

AFTER HURRICANE IGOR

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NEWFOUNDLAND IS REBUILDING ITS INFRASTRUCTURE AFTER IT WAS BATTERED BY A HURRICANE IN SEPTEMBER. CONSULTING ENGINEERS ARE HELPING OUT.

Hurricane Igor barreled through the southern, eastern and central regions of Newfoundland on September 21st, wreaking havoc beyond anything in residents' memory. Rainfall reaching nearly 240 millimetres in some areas in a 24-hour period coupled with winds as high as 170 kilometres per hour overwhelmed roads, bridges and river systems. Extensive highway and road damage isolated 90 communities, 22 of which declared a state of emergency. An 80-year-old man on Random Island died when the driveway under his feet collapsed and washed him out to sea. Over 900 soldiers and military engineers helped to rebuild roads and bridges to reconnect communities that had been isolated. As of mid-December, 35 families remained in temporary quarters due to major damage to their homes.

NASA photograph of Hurricane Igor over the Atlantic Ocean on September 13.

Estimates of the total damages for immediate response, repairs to municipal and provincial infrastructure, and anticipated claims settlements, have been cited at \$100 million, while the Insurance Bureau of Canada has cited a figure of \$65 million for private property damage.

The Department of Transportation and Works' engineering staff are dealing with the damage to provincial highways and 26 bridges. There are also four bridges that need replacing. Transportation and Public Works Minister Tom Hedderson says they "may" engage consulting engineers in the design.

Meanwhile, consulting engineering firms have been busy assisting with emergency and temporary repairs and assessing damages to municipal infrastructure. Some of the design work is also underway for permanent rebuilding in the municipalities.

Consulting engineers in the eye of the storm

At 6:45 a.m. on September 22, Bill Mills, P.Eng., regional manager of Newfoundland and Labrador Consulting Engineers Ltd. (NLCEL)/ADI, whose Marystown office was in the eye of the storm, received a phone call from the Marystown Town Manager.

"There was a major flood threatening the road, water and sewer system," Mills recalls. "There are two rivers and we didn't want to lose the road completely, so we excavated the lesser of two evils to get the water to recede. We sacrificed a section of the roadway to relieve the upstream pressure." Four major roads washed out, including an intersection that was serviced by two 1800-mm culverts.

After stabilizing the critical road networks, Mills, his staff and local contractors sourced culverts and performed temporary repairs to last

through the winter. The NLCEL/ADI staff worked 12 to 14 hour days for 21 days in a row. To replace and increase the capacity of four 1200-mm culverts, Mills is currently designing a box culvert with a concrete footing on either side of the stream to provide a clear opening.

Marystown Mayor Sam Synard reports that in addition to intense rainfall and high winds, unusually high tides made Igor "the perfect storm." He estimates total damage to the municipality at between \$1 and \$2 million. One hundred homes in the town were flooded, causing significant damage to basements.

Marystown (population 5,400) is only one of dozens of communities that suffered Igor's wrath. NLCEL/ADI is the engineering consultant for 14 municipalities that were directly impacted by Igor in the Burin Peninsula, western Avalon, Bonavista Peninsula, and central regions of the province.

In Sunnyside (population 600) on the Avalon peninsula, water flooded over the entire 40-metre width of a dam structure, eroded the spillway, and destroyed the concrete at the base of the structure. The building was standing there like the leaning tower of Pisa. It refused to fall," recalls Darryl Mills, NLCEL/ADI's group manager of civil engineering.

In Clarendville (population 5,200) located in the Shoal Valley on the east coast, Rutter Engineering has been doing structural evaluations of damaged homes, and working on road and shoulder washouts, culvert replacements, guiderails, repaving, and, in one community, replacing water service lines.

As the town engineer for 20 other municipalities, Rutter Engineering has also been selected to do repairs on over 250 washed-out sites on a 380-kilometre section of the T Rail-

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Above: road washed out in Amherst Cove.

Chad Fisher, Rutter Engineering

way, a provincial park located on a former railway bed, as well as repairs to nearby Lockston Path Provincial Park.

"It's a bad wind that doesn't blow some good," says Rutter Engineering general manager Stephen Chaytor, P.Eng. He estimates the firm has obtained \$250,000 worth of Igor-related work as of mid-December. "If there's anything positive to say about Igor, it's been the business impact. That said, we don't like to celebrate the financial benefits when we see first-hand the devastation and personal turmoil this has caused to many private residents."

Hatch Mott MacDonald in Clarenville and Cecon Limited in Gander are other consulting engineering firms that are busy serving municipalities and their regions in the hurricane's wake.

Repairs in St. John's

To date, the city of St. John's has engaged Kavanagh & Associates and Kendall Engineering to assist with river stabilization, sediment removal and erosion control. Igor-related infra-

structure work in St. John's, estimated at \$11 million, also includes replacing culverts and concrete structures, and rebuilding a retaining wall on the Waterford River.

John Barry, senior project engineer in the city's Department of Engineering, reports that a control structure upgrade to Quidi Vidi Lake was completed the night before the hurricane. Barry points out that one of the homes at the upper end of the lake normally gets flooded: "But it didn't happen this time. We consider that a success!"

Under the Disaster Financial Assistance Arrangements Program, the federal government will reimburse 90 per cent of the cost of infrastructure repairs and the province will pay for the remaining 10 per cent. Infrastructure enhancements that can be justified, to a maximum of 15 per cent of the replacement cost, are being allowed.

As for cases requiring a greater enhancement than 15 per cent, Kevin O'Brien, Minister of Municipal Affairs says, "The provincial government

and certainly myself as the minister responsible, are prepared to make the necessary repairs and improvements. Keep in mind that these events are happening more often. We need to increase the capacity of our roads, culverts and bridges so we can withstand anything the environment can throw at us, such as Hurricane Igor. If a 25 per cent increase is determined by engineers, we're prepared to go to that level to make sure we have the proper infrastructure in place." In that event, the amount over 15 per cent would be cost-shared between the province (80 per cent) and the municipality (20 per cent).

Minister Tom Hedderson says that "engineering for climate change is part of the discourse," and adds, "We are depending on our engineering community to point us in the right direction and to make sure we are making the proper adjustments." **CCE**

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