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Project #3
Floodplain Delineation

Problem Statement

Iowa City needs to update its 50-year floodplain maps to reflect new urban development over the past 30 years. The city engineer for Iowa City has chosen the North Branch Ralston Creek to be the first area for floodplain map updates. You have been hired as the consultant for the project.

Project Objectives

Delineate the floodplain limits for the 50-year return period flows for a section of Ralston Creek.

Site Information

The Ralston Creek watershed is located on the east side of Iowa City. Its southern and lower branches are urbanized. The North Branch subbasin is largely agricultural, but has undergone new development as Iowa City has continued to expand. Hickory Hill Park is located at the downstream end of the North Branch subbasin, and a bridge on Rochester Avenue that crosses the creek constrains flood flows.

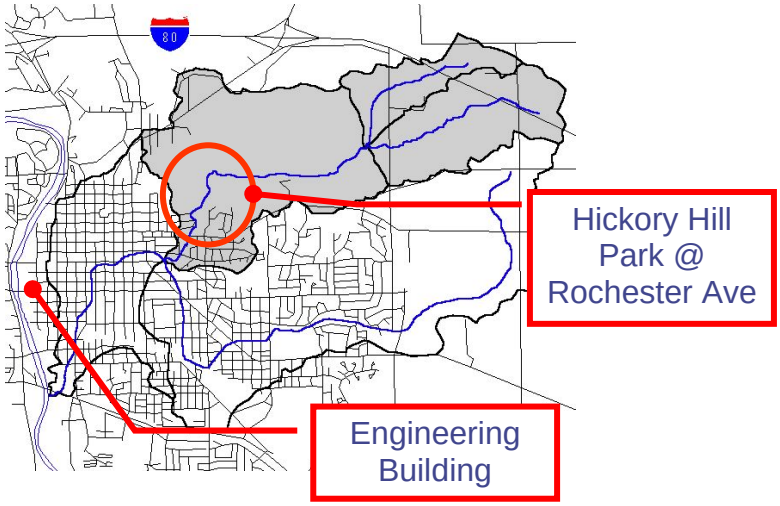

Figure 1: The Ralston Creek watershed. The North Branch subbasin is shaded.

Design Criteria

The 50-year return period peak discharge for existing watershed conditions (2005) should be estimated using the design storm approach. The city requires the use of the SCS (NRCS) methods, including the SCS (NRCS) 24-hour design storm, the SCS (NRCS) runoff method for computing rainfall excess, and the SCS (NRCS) dimensionless unit hydrograph (or SCS Transform) for computing the direct runoff hydrograph.

The 50-year return period floodplain is determined by the water levels for the 50-year return period peak discharge. The water-surface profile through the Hickory Hill Park study area (upstream of Rochester Avenue) should be estimated using the standard step method.

Watershed and Channel Information

For this project, you will use the Hydrologic Modeling System (HEC-HMS) Version 3.2 to estimate the 50-year return period peak discharge. A HEC-HMS model for the North Branch Ralston Creek will be provided. However, you will need to supply the model with the correct model parameters and inputs for the design flood simulation. This information will be developed as of part of class homework assignments, or provided (see *Supplementary Information*).

You will use the River Analysis System (HEC-RAS) Version 4.0 to do the backwater (water-surface profile) calculations. A HEC-RAS model for the stream section in Hickory Hill Park will be provided. However, you will need to supply the model with the estimated design flow and cross-section information at a single section. You will be provided with the cross-section geometric data (see *Supplementary Information*).

A floodplain map will be constructed using AutoCAD. The topography for the Hickory Hill Park study area and the location of the channel cross-sections used by HEC-RAS in the water-surface profile calculations will be provided in AutoCAD format.

Project Submission

Your project team must submit one-page cover letter to the city engineer for Iowa City, which briefly describes the analysis refer to the following attachments:

1. A printout of the *Summary Table* from HEC-HMS for Ralston Creek @ Rochester Avenue for SCS 50-year 24-hour design storm. The estimated 50-year peak discharge must be highlighted.

2. A printout of the *Profile Output Table* and the *Profile Plot* from the HEC-RAS calculation for Hickory Hill Park site for the 50-year peak discharge.
3. The 50-year floodplain map for the Ralston Creek site. The map should also contain tables summarizing key design parameters for estimating the 50-year floodplain limits.

Due Date

Final project is due on **Friday 8 May 2009 (at the beginning of the class)**.

Supplementary Information

1. About HEC-HMS & HEC-RAS
2. How to make HEC-HMS work
3. How to make HEC-RAS work
4. HEC-HMS Parameters for North Branch Ralston Creek
5. HEC-RAS Geometric Data for North Branch Ralston Creek
6. SCS Design Storm for Iowa City