

# TWO-STAGE DITCHES

AN INNOVATIVE APPROACH TO WATER MANAGEMENT

## WHAT ARE THEY?



Two-stage ditches transform traditional drainage ditches by incorporating a widened channel and a floodplain bench. This design not only accommodates more water but also uses vegetation on the floodplain bench to enhance nutrient removal from the water, contributing to cleaner waterways.

## FEATURES

- 1 Widened Design**  
The channel is expanded to include a vegetated floodplain bench alongside the conventional ditch, significantly increasing its width—typically to about three times that of a standard ditch.
- 2 Floodplain Storage**  
This bench provides additional space for water during high-flow events, effectively storing floodwater and reducing overflow.
- 3 Nutrient Processing**  
The vegetation on the floodplain bench plays a crucial role in filtering water and encouraging denitrification, which removes nitrates from the water.

## IMPACT AND COST

- Environmental Benefits:** USDA-ARS research shows two-stage ditches achieve 30 percent higher denitrification rates than natural channels, enhancing nutrient removal.
- Flood Management:** The extra width allows for up to a 200-year flood within ditch banks, minimizing flood risk.
- Economic Efficiency:** Installation costs range from \$5 to \$50 per linear foot, making it a scalable, sustainable drainage solution for communities and land managers.

## IMPLEMENTATION

- Location Considerations:** Two-stage ditches are designed to maximize efficiency and preserve agricultural land by utilizing space effectively, making them ideal for areas alongside streams with existing filter strips.
- Design Criteria:** The top width of a two-stage ditch is generally three times as wide as a conventional drainage ditch, providing ample room for water management and floodplain reconnection.

*Two-stage ditches represent a strategic advancement in drainage management, balancing the need for effective water conveyance with environmental stewardship and flood risk mitigation.*

SOURCES: AGRICULTURAL DRAINAGE MANAGEMENT COALITION (ADMC) & OHIO STATE EXTENSION

