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"Bettering Iowa since 1970"

July 10, 2025

RE: Amendment No. 1 to Engineer's Report for Proposed Tile Improvements
Drainage District No. 69 in Palo Alto County, Iowa
JWA PROJECT NO: E24108

Dear Board Members and Landowners:

We filed an engineer's report regarding proposed improvements to the tile system of Drainage District No. 69 (DD69) dated February 12, 2025. An informational meeting was held on March 18, 2025. Based on the discussions at the informational meeting we have completed additional analyses, and have evaluated several alternatives for improvements. We submit this report as an Amendment to the originally filed report.

A. Tile Investigations

During and following the March 18, 2025 informational meeting multiple landowners indicated possible issues with the tile in need of investigation.

It was believed that the water main crossing of the Main Tile and Lateral E tile along 320th St was potentially causing drainage issues. On April 3, 2025 Iowa Lakes Regional Water exposed the crossings. No issues were found at the crossing of the Main Tile, however the PVC was replaced for Lateral E at the water main crossing (it was found to have significant backfall / reverse grade).

Additionally, it was expressed that the Lateral G tile needed to be investigated, as it was believed to be plugged. On the same day as the informational meeting contractor Russ Lair dug up the tile in the NW NW ¼ of Section 33 of Walnut Township (T-97-N, R-33-W) and estimated it was over half full of mud and/or sand. Considering the history of issues with this tile, and its design inadequacy (even if the tile were clean) replacement and improvement should be considered. For an improvement, we would recommend installing approximately 2,000 feet of 12" diameter reinforced concrete pipe parallel to the existing 10" diameter tile. We estimate a construction cost of approximately **$80,000**. Due to the small number of landowners using this lateral tile, and the small tile size required, it may be worth pursuing this work privately for a potentially lower cost. For this reason, at this point we consider the Lateral G improvement optional and have not included the cost in the cost estimates presented later in this report amendment.

We spoke with the tenant of the farmland near the outlet of the existing Main Tile into the DD5 Main Open Ditch, due to the drainage district records showing several repairs made in the past. The tenant indicated they knew there had been issues in the past but did not believe there had

been any repairs in the last 5 years. The tile was not televised, as we were not able to arrange it to be done before crops were planted.

B. Re-route to the West Fork Des Moines River

During the March 18, 2025 informational meeting several landowners expressed interest in pursuing a re-route of the upper approximately 770 acres of DD69, including the areas drained by Lateral E tile and the Main Tile above Lateral E, directly to the West Fork Des Moines River. The re-route tile would be a 36" diameter pipe approximately 3,570 feet in length located in Section 34 of Walnut Township (T97-N, R-33-W). See the enclosed map.

In order to re-route the drainage from the northern portion of DD69 to the river, a very deep cut would be required. The maximum depth of cut for the re-route tile would be around **40 feet**. We contacted several contractors to develop a cost estimate, as a cut this deep would be very challenging and is uncommon. See enclosed plan & profile. Without a geotechnical investigation (estimated at $20,000) we are not sure the underlying soils would be suitable. A major concern would be if flowable sand were encountered at these depths. Assuming the soils are suitable, we estimate the construction cost for the re-route tile alone to be nearly **$800,000**. That does not include non-construction costs, and does not include any improvements to Lateral E nor the Main Tile above Lateral E. If these additional improvements were included in the project, we estimate a total project cost with the re-route to be roughly **$1.901 million**. The lower portion of the district would pay a portion for relief of their tile; however, most of this cost would be assessed to the upper 770 acres that would be served by the new tile. We anticipate a *possible* average of $1,700 - $1,900 /acre to these lands, with some parcels **over $3,000 per acre**. In our opinion this is not feasible.

If the re-route were completed, the lower portions of DD69 (below the re-route) would receive some drainage relief. See the enclosed map for the effect on the drainage coefficients. Even with relief, the lower (south) end of the existing Main Tile would have a drainage coefficient of roughly 0.2 inches per day, which is still inadequate and quite low. A minimum of 2.5 times the flow capacity would still be required to approach having an adequate tile outlet.

If we improved the lower Main Tile and Lateral D tile along with the re-route improvements previously described (re-route tile, Lateral E improvement, and upper Main improvements) we estimate a total project cost of **$2.605 million**, which is around **$350,000** more than the cost estimate from the original engineer's report. This again shows the re-route to the river is not a cost-effective solution. We understand the idea behind it, but we do not view a re-route to the West Fork Des Moines River as the best option.

C. Open Ditch Outlet Analysis

According to landowners the outlet of the existing DD69 tile system, the Drainage District No. 5 (DD5) Main Open Ditch, is small & shallow, likely slows the drainage of the existing tile, and may restrict flow from the improvements proposed in our originally filed engineer's report. This is a major reason for the interest in investigating re-routing drainage to the West Fork Des Moines River, discussed previously.

In our original report, we completed an initial evaluation of the DD5 Main Open Ditch, and concluded it was adequate. However, the evaluation was based primarily on the ability of the ditch to surface drain and prevent flooding in the low-lying lands adjacent to the ditch.

We acknowledge that if at all possible, a tile should outlet into a channel at or above the water surface elevation of the usual low flow during the growing season. We would define this condition as when the flow in the ditch is dominated by subsurface drainage tile, and the tiles are flowing *reasonably* full.

For the DD5 Main Open Ditch, we estimate the depth of flow to be **3.86 feet** at a 1/2 inch per day drainage coefficient equivalent flow rate over the area it drains (over 10,000 acres). We do not expect that the entire area is currently drained at a 1/2 inch per drainage coefficient, and even if it was, we would not expect all the tiles to be discharging at full capacity all at the same time, or for any extended period of time. A more reasonable value for evaluation may be a 1/4 inch per day drainage coefficient. At this equivalent flow rate, we estimate the flow depth in the ditch to be approximately **2.63 feet**. For reference, the existing Main Tile of DD69 is **less than 2 feet** off the DD5 Main Open Ditch bottom, and our proposed tile was originally designed to be placed even closer to the ditch bottom.

Larger diameter tile mains do have an ability to overcome some backwater effects when the pipe would otherwise be flowing partially full, as the pipe has space to "fill up". As an example, we would expect less of a backwater effect for a 48" diameter pipe vs. a 24" with both set at the same outlet elevation. Backwater effects are more pronounced for tiles with very little fall (flat grades). With our originally proposed Main Tile improvement the design grade for the first 2,800 feet was 0.06% (only 1.68 feet of total fall over that reach).

We conclude that the DD5 Main Open Ditch at times is a significant flow restriction to the existing DD69 tile system and are concerned it would also be a restriction for our originally proposed tile improvement. Modifications to the design are necessary and are discussed below.

D. Modifications to Proposed Tile Improvements in Engineer's Report dated February 12, 2025

Our original proposal included improvements to the Main Tile, including re-routing the improvement below Lateral B to a new outlet location to the DD5 Main Open Ditch. The route would be a shorter distance and result in significant cost savings. We also proposed improvements to a portion of the Lateral D tile, and Lateral E tile. The project cost was estimated at $2.267 million. We have since refined and updated that cost estimate to $2.251 million.

The simplest way to modify the design to alleviate the DD5 Main Open Ditch concerns is to raise the outlet elevation higher above the ditch bottom. However, there is limited ability to do this while maintaining a minimum grade and adequate cover. Lowering the grade would mean that more costly larger diameter pipe would be needed, and we need a minimum of 2.5 feet of cover over the pipe (3 feet preferred).

Raising the outlet of the originally proposed Main Tile improvement would result in upsizing roughly 1,500 feet of 36" to 42" diameter tile due to flattening the grade, increasing the cost of the project. It would also result in the first approximately 300 feet (south of 340th St) having inadequate cover (only 1 – 2 feet). This would result in a short open ditch being needed on the south side of 340th St. Although in terms of construction the open ditch would be less expensive than 42" diameter tile, right-of-way acquisition would be required. We estimate the total project cost considering these modifications to the originally proposed improvements would be **$2.276 million**, or an increase of approximately $25,000. This is roughly **$330,000** less expensive as compared to the overall cost estimate for improvements with a re-route to the West Fork Des Moines River, described in Part B of this report amendment.

E. Open Ditch Improvement Option

One other option we considered as a potential lower cost alternative for necessary drainage improvements was an approximately 4,500 ft open ditch to be located on the east side of 430th Avenue, extending from the DD5 Main Open Ditch northward to near the west quarter corner of Section 3 of Emmetsburg Township (T-96-N, R-33-W). Although the construction cost of an open ditch is typically lower than a large diameter tile, one major drawback is that ditches typically require more frequent and costly maintenance than tiles.

For an open ditch, combined with the previously proposed tile improvements above the open ditch, we estimate a total project cost of roughly **$2.204 million**. As compared to the project described in Part D of this report amendment, this improvement option only results in roughly $75,000 of cost savings. This is due in part to the longer distance of the ditch as compared to the re-routed Main Tile, deep cuts requiring large quantities of excavation, and potentially high right-of-way acquisition costs due to severance (paying for crossings).

F. Evaluating Improvement Alternatives

To date, we have developed many designs and cost estimates in an effort to find the most cost-effective means of providing significantly needed improved drainage to DD69. A summary of the alternatives we have evaluated is shown in the table below.

Number	Description of Improvements	Main	Lateral D	Lateral E	Project Cost Est.
1	Parallel Main Tile Improvement	X	X	X	**$2.660 million**
2	Re-Routed Main Tile Improvement (no ditch)	X	X	X	**$2.251 million**
2A	Re-Routed Main Tile Improvement (with short ditch)	X	X	X	**$2.276 million**
3	Re-Route to River (no Main Tile improvements below Lat E)	X	X	X	**$1.901 million**
3A	Re-Route to River (with Main Tile improvements below Lat E)	X	X	X	**$2.605 million**
4	Open Ditch and Tile Improvements	X	X	X	**$2.204 million**

In our opinion the only feasible alternatives are 2A and 4. We consider the other alternatives to be unviable and are presented for informational and discussion purposes only.

Alternative 1 is too costly compared to the others. Alternative 2 would include significant flow restrictions due to the DD5 Main Open Ditch. Alternative 3 shows the lowest overall cost, but the vast majority of the cost would be assessed against the roughly 770 acres directly benefited. This makes Alternative 3 cost prohibitive as well. Alternative 3A has the same issue as Alternative 3 and also is significantly more expensive compared to Alternative 2A. Alternative 4 is feasible, but in our opinion the possible limited cost savings as compared to Alternative 2A are not worth the higher long-term maintenance expenses of an open ditch. Therefore, **we recommend Alternative 2A**. As compared to the originally filed engineer's report, the estimated project cost is $9,000 more.

G. Pre-Classification

At the March 18th, 2025 informational meeting, our firm was directed to proceed with pre-classification. The intent of the pre-classification is to give landowners a better estimate of their potential parcel specific costs for the project. We have completed a pre-classification for the improvements described in Part D of this report amendment (Alternative 2A in the table in Part F of this report). The pre-classification is a separate report.

H. Next Steps

We recommend that at the Board's discretion either an informational or formal hearing be scheduled.

Sincerely,

JACOBSON-WESTERGARD & ASSOCIATES INC.

Collin Klingbeil

Collin J. Klingbeil, P.E.

Encl. Map of Re-Route to the West Fork Des Moines River (Alternative 3)
Plan & Profile of Re-route to the West Fork Des Moines River
Map of Re-Route to River Effect on Drainage Coefficients in DD69
Map of Updated Recommended Improvements (Alternative 2A)
Map of Open Ditch and Tile Improvements (Alternative 4)

Drainage District No. 69
Re-Route to River Map
Alternative 3

Palo Alto County, Iowa

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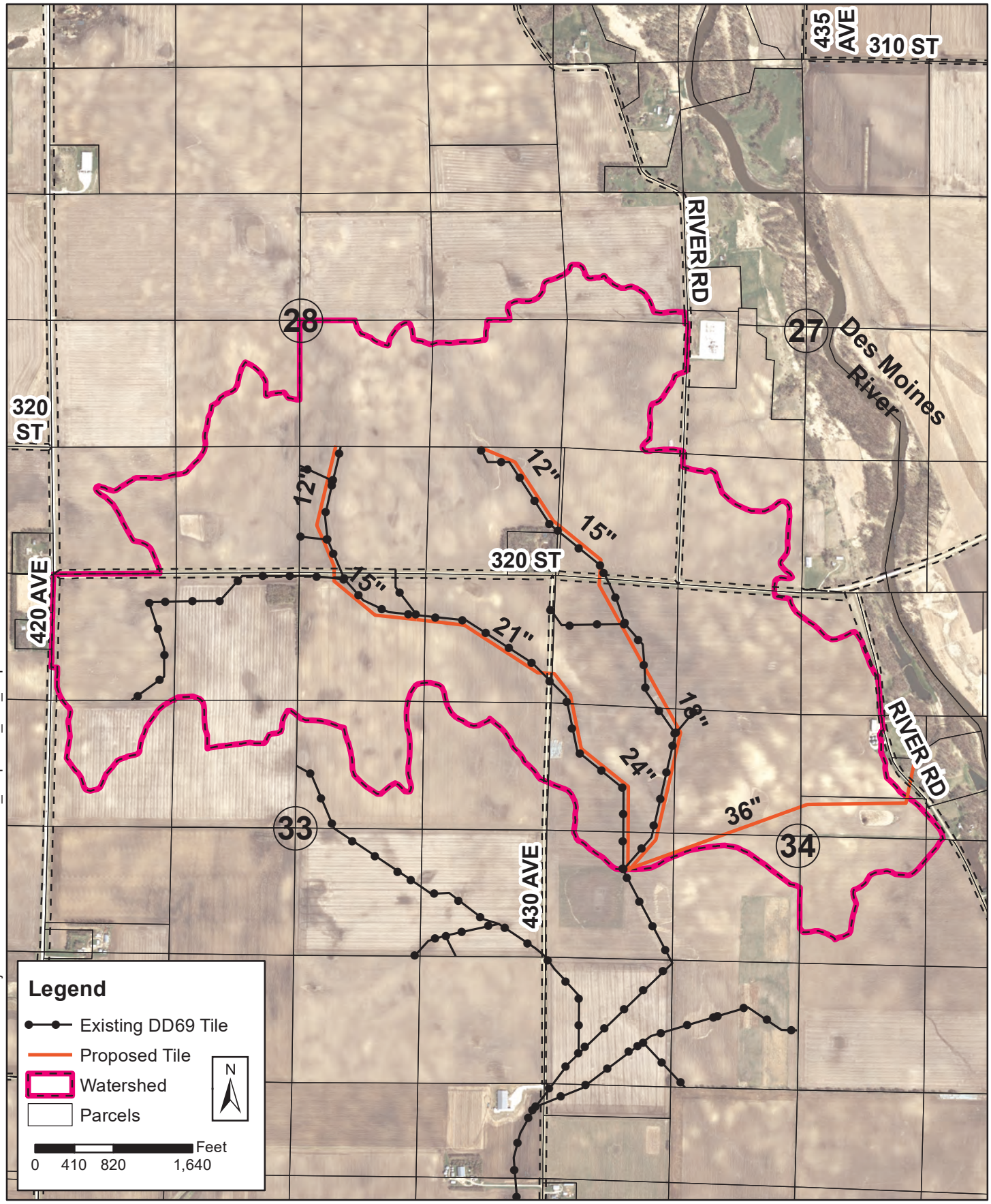

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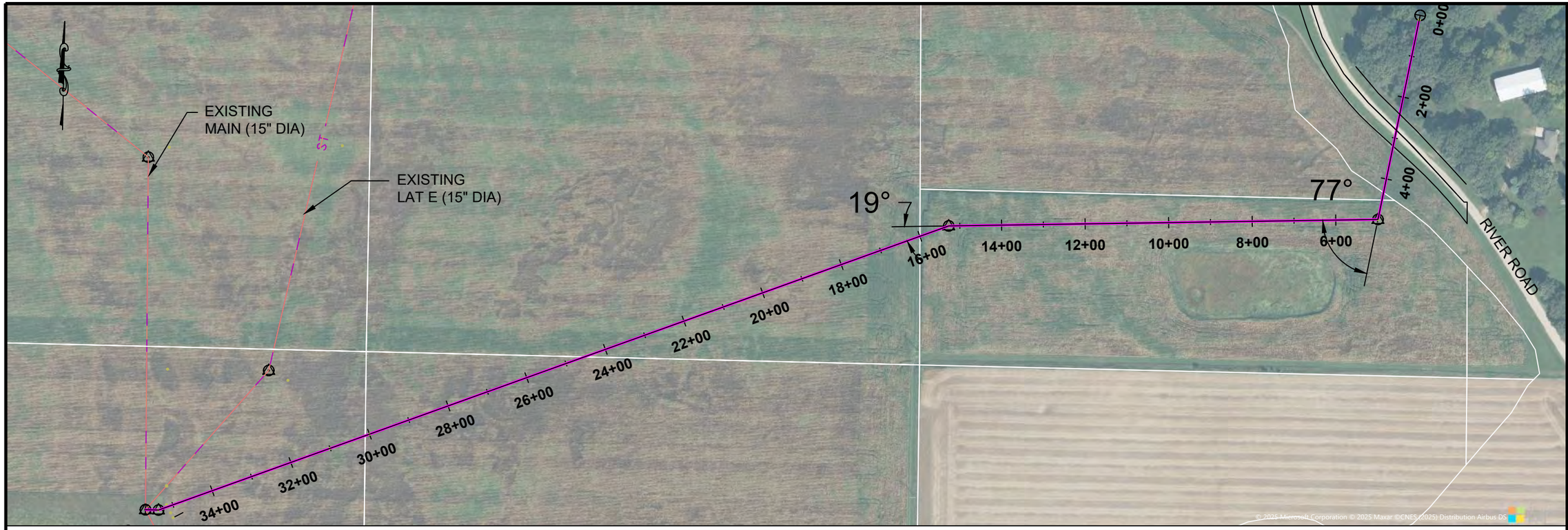
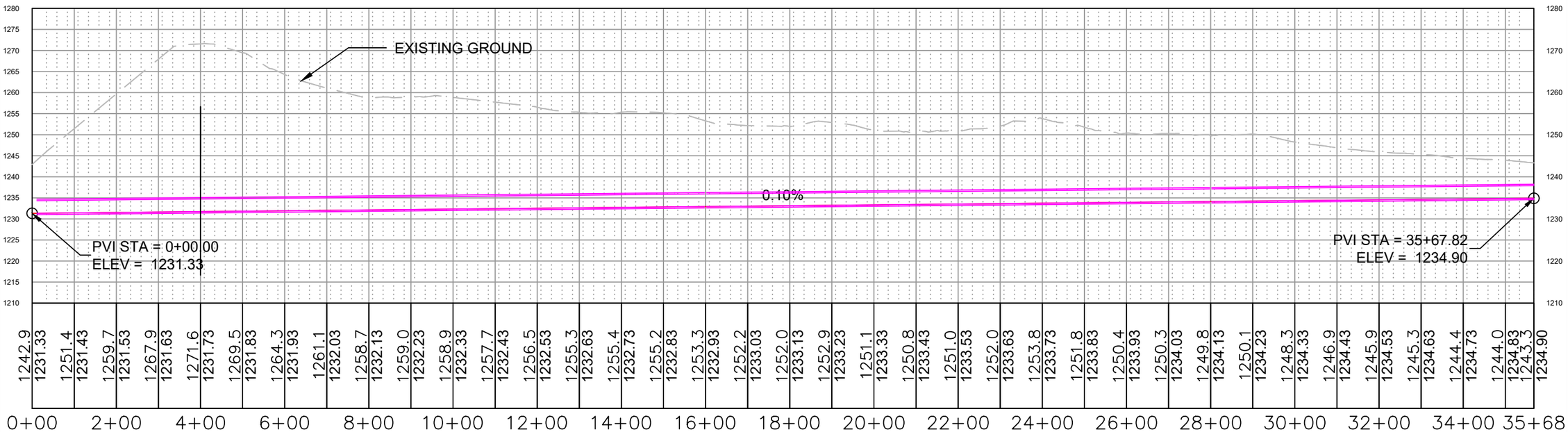


3,568 LF OF 36" DIA. RCP (1,550 LF OF CLASS V, 1,250 LF OF CLASS IV, 768 LF OF CLASS III)
DEPTH OF CUT = APPROX. 9 - 40 FEET
ONE ROAD CUT, GRAVEL, RIVER ROAD



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CONSULTING ENGINEERS LAND SURVEYING

REVISIONS	BY	DATE

DRAINAGE DISTRICT NO. 69
PALO ALTO COUNTY, IOWA

PLAN AND PROFILE
PROPOSED LAT E &
MAIN TILE RE-ROUTE

Date	4/25
Designer	MV
Draftsman	CK
Checker	CK

Project Number
E24108

Sheet
1 of 1

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Drainage District No. 69
Lat E Re-Route DC Map

Palo Alto County, Iowa

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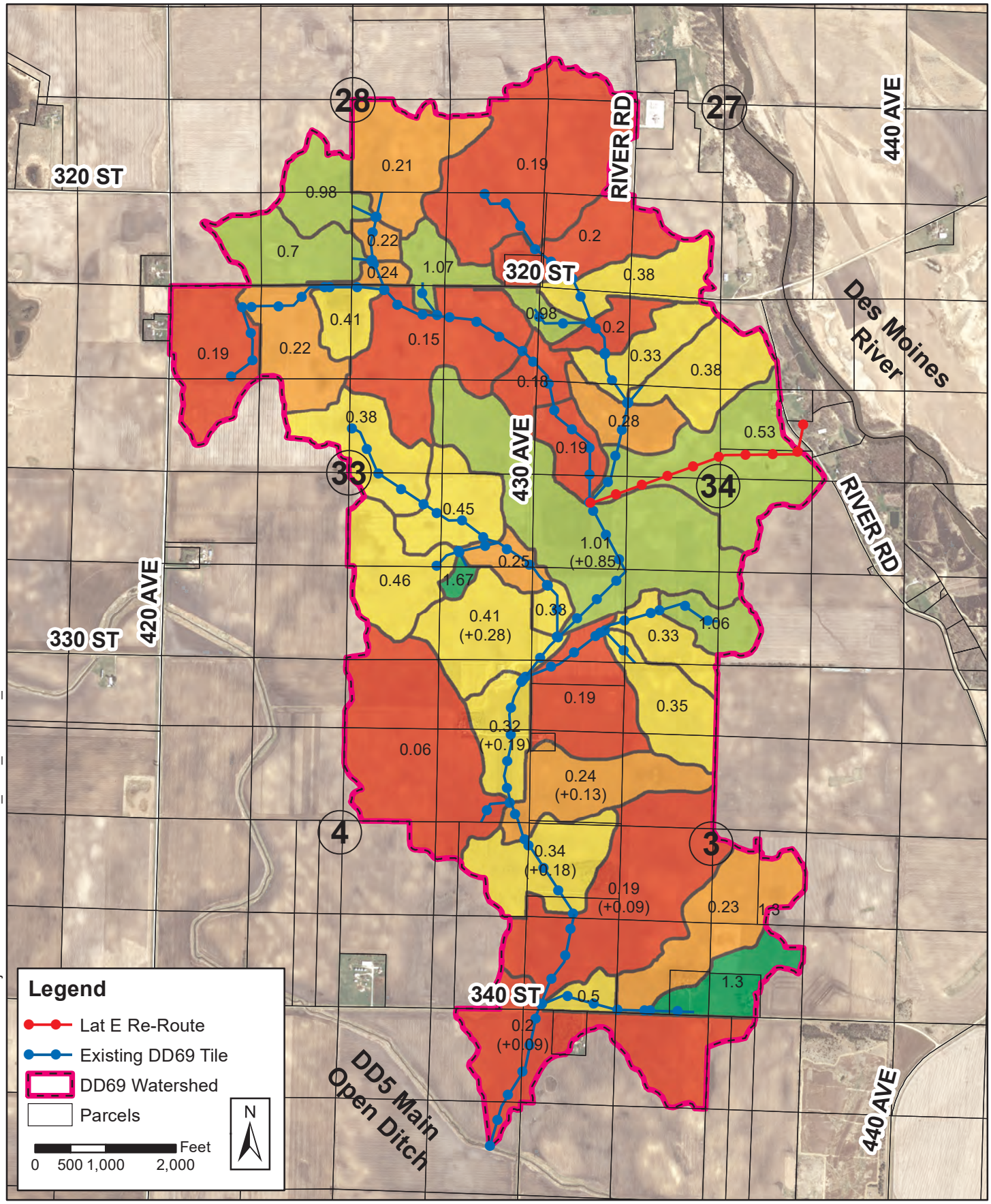

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Drainage District No. 69
Updated Proposed Improvements Map
Alternative 2A

Palo Alto County, Iowa

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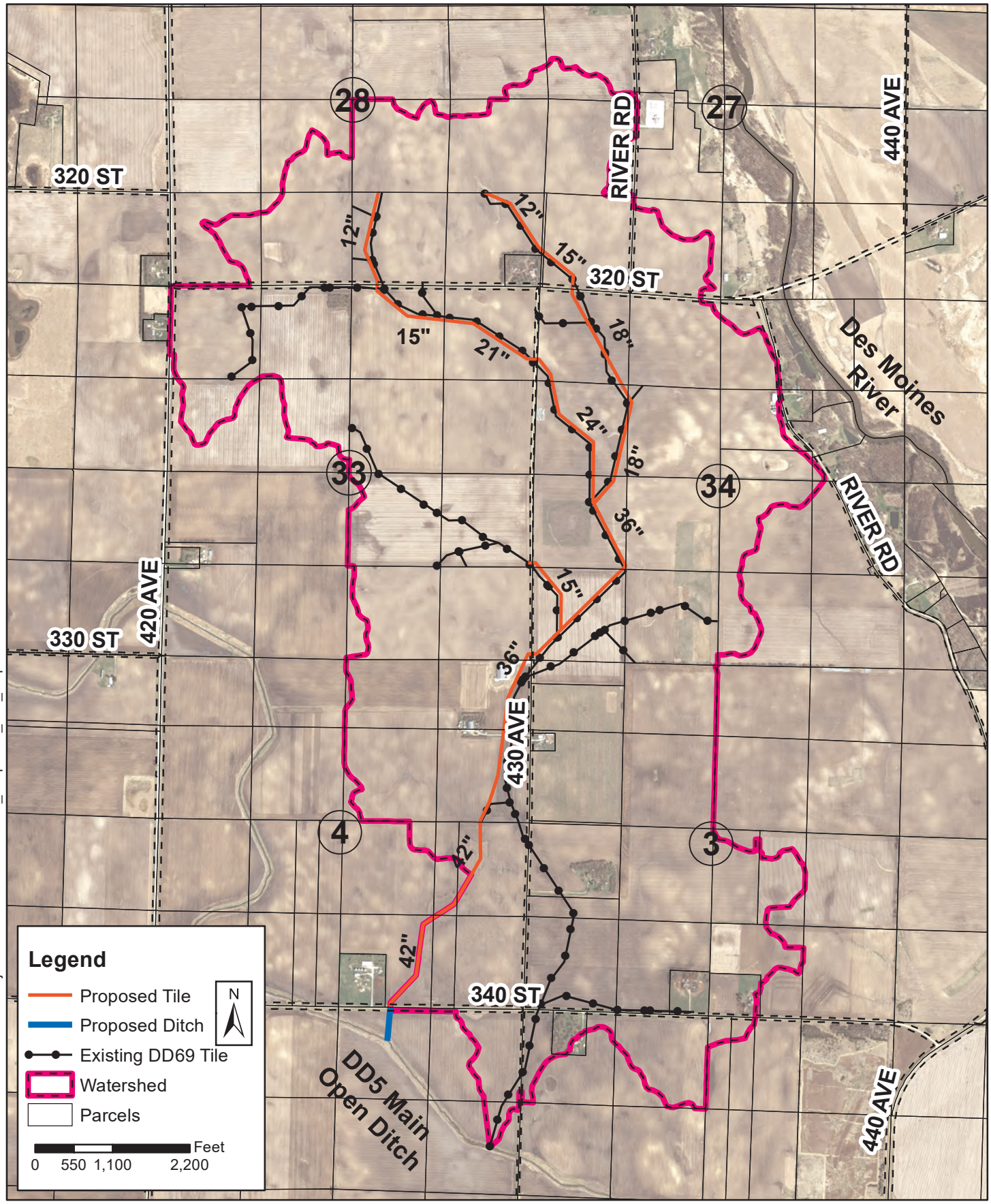

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Drainage District No. 69
Open Ditch & Tile Improvements Map
Alternative 4

Palo Alto County, Iowa

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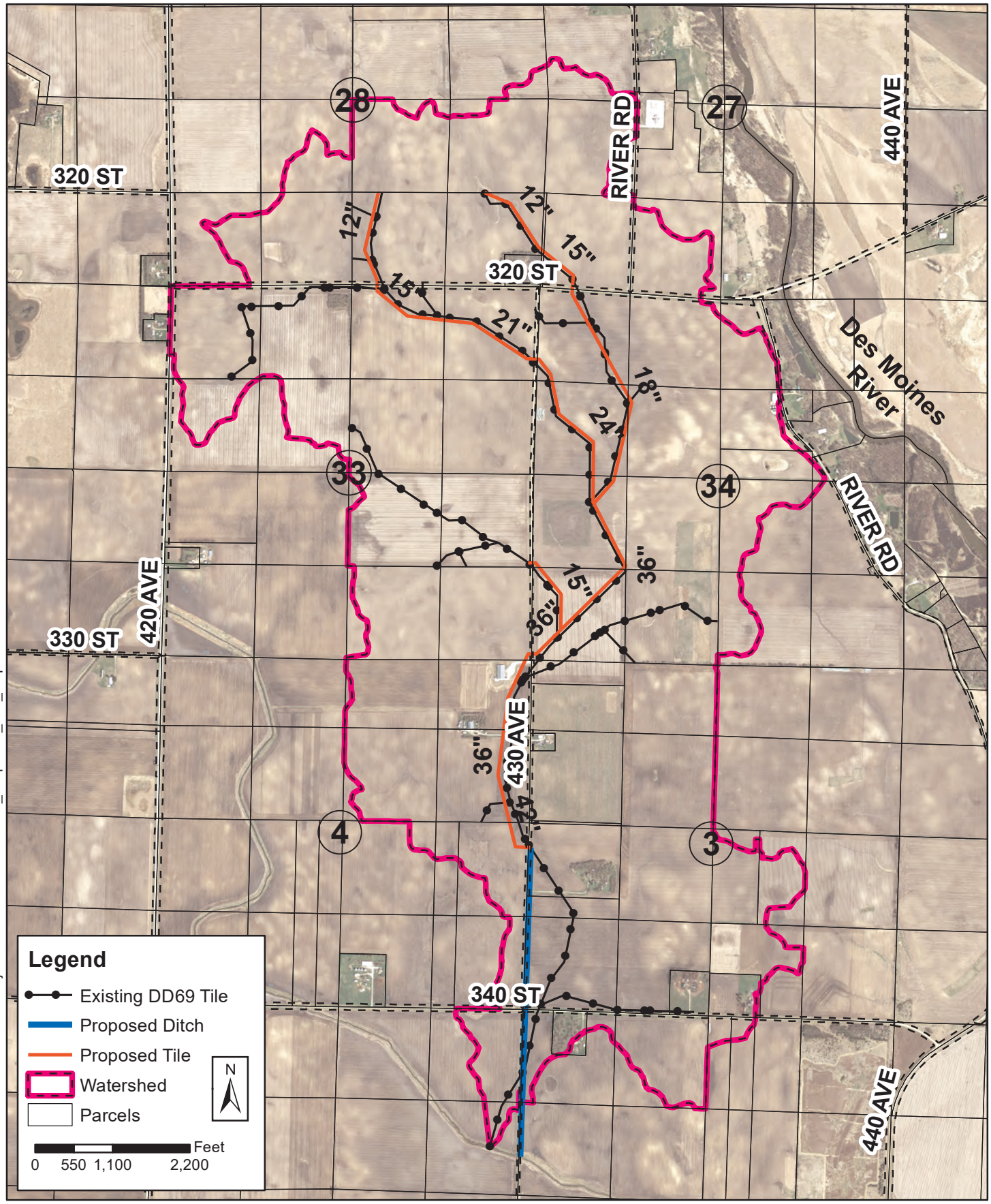

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