



Agenda Memorandum

Agenda Item - VIII.A

City Council Meeting
May 15, 2023

Subject: Eastern Area Drainage Basin Study - Update

Prepared By: Justin Weiland, City Administration

Background of Issue:

Attached is a draft study prepared by DGR Engineering for the Eastern Drainage Study conducted by DGR. The City of Dell Rapids received a FEMA Hazard Mitigation Grant Program (HMGP) Grant to conduct a drainage study of the eastern area of Dell Rapids. The intent of this study was to analyze the drainage basin and the existing storm drainage infrastructure located in the central and eastern area of Dell Rapids. The area to be studied was from the Big Sioux River and tracing north up the Rock Wall Drainage area to 6th Street and the areas north that flow into that drainage system. The City requested recommendations for future infrastructure improvement projects that can help to mitigate future flooding and to improve the existing failing infrastructure. The City within the Capital Improvement Plan meetings has discussed addressing the drainage issues in the future. The drainage area has been failing for years and progressively getting worse. This study will help the City assess

DGR Engineering has been engaged in this drainage study over the past nearly two years. They have findings from the study that they plan to present to the City Council at May 15th Council meeting. Below is correspondence from DGR's Trent Bruce that will be at the May 15th Meeting to present the study to the Council.

Justin –

As promised and recently discussed with you, here are some documents that outline the drainage analysis we did for Dell Rapids. The exhibits and figures will be incorporated into the FEMA floodplain analysis report we are preparing for the City and hope to have the DRAFT version to you tomorrow to include in your packet, or, send to the council.

As you are aware, 2D hydraulic and hydrologic analyses were used via XP Storm and AutoCAD Hydraflow-Hydrographs to analyze the existing drainage basins throughout Dell Rapids. The existing storm sewer system was modeled in from our records from previous construction projects and surveys. As such, we believe that information to be pretty accurate. The land surface used in our 2D analysis was a combination of record surfaces, topographic surveys, and LIDAR contours which should give us a pretty good background template. The impact of the surface runoff in a 100-year storm event from the contributing approximate 475 acres on the existing storm sewer infrastructure throughout the City was analyzed. The attached inundation maps indicate that the existing storm sewer infrastructure is generally able to convey the necessary flow to minimize excessive inundation during the storm. We also modeled the proposed storm sewer infrastructure to be installed this year as part of the 3rd Street Project and attached that inundation map as well. Since the existing infrastructure is generally sufficient to convey the 100-year storm, our proposed improvements focus on maintenance of the system and provide for additional capacity. Three different improvements are to be proposed in this

report:

- Improvement 1: Storm sewer improvements from the 3rd Street Project. This work is already under contract and will replace deteriorating pipes and structures in the 3rd Street area and provide for additional capacity.
- Improvement 2: Garfield Avenue storm sewer rehabilitation. The shallow storm sewer along the west side of Garfield Avenue between 11th Street and 6th Street is aging and would benefit from the installation of new storm sewer. This would be upgraded to provide for additional capacity to minimize small pockets of localized flooding (minimal).
- Improvement 3: Rock Channel improvements from 6th Street to south of 4th Street. This rock channel is failing in multiple locations and is of inconsistent width. Replacement of the deteriorating quartzite channel with a uniform concrete channel would increase the functional life of the storm sewer and provide for better conveyance of storm water.

The land use exhibit illustrates the information used to process the surface information when running the drainage simulation. Three different land uses were identified – Pavement, Buildings, and Residential. All areas that were not classified as “pavement” or “buildings” were designated as residential land use. The analysis software uses these designations to factor in variables such as permeability and surface roughness. Data from the USDA Web Soil Survey indicated a loam soil type throughout the City, and this was factored in to our calculations.

The inundation maps attached show the maximum water depths throughout the City. Water depths of less than 0.5’ were omitted from the figures to better illustrate the areas experiencing inundation as they won’t have any impact on flooding. Ultimately, we are focused on areas of more than 1’, and more specially, those areas where homes/structures would be at risk to flooding.

The report itself will further explain the analysis methodologies and explore each of the improvement options in more depth. As noted, we’ll intend to have the draft version to you tomorrow, will make present some info on Monday at the meeting.

Thanks!

Trent

Trent Bruce, PE

Recommendation

Recommend the Council listen to the presentation of Trent Bruce and be prepared to ask any questions or pose any future direction in regards to the Eastern Area Drainage Basin Study. No motion or action is needed for this agenda item.

ATTACHMENTS:

[Dell Rapids_HH Report.pdf](#)

[DR - Propose FEMA drainage map.pdf](#)