

Precast Concrete Boxes Used for Stormwater Management and Stream Crossing

By Minnesota
Department of
Transportation
District 3

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Longstanding severe flooding was associated with a section of T.H. (Trunk Highway) 371 and adjacent railroad near the Town of Little Falls, Minnesota. The flooding was generally attributed to Fletcher Creek, a meandering stream that passed under T.H. 371 and through a local campground before discharging into the Mississippi River. The preferred remedy to the chronic flooding was to manage runoff and floodwaters by increasing the hydraulic capacity of Fletcher Creek between the alignment of the new freeway, which paralleled old freeway 371, and the Mississippi. This remedy would control flooding without the construction of extensive storm sewers along the alignment of the new highway toward Little Falls where there was no well-defined outlet to the Mississippi.

The Morrison County Board of Commissioners has jurisdiction over Fletcher Creek, known as County Ditch 14. The Board found the proposal to increase the capacity of Fletcher Creek

near the flooding acceptable and further agreed to be the lead agency with respect to the design and construction management of the public works. The state provided hydraulic and structural design support.

There are several unique design elements associated with the flood control project. The Board required that the existing character of the creek be maintained and that rehabilitation or restoration activities include little or no increase in high flows. A high flow cutoff channel (overflow channel) was constructed directly to the Mississippi River.

Precast concrete boxes were used for critical design fea-

tures including a drop grade control structure (leading to the high flow cutoff channel) consisting of a special reinforced concrete box (RCB) culvert with end sections under an access road to the Fletcher Creek Campground. The structure commenced at the prescribed inlet invert elevation where a skewed 16-foot x 7-foot RCB inlet and apron was installed. The box transitioned to a 16-foot x 13-foot RCB with a 6-foot invert drop for a length of 12 feet, and then to an 80-foot run of 16-foot x 10-foot reinforced concrete boxes. The run terminated with a 16-foot x 10-foot skewed box outlet apron. The 80-foot channel of the structure included roughness elements (baffles) on the floor of the boxes to reduce the energy of floodwater before discharge into the channel to the Mississippi.

Precast concrete boxes were used for two additional design elements to complete the required structures of the flood control works. These included a double-celled culvert under Trunk Highway 371 and a triple-celled box culvert under the adjacent railroad. Both of these culverts were designed with skewed inlets and outlets to accommodate the normal flows of Fletcher Creek and to channel the waters into the natural alignment of the creek downstream of the T.H. 371 crossing. Engineers designed the elevation of the inlet apron of the drop grade control structure, so that only floodwaters would be diverted, thereby maintaining the natural flows and character of Fletcher Creek. ☺



Concrete boxes used for drop grade control structure.

Project:	Fletcher Creek T.H. 371 A Minnesota State/Morrison County Flood Control Project S.P. 4912-53/S.A.P: 49-647-10
Owner:	Minnesota Department of Transportation District 3
Engineering Design:	The Morrison County Highway Department Minnesota Department of Transportation, District 3, MnDOT Bridge Office
General Contractor:	Landwehr Construction, Inc St. Cloud, Minnesota
Producer:	Hancock Concrete Products, Inc. Hancock, Minnesota
Quantities:	80 feet of (16-foot x 10-foot) RCB (Grade Control) 12 feet of (16-foot x 13-foot) RCB Structure) One (16-foot x 7-foot) RCB skewed end section One (16-foot x 10-foot) RCB skewed end section

Since 1917, Hancock Concrete Products has produced precast concrete pipe, culverts, boxes, manholes and arches for communities in Minnesota, Iowa, Wisconsin, and the Dakotas. The company has introduced innovative designs such as large span arch pipe and long span arch. See www.hancockconcrete.com for information.