



Illustration 2.7 Rush and Lower Rush Rivers Spillway Design.

2.1.1.9 Inlets, Ditches, and Smaller Hydraulic Structures

Ditches and smaller hydraulic structures would be required to accept existing drainages intersected by the diversion channel. Ditches running outside and parallel to the diversion channel would direct local drainage to a reasonable number of diversion inlet locations. Existing ditches, field swales, and drain tile would be directed into these parallel ditches. The larger inlets, such as Drain 14 (a drainage ditch which runs generally south to north from Davenport to the Maple River near its mouth), would be open inlets like the Lower Rush River and Rush River. These larger inlets would be either concrete drop structures or rock ramps. The smaller inlets would be culvert structures with flap gates and energy dissipation chambers at the outlet. The culvert flap gates would prevent backflow from the diversion channel after peak flows.

Uncontrolled inlets (inlets without backflow prevention) would be placed at drainages that have either natural or manmade levees which would prevent widespread flooding from diversion channel backflow for events up through the 100 year flood. The project design is to maintain the existing 100-year flood floodplain in adjacent upstream drainages.

2.1.1.10 Oxbow/Hickson/Bakke Ring Levee

The communities of Oxbow, Hickson, and Bakke Addition in North Dakota are located within the inundation area and would be impacted during Project operation. The Diversion Authority has

1567 begun building a ring levee around these communities to address existing flood threats. The ring
1568 levee is intended to eliminate the need to relocate these communities and prevent inundation.

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1570 The full Oxbow, Hickson, and Bakke Levee alignment (OHB ring levee) would surround Hickson,
1571 Bakke, and a portion of Oxbow (Figure 4). Oxbow is located along the banks of the Red River and
1572 generally consists of residential lots surrounding the Oxbow Country Club. A number of
1573 residential lots as well as the country club would be impacted by the levee alignment.
1574 Approximately 40 residential structures would be removed. The alignment would generally
1575 parallel the Red River through residential areas in both the north and south portions of Oxbow
1576 and would cross directly through the Oxbow Country Club. The alignment would parallel the
1577 north edge of Bakke and continue south along the west edge of Bakke and Hickson. From the
1578 southeast edge of Oxbow and the southwest edge of Hickson, the levee would encompass
1579 agricultural areas, new residential lots, and portions of the golf course.

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1581 The levee would be constructed to maintain a freeboard, the height above the recorded high-
1582 water mark, of 4.0 feet above the 100-year flood floodplain elevation, the higher elevation being
1583 on the upstream end of the levee. The 100-year flood elevation at Oxbow, Hickson and Bakke,
1584 North Dakota, based on modeling information, is an elevation of approximately 922.3, and the
1585 500-year flood elevation is approximately 922.5. The 100-year and 500-year flood elevations are
1586 similar since all three communities are located in the inundation area. The top of OHB ring levee
1587 elevation is designed to 927.50. The five foot elevation difference accounts for: four feet of
1588 freeboard, 0.5 feet of overbuild to account for settlement, and 0.5 feet of aggregate roadway.

1589 The OHB ring levee includes a 2,300 foot overflow section on the west side of the levee that is
1590 one foot lower than the levee designed elevation. During a flood event greater than the 500-
1591 year flood, which could potentially overtop the OHB ring levee, this overflow section would
1592 allow flood water to enter (breach) the levee, but in a controlled location. This design could
1593 potentially prevent an uncontrolled breach of the levee elsewhere along the alignment.

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1595 The levee embankment would be located a sufficient distance, approximately 150 feet, from
1596 residential lots to allow for levee maintenance access, drainage features, and a vegetative
1597 buffer. The levee would be located a sufficient distance from the Red River to ensure
1598 geotechnical stability.

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1600 OHB ring levee construction requires the raising of Cass County Highways 81, 18, and 25 and
1601 Interstate 29 (I-29) to allow continued access during inundation. An additional area of Oxbow
1602 would be created within the benefitted area that would include new roads, residential lots, golf
1603 course holes, and a new clubhouse to replace structures and features lost due to construction.
1604 The existing sanitary sewer system, water main, and storm sewer system would be modified to
1605 accommodate the ring levee and new residential areas. Internal drainage features would be
1606 included, such as: open channels, storm sewers, storm water ponds, and a storm sewer pump
1607 station.

1608 1609 **2.1.1.11 Comstock Ring Levee**

1610 A levee would be also constructed around the city of Comstock, Minnesota, which is currently
1611 located outside of the 100-year floodplain. Operation of the Project would cause new
1612 inundation in this community during the 100-year flood. The levee would be constructed to
1613 prevent flooding by maintaining a freeboard of 3 to 3.5 feet above the 100-year flood elevation,