OLD MT 200
• EROSION REPAIR •

Running alongside the Clark Fork River, Highway 200 connects the City of Missoula and the town of Bonner, Montana.

In 2019, the Clark Fork River experienced heavy spring runoff and flooding. High water levels pushed sediment and rock downstream and away from the riverbank; compromising the stability of the highway. An erosion wall had to be constructed to save the roadway from sliding into the river.

WHAT IS EROSION?

Erosion occurs when natural forces such as wind, water and ice wear away or transport dirt, rock and other earthen materials. Of these forces, running water is the primary cause of soil erosion. This is because water is so abundant and powerful.

Snow builds up in the mountains over the winter months. As winter snow melts, the water flows into streams and rivers. This is called runoff. Runoff can cause streams and rivers to swell and overflow. Great amounts of water rush downstream, transporting sediment and rock away from the bank.

VISION ZERO
zero deaths · zero serious injuries
MONTANA DEPARTMENT OF TRANSPORTATION

Presented by The Montana Department of Transportation

HOW CAN EROSION BE PREVENTED?

There are several ways to diminish or prevent erosion. Some methods are simple, while others are more complex.

Planting trees, shrubs and other vegetation is one way to prevent and reduce soil erosion. Leaves of vegetation slow the impact of rainfall on the soil. Plant and tree roots hold the soil tightly together making it difficult for the soil to be transported away by water or wind.

Diversion is another way to prevent or decrease erosion. Water follows the path of least resistance, meaning it will flow in the direction of the fewest obstacles. By creating a diversion, the path of the water changes and moves away from the area of concern.

Another method of preventing erosion is to build a structure that can reduce the powerful effects of water. An erosion wall can be made out of several types of materials. The complexity of an erosion wall can vary from stacked rocks to a full structure comprised of steel beams and concrete.

ENVIRONMENTAL CONCERNS

The Old MT 200 erosion prevention wall was designed by a team of engineers to address the specific needs of the area. This erosion wall had to be strong enough to support the roadway while protecting the environment around it.

The Clark Fork River is home to several species of trout. Each year, trout migrate upstream to the place they were born to lay their eggs. For many trout in the Clark Fork River, this means swimming from the Clark Fork into Marshall Canyon Creek. This creek flows into the Clark Fork River at the erosion site.

When the highway was constructed, a fish ladder was added under the roadway to maintain the connection between the creek and the river. The fish ladder allows fish to swim upstream from the river to the creek.

A fish ladder consists of a series of small elevated steps, or ascending pools. Fish can navigate the ladder by jumping against the current, resting in the pool and repeating the process until they have bypassed the obstacle; in this case, Highway 200.

The erosion wall was specially engineered to be built around the fish ladder and protect access for trout migrating from the Clark Fork River to Marshall Canyon Creek.

Migratory birds also had to be considered before construction on the erosion wall could begin. Trees needed to be removed from the site at just the right time of year to protect migratory birds. Roadside landscaping was completed months before the project began in accordance with the Migratory Bird Treaty Act (MBTA) of 1918. The MBTA protects migratory birds and forbids disturbing or moving their eggs and nests. Trees and shrubs could not be removed if migratory birds were nesting in them, so landscaping had to be completed before the birds returned to the area in the spring. By removing potential nesting sites before birds came back to Montana, any possible conservation-construction conflict was eliminated, and the project could move forward.

BUILDING AN EROSION WALL

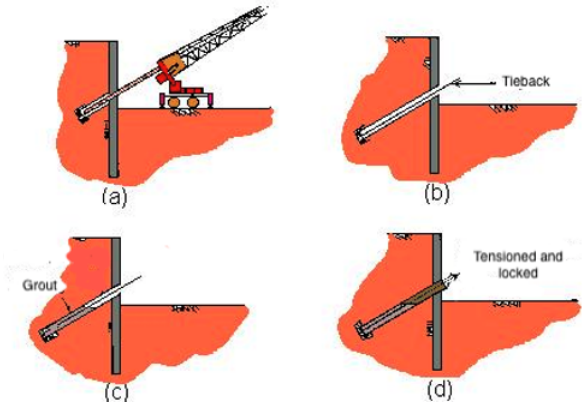
Construction on the erosion wall began with the removal of the old erosion prevention structure. Crews excavated the area and tore out the cement wall that had previously acted as an erosion prevention method.

Once the area was excavated, large steel beams, called soldier pile, were pounded deep into the ground to create the structural framework of the wall. Horizontal holes were then drilled through the steel beams and into the soil. Long braided cables were placed into holes and grout was added hold them in place and protect them from corrosion. These long cables are known as tiebacks because they tie the steel beams to the soil.

Crews added the tieback supports row by row, excavating the soil away from the wall as the work moved closer to the riverbank. The Old MT 200 erosion prevention wall consists of 55 soldier pile beams, each with four rows of tieback supports.

When all of the tiebacks had been drilled, installed, grouted and tensioned, the wall was covered with wooden slats and a concrete facing was poured to create a protective shell and decorative covering for the wall.

Large loose stones, called riprap, were added from midway down the wall to the bank of the river. The riprap was covered in topsoil and vegetation was planted to strengthen the riverbank against erosion and to reclaim the area for wildlife.



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EROSION ANALYSIS QUESTIONS

1. What caused the Clark Fork riverbank to erode and what impact did it have on Highway 200?

2. What is the primary cause of soil erosion and why?

3. What are three methods for preventing soil erosion?

4. Why are trees and shrubs an effective means for preventing erosion?

5. Name two environmental factors that had to be considered before or during the construction of the Old MT 200 erosion wall.

6. After reading the material, why do you think the erosion wall needed to have both vertical steel beams and horizontal supports?

7. CRITICAL THINKING:
After reading about this erosion repair project, what, if anything, do you think can be done to prevent erosion like this from occurring in other places?