

HERBERT HOOVER FLOOD INUNDATION MAPPING AND FLOOD FREQUENCY REPORT

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The purpose of this task was to recompute hydrologic and hydraulic analyses of flood inundation and flood frequency, and create geographic information systems (GIS) data layers for an unnamed tributary to the West Branch Wapsinonoc Creek, hereafter referred to as Hoover Creek, that flows within the Herbert Hoover National Historic Site (NHS) located in the community of West Branch in Cedar County, Iowa. This task will be used to develop the Proper Functioning Condition (PFC) and fluvial geomorphology, which were identified within the Inventory and Monitoring Program (I&M) of the National Park Service as priority concerns at NHS.

The following task elements were completed:

- 1) Calculation of flood frequency discharge rates for 5-, 10-, 25-, 50-, and 100-year recurrence intervals using current Iowa flood-frequency equations
- 2) Creation of flood inundation GIS coverages for 5-, 10-, 25-, 50-, and 100-year recurrence interval discharges
- 3) Creation of Federal Geographic Data Committee (FGDC) metadata for the flood inundation GIS coverages
- 4) Calculation of recurrence intervals, and velocities at selected floor-level elevations within the Herbert Hoover Historic Site

The hydrologic analysis that was completed first was the recomputation of flood-frequency discharges for Hoover Creek using urban estimation equations (Sauer and others, 2002), (Table 1). The Hydrologic Engineering Centers (HEC-2) model constructed by Robert Einhellig, U.S. Geological Survey in 1994 was recomputed using flood-frequency discharges derived from the urban estimation equations, and one-foot contour interval data provided by the National Park Service. These data sets were used to devise a revised HEC-RAS model. Discharges and stages from the revised model were used to create GIS data layers mapping flood-inundation areas within the NHS for the 5-, 10-, 25-, 50-, and 100-year recurrence-interval floods. Recurrence intervals also were calculated for floor-level elevations and floodwater

velocities for selected locations within the NHS using the HEC model and are shown in Table 2.

Included with this report is a compact disc with the GIS data layers, and metadata for each of the data layers. The data layer files are in Arc/Info export format (e.00). The metadata files are in FGDC html format for easy viewing.

Flood-Frequency Estimations		
Recurrence Interval	Mean Flood Elevation	Discharge in Cubic Feet Per Second (ft ³ /s)
5 year	712.32	710 ft ³ /s
10 year	712.83	1080 ft ³ /s
25 year	713.39	1600 ft ³ /s
50 year	714.09	2030 ft ³ /s
100 year	714.38	2490 ft ³ /s
250 year	714.67	3000 ft ³ /s
500 year	715.13	3750 ft ³ /s

Table 1. New flood-frequency discharges using urban estimation equations

Recurrence Intervals for Floor-level Elevations and Floodwater Velocities for selected locations within Herbert Hoover National Park				
Location	Floor-Elevations	Discharge	Recurrence Interval	Velocity
Visitors Center	711.62	1080 ft ³ /s	10 Year	1.87 ft/s
Quaker Meeting House	714.72	>3750 ft ³ /s	>500 Year	1.89 ft/s
Black Smith Shop	714.79	1650 ft ³ /s	30 Year	1.94 ft/s
Library-Museum	715.53	>3750 ft ³ /s	>500 Year	1.80 ft/s
Birthplace Cottage	715.85	>3750 ft ³ /s	>500 Year	1.80 ft/s
School House	718.47	>3750 ft ³ /s	>500 Year	1.50 ft/s
Barn	713.01	1450 ft ³ /s	23 Year	1.70 ft/s
ISIS Statue	712	1000 ft ³ /s	9 Year	3.57 ft/s
Comfort Station	716.73	>3750 ft ³ /s	>500 Year	4.15 ft/s
Maintenance Buildings	710.19	1000 ft ³ /s	9 Year	1.75 ft/s

Table 2. Floor-level recurrence intervals at selected locations

