



# Manchester

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## Stormwater Mitigation & Subdivision

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**Problem Statement:** The City of Manchester, Iowa is planning on future development north and east of the Delaware County Fairgrounds. Road extensions and a subdivision were designed to support this. Sufficient drainage channels and a permanent pool must be designed to efficiently and safely manage stormwater for new development.



### Historical Flooding in Manchester



Flooding has been very problematic in Manchester, specifically in our project location. Ineffective stormwater management in residential areas contributes to the negative impact of large rainfall events. This image shows the historical hydrology of our project location with the proposed design overlaid.

### Future Development for Manchester



Future expansion is planned for the northeast corner of town. The city is looking to add more residential area, specifically single-family residences. All future development will target attractive community layout with a focus on floodwater mitigation.

### Roadway Extension

Grand Avenue will extend north to meet 195<sup>th</sup> Street. Fairview Dr. and Deann Dr. will extend east to meet the new Grand Ave. extension. Stormwater sewers, water mains, and sanitary sewers were designed for all roadway extensions. The design standards used were SUDAS, the Manchester City Ordinance, and regulations enforced by the Army Corps of Engineers.

The proposed design will help flood mitigation and meet the demands of future expansion in Manchester. Grand Ave. will provide smooth traffic flow and opportunities for additional residential expansion.



### Subdivision Design



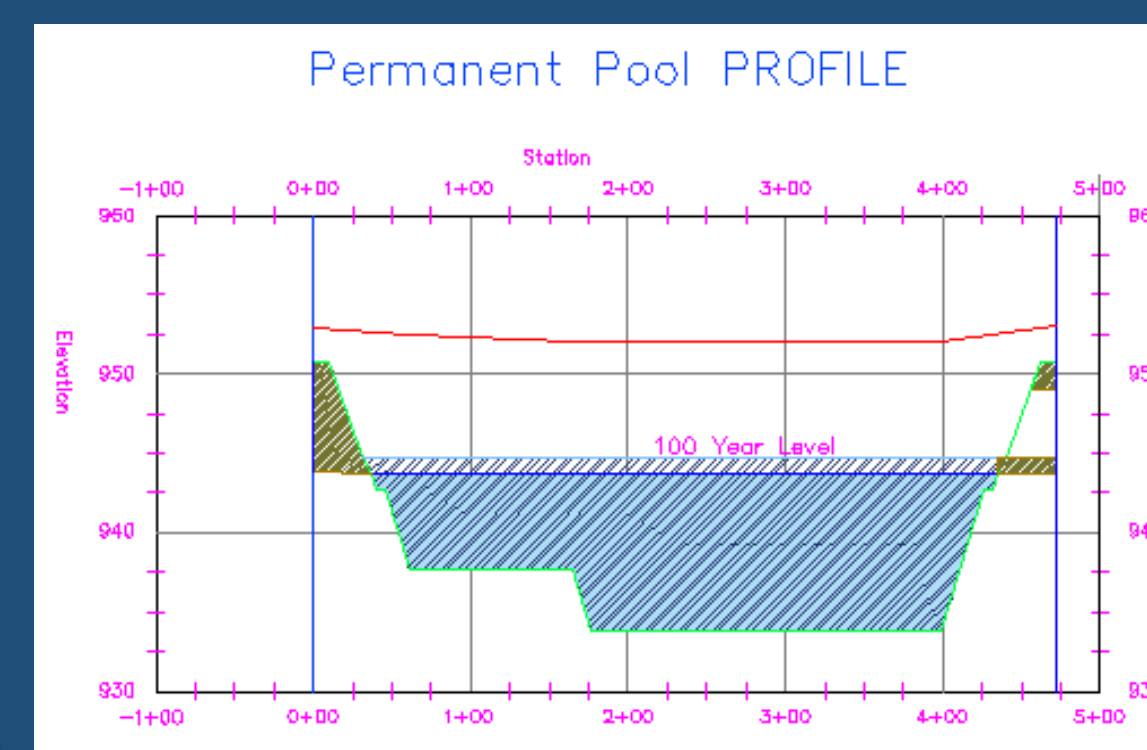
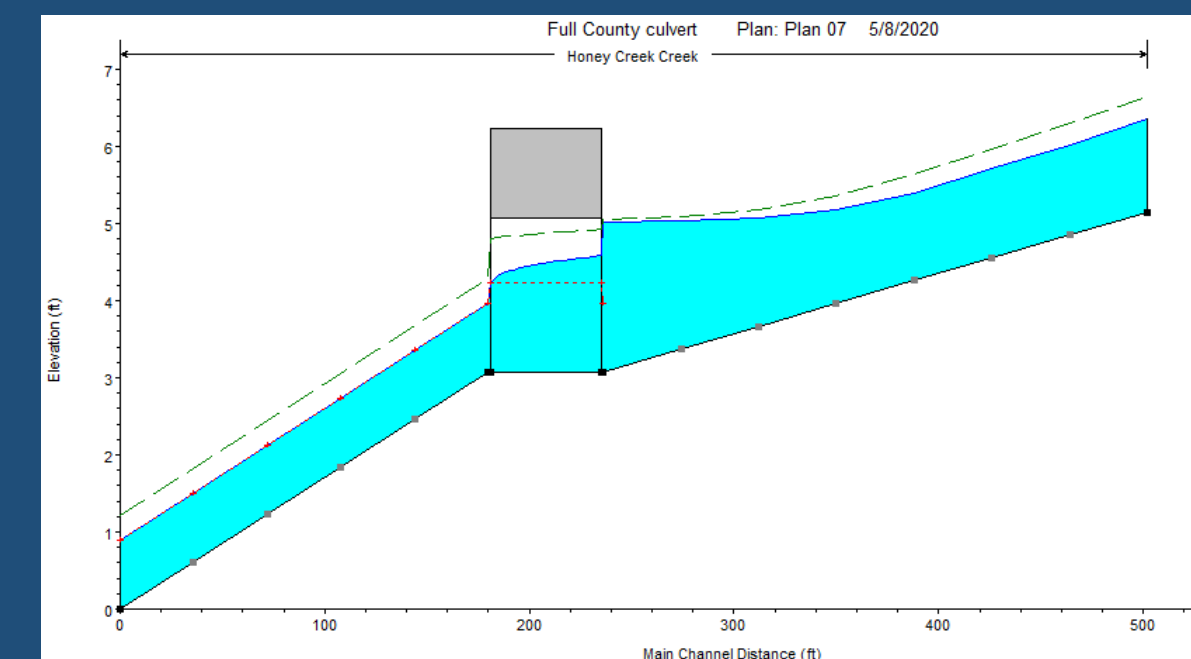
The subdivision will feature an east extending road with a cul-de-sac. Lots will line the north and south side, and around the cul-de-sac. The lots average 0.28 acres. The subdivision is designed for 15 single-family residences and will feature ranch-style architecture with 3-car garages. Lots will also line the Grand Ave. Extension. There are 19 lots along the Grand Avenue extension.

This subdivision will improve flood mitigation with drainage channels around the homes, two water detention basins, and stormwater intakes.

The Manchester Zoning Ordinance and SUDAS are used for subdivision design.

### Drainage Channels & Stormwater Management Basin

This channel system will divert water from the existing residential areas, collect water from the proposed subdivision, and store it in the detention basin. The main channel of the system will have the capacity to transport a 100-year storm event, which will have a flow rate of 322 cfs. The detention basin will have the capacity to hold 1.3 acre-feet of storm water.



Iowa Storm Water Management and SUDAS are used to develop the storm water drainage system and detention basin.

### Design Standards



### Cost Estimate

Budget Summary		Cost
Design Element	Public	
Roadway Extension		\$1,267,656
Stormwater Sewer		\$236,286
Water Main		\$295,057
Preliminary Sanitary Sewer		\$318,328
Channel and Culvert		\$132,695
Mobilization		\$45,000
5% Contingencies		\$112,501
10% Engineering and Administration		\$225,002
<b>Total:</b>		<b>\$2,632,525</b>
	Private	
Stormwater Management Basin		\$165,552
Subdivision's Infrastructure		\$676,718
Mobilization		\$16,845
5% Contingencies		\$42,114
10% Engineering & Administration		\$84,227
<b>Total:</b>		<b>\$985,456</b>
<b>Combined Total:</b>		<b>\$3,617,981</b>