

AGRICULTURAL DRAINAGE

ARCHITECTURE + ENGINEERING + ENVIRONMENTAL + PLANNING



True Expertise + Sustainable Solutions

ISG



Facing the Challenges Together

With over 40 years of experience, ISG is focused on improving drainage capacity and crop yields while positively addressing water quality through innovative nutrient reduction practices. Producers face enough natural elements every day without needing to worry about the challenges of prolonged wetness, soil saturation, and environmental impacts. ISG's multi-disciplinary team is acutely aware of these challenges and can contribute an unparalleled level of expertise to the agricultural industry, local governments, and state agencies as we work collaboratively to ensure mutually beneficial results.

At ISG, we understand that drainage is critical to the success of the agricultural community and have helped producers across the Upper Midwest experience valuable water management practices. Through a combination of efforts, ISG has directly saved landowners project costs that in many cases, allowed savings to be utilized to perform additional repairs of improvements to the systems that were initially felt would be too costly. ISG's extensive conservation drainage experience has demonstrated that there are significant benefits to hiring a professional engineer, which include:

- **Proper Design:** Results in a long term solution that minimizes future maintenance costs.
- **Complete + Accurate Plans/Specifications:** Clearly defines work to be completed, providing a basis for competitive bidding.
- **Accurate Quantities:** Reduces the unexpected costs associated with quantity overruns.
- **Superior Coordination with Various Agencies:** Utilizes positive relationships with DNR, NRCS, County and State Highway Departments, and other agencies.

Whether it be tile repair, extension, district watchman services or open ditch clean out, ISG has intimate knowledge of sustainable agriculture solutions that result in higher yields, increased operational efficiencies, and cleaner water.

AGRICULTURAL DRAINAGE WORK

- Drainage Studies + Reports for Repairs and Improvements
- Open Ditch + Tile System Survey and Designs
- Integrated Water Quality Treatment
- Wetland Delineation
- Wetland Planning + Design
- Watershed Boundary Reviews
- Reclassifications of Benefits Services
- Right-of-Way Acquisitions
- District Watchman Services
- NRCS Technical Service Provider Services
- Annexations Services
- Flood Control Levee Design and Maintenance
- Construction Staking + Observation
- Construction Management

COUNTY DITCH NO. 62 BIOREACTORS

Faribault County, Minnesota

This 700-acre watershed that drains into the Blue Earth River had a tile outlet that was in poor condition, damaged, and failing in many areas. A partnership was developed among the Drainage Authority, Faribault County Soil and Water Conservation District (SWCD), and a landowner who offered a grassed swale site that was ideal for bioreactors. ISG designed three bioreactors into the drainage repair to maximize the efficiency of nitrate reduction while also meeting the time limitations for water storage. Each bioreactor is 135' by 25' by 5' deep and is aligned with tile so each can be filled consecutively once capacity is met. This increases effectiveness as more peakflow from the system is treated. A stormwater quality unit was also installed to remove sediment and debris prior to entering the bioreactors. This water quality project did not take land out of production and utilized grant funding.



COUNTY DITCH NO. 57

Blue Earth County, Minnesota

This community-based water quality and treatment demonstration project showcases how landowners, local government, and state agencies can develop a watershed approach to improving water quality and replacing outdated drainage systems. Recognized as the first public multi-purpose drainage project in Minnesota, Blue Earth County Ditch 57 received a 2012 American Council of Engineering Companies Award of Excellence.



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JUDICIAL DITCH NO. 46

Jackson County, Minnesota

This 739-acre watershed in far southern Minnesota had 100 year-old tile that was in disrepair and drastically undersized for today's standards and production practices. The improvement included increasing the drainage capacity with new mainline and branch tile. A pond at the outlet with a low-flow structure provides peak flow reductions and sediment storage, decreasing the amount of total suspended solids leaving the watershed and improving water quality. Installing controlled drainage systems allow producers to regulate water levels in their fields, which is helpful in dry years because more rainfall is stored in the soil when it is needed during the growing season. Installation of water quality inlets in road ditches and fields prevents erosion and sediment from entering the buried tile system.



NAGEL DRAINAGE DISTRICT

Monona County, Iowa

After erosion occurred from two high water events in 2010, ISG was called in to act as drainage engineer and ultimately a request was submitted for rehabilitation assistance from the U.S. Army Corps of Engineers (USACE). An \$18.7 million project was approved by the USACE that involved the setback of over four miles of existing levees along both banks of the district facility. ISG coordinated construction administration, acquired additional right-of-way, located an adequate soil borrow source, and traced crop damages outside the newly acquired right-of-way for payment by the district.



DRAINAGE DITCH 15

Palo Alto County, Iowa

Palo Alto County volunteered to be part of this pilot project with the Iowa Department of Agriculture to demonstrate a market driven approach that would improve both production and achieve significant environmental benefits through combining updates to tile drainage infrastructure with targeted water quality wetland restorations. This integrated approach was designed by ISG to reduce surface runoff that can lead to phosphorous and other agricultural chemical runoff as well as address the higher nitrate levels associated with tile drainage. Drainage improvements and a strategically located and sized wetland were placed in the watershed.

As one of five pilot projects of the Iowa Wetland Landscape Systems Initiative, this ISG designed project included construction of 0.70 miles of open ditch; 6.7 miles of tile; design and construction of a nutrient removal wetland encompassing 42.7 acres; 404 permitting with channel mitigation plan; and development and coordination with the Natural Resource Conservation Service (NRCS) for mitigation of farmed wetlands. This project provided the means to demonstrate that wetlands can provide mitigation, thereby making this market driven approach feasible for application across the rest of Iowa's drainage districts that are nearing the end of their design life and will need to be modernized over the next few decades.



MDA CONSERVATION DRAINAGE

Mower County, Minnesota

In conjunction with the Minnesota Department of Agriculture (MDA), the Nature Conservancy, and Mower County, two drainage surge basins were designed and constructed utilizing areas currently not tilled. Existing tile flow and overland flow was diverted into each basin to provide stormwater storage and treatment for agricultural runoff.

Each basin utilizes control structures to allow the water levels to fluctuate and provide for testing of flow rate, sediment and nutrient load. Other best management practices, including a large woodchip bioreactor were designed as a part of the project. Ongoing research by the MDA will provide detailed information on how small surge basins can improve water quality in an agricultural watershed.





DRAINAGE DISTRICT NO. 65

Pocahontas County, Iowa

ISG was appointed to investigate and recommend drainage improvements to Drainage District No. 65's antiquated system of open and subsurface drains. The system dated back to 1913 and had proven incapable of efficiently removing excess waters. Dedicated to giving back through support of the industries it serves, ISG engineers were actively involved in the development of the IDALS- and ISU-supported Iowa Drainage and Wetlands Landscape Systems Initiative. The initiative combined drainage improvements with nitrate-removal wetlands for a potentially voluntary self-funded means of reducing pollution, improving water quality, improving agricultural productivity, and boosting landscape diversity.



COUNTY DITCH NO. 25

Blue Earth County, Minnesota

This project, near St. Clair, Minnesota, had large portions of open ditch that were in need of cleaning, slough repair, and tile inlet repair. In addition, it was discovered that two county road crossings were constructed 2.5 feet higher than the legal ditch profile when they were reconstructed 30 years ago. Blue Earth County Public Works offered to pay for the culvert replacement. In the end, the land owners saved \$62,000 which enabled them to afford the cleaning of an additional 2,700 feet of ditch beyond the scope of the original project. Along with the cleaning of the ditch, a wetland bank was constructed on the upper end of the system, which provided storage and water quality treatment in the watershed.

DITCH NO. 29 + JUDICIAL DITCH NO. 367

Martin County, Minnesota

This drainage system was drastically undersized for today's standards and production practices. ISG's improved design replaced the existing tile to achieve a higher drainage coefficient and improve the downstream effects of the system. The improvement consisted of larger tile and increased depth in the system. A new storage pond was connected to an existing wetland basin that enhanced the project and also provided storage, water quality treatment and wildlife habitat. By storing water, the drainage coefficient increased while the outlet capacity of the system decreased—protecting farmland and lakes downstream.



COUNTY DITCH NO. 78

Blue Earth County, Minnesota

At over 2,000 acres, the Branch I watershed was not draining properly despite having soils that are considered prime farmland. Existing tile was deteriorated and capacity was not adequate. Improvements included main branch tile as well as lateral tile improvements. Included with the project was to deepen 3,100 feet of the Branch I open ditch to add depth and storage capacity. One to two-foot berms provide additional storage and raised elevation to keep the ditch from overtopping up to the 100-year rain event. Two strategically added culverts helped reduce downstream peak flows and maximized storage capacity.



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