and Shore Drive location.
7. We then drove upstream to make additional observations on the Millers River in the vicinity of the Athol Manufacturing Dam (Figure 7). There was no indication of any water release through this location, although this waterfall probably contributes significant frazil to the downstream locations during extreme cold weather.
8. We then stopped by the Athol Fire Station and updated Fire Chief Jim Wright of our additional river observations and thanked him and his crew for their support.

Respectfully Submitted,

Gordon E. Gooch
Civil Engineering Technician



Figure 7. Athol Manufacturing Dam