



**BOLTON
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December 8, 2023

Board of Supervisors
Worth County Courthouse
1000 Central Ave
Northwood, Iowa 50459

RE: Amendment No. 1 to the Engineer's Report
Drainage District No. 14
Project No.: 0A1.124363

Dear Board Members:

This amendment serves to provide additional information that was requested at the hearing of the Engineer's Report that was continued on November 27th, 2023. This amendment does not materially change the proposed improvements already contained in the report.

Background

The proposed improvements involve deviating from the natural watercourse by carrying water that drains from the north, approximately 1,028 acres, and taking it west to the Shell Rock River. Doing so provides relief to all lands south of the proposed main that currently receive waters from the north. Historical photos and survey suggest that the main tile south of 450th Street was already cut off from the north by quarrying on the main tile south of the junction with Lateral No. 3, and possibly at what is now Kuennen's Quarry County Park. Surface flows may still cross 450th Street to the south through culverts, but subsurface drainage was diverted west by construction of a 24-inch main tile in 1976.

Concerns

Specific concerns raised at the Nov. 27th hearing include:

1. That the proposed improvements do not follow the natural course of drainage.
2. That the proposed construction of the Lateral No. 4 and Upper Main improvements at 90 degree angles to the Lower Main is ineffective.
3. That the lands south of 450th Street have not been included in pre-classification estimates of relative benefit.

Regarding Item No. 1:

Drainage districts in Iowa are established via Iowa Code Section 468. Section 468.4 gives drainage districts the authority to locate facilities outside the natural course of drainage, "where it will be more economical or practicable." It is our engineering opinion that the recommended improvements are more economical and practicable than following the natural course of drainage south.

To drain south to the watershed's natural outlet would require approximately 5,200 feet of additional tile compared to the proposed Main tile. Assuming the same grade can be achieved as the 1914 tile, this new tile would need to be 42 inches in diameter to accommodate the lands north of 450th Street at the same capacity of the proposed 36-inch tile. To accommodate all the lands south of 450th Street that may potentially drain to it would require a 48-inch tile. Each proposed lateral would also require more length of tile. A table summarizing the additional lengths and costs is attached.

Draining the quarry or county park is not an option. It would be effectively draining to groundwater and creating an agricultural drainage well. The Iowa Department of Agriculture and Land Stewardship has closed over 90% of agricultural drainage wells since 1997, and a new well would not be permitted. Additionally, much of the land south of 450th Street appears likely to be developed in the future by the quarry and may not see the full rate of return on a tile project. All these factors and the possibility of hitting bedrock when constructing the newer, deeper tile contribute to the proposed improvements being far more feasible than following the natural watercourse south. The design and construction of the 1976 Main tile would indicate that the contemporary engineer had a similar opinion.

Regarding Item No. 2

It is true that tight-angled junctions are not the ideal way to conduit water. However, economics and constructability must also be considered when designing drainage systems. The proposed prefabricated, reinforced concrete tees are well-proven, easy to install, and economical. Manholes and custom made Y-style junctions also slow down water and are not worthwhile under these conditions. A single manhole may cost upwards of \$10,000, ten times more than the tees that are proposed.

Fear of drainage issues and damage to the tile resulting from use of tees are unfounded. Tees are standard pieces of drainage infrastructure. The proposed grades (slope) of the tile are typical for agricultural drainage, meaning water will flow at normal speeds and energy. In these conditions, reinforced concrete pipe is expected to have a useful life of 150 to 200 years.

Regarding Item No. 3

The pre-classification maps provided in the Engineer's Report are estimates. A separate classification hearing will be held after the Classification Report is submitted. At that time all landowners will be able to object, and the classification will be subject to the approval of the trustees.

Our present belief is that the district drainage tile south of 450th Street is cut off from that of the north. The tile is likely broken from quarry-related activities, and water north of 450th Street is already intercepted by the 1976 Main. Surface flow through 450th Street may be limited by the capacity of the existing culverts. Further investigation can be conducted for the classification report as to how much benefit the southern lands receive from the proposed improvements, but a conservative approach was chosen for presenting the report that did not include those lands.

Sincerely,

Bolton & Menk, Inc.



Jacob Hagan, P.E.

Project Engineer

Attached:

Tile-Only Cost Comparison of Current Proposal vs. Southern Route
Map of Hypothetical Southern Route

TILE ONLY COMPARISON								
FACILITY	EXISTING PROPOSAL				SOUTHERN ROUTE			
	LENGTH (ft)	DIA. (in.)	COST/FT	COST	LENGTH (ft)	DIA. (in.)	COST/FT	COST
MAIN	3126	36	\$ 85	\$ 265,710	8297	42	\$ 120	\$ 995,640
UPPER	5240	24	\$ 54	\$ 282,960	1513	30	\$ 70	\$ 105,910
UPPER	-	-	-	-	5240	24	\$ 54	\$ 282,960
LAT #4	3354	18	\$ 42	\$ 140,868	3901	24	\$ 54	\$ 210,654
LAT #4	-	-	-	-	1320	18	\$ 42	\$ 55,440
LAT #5	1600	24	\$ 54	\$ 86,400	3466	24	\$ 54	\$ 187,164
LAT #5	1009	18	\$ 42	\$ 42,378	1009	18	\$ 42	\$ 42,378
Totals	14329			\$ 818,316	24746			\$ 1,880,146
Diff.					10417			\$ 1,061,830
% Incr.					73%			130%

FACILITY	% INCREASE
MAIN	275%
UPPER	37%
LAT. #4	89%
LAT. #5	78%



