A Solution to Spring Ice-Jam Flooding

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EACH SPRING, the City of Buffalo is faced with the possibility of ice-jam floods from heavy rains. Cazenovia Creek, located in the southern part of the city is covered with a sheet of ice at that time of year, substantially reducing its discharge capacity. To alleviate this condition, the city employs three World War II landing vehicles (LVTs) to act as small ice breakers. Even small tugboats would require too much draft to operate in very shallow streams.

Many communities which are adjacent to non-navigable streams are faced with the same problem. Often, the only immediate recourse is to use dynamite on the ice field or, for the long range, look to the federal government for relief. In 1963 Buffalo was not successful with either solution, so we developed an ice breaker that could operate in non-navigable waterways.

The LVTs are track powered and amphibious. They have been extensively modified for ice breaking activities by adding the following: A front end, below water line, armor plating; perimeter impact rubber bumpers; and a diesel power plant, heavy duty clutch and fluid couplings.

These modified vehicles are approximately 27 feet long by 10 feet wide and weigh 36,000 pounds. They can operate in five feet of water and can break ice up to two feet thick. By using dynamite in conjunction with our vehicles, we have broken ice up to five feet thick.

Theory

There is quite a difference between open flow channel capacity and "closed conduit" capacity. The former occurs when we have a moving, broken ice field, and the latter occurs when an ice field is solid and stationary. For example, the free-flow capacity of Cazenovia Creek is 11,000 cfs. However, the city has experienced flooding with a flow of as little as 5,400 cfs when there was a large, solid, stationary ice field. There does not have to be a complete ice blockage of the channel cross section in order to have flooding. Under certain conditions, a large, stationary ice field will do the job just as well.

Therefore, in order to increase Cazenovia Creek's capacity, Buffalo uses the LVTs to break up the ice field before the heavy spring runoff. In this way, we try to prevent a problem from occuring, rather than reacting to one after it happens.

Last spring, two LVTs were transported to Port Byron, New York, approximately 130 miles east of Buffalo, on flat bed tractor-trailers. This community is adjacent to a non-navigable stream, Owasco Outlet, and downstream from a dam which was at that time in danger of topping. Under normal conditions, the elevation of the reservoir is controlled by passing water into the Owasco Outlet. However, its capacity was drastically reduced by an ice cover which resulted in rising reservoir water levels. If conditions continued uninterrupted, the dam would be topped with the spring rains causing the flooding of Port Byron.

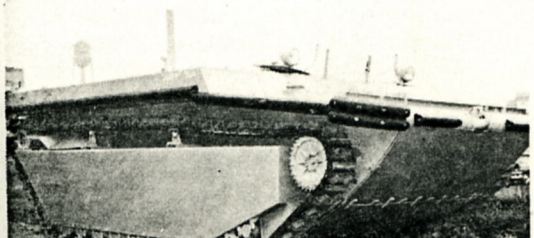
An emergency was declared by the State of New York and Mayor Griffin of Buffalo was asked to transport the LVTs and operators to Port Byron. The vehicles were successful in breaking up critical sections of the ice field and were instrumental in sufficiently increasing Owasco Outlet's capacity to avert flooding conditions.

Future Development

One major drawback experienced with the LVTs in the Port Byron operation was their lack of power and speed in reverse. Our normal method of operation is to wait for a small stream flow to develop. Then the LVTs break ice from the open water edge of the ice field. This allows the broken pieces of ice to flow downstream, beyond the LVTs' area of ice-breaking activity. If these conditions do not exist, the LVTs will be surrounded by large pieces of ice, and because of their lack of power in reverse, will become stuck in the ice field. We are looking into the possibility of obtaining a federal grant to modify the LVTs' transmissions which will overcome this problem.

I believe that the LVT operation is a very cost-efficient solution to a not uncommon problem. □□□

■ **LVT's break ice to increase winter flow of Cazenovia Creek and prevent ice jams that might cause extensive flooding in early spring.**



■ **IN 1959 the creek developed an ice jam that threatened the residential areas along banks. Experience led to present concern.**