

APPENDIX D-4

PEORIA LAKE ISLAND FLOOD HEIGHT IMPACTS ANALYSIS

D-4

Peoria Lake Island Flood Height Impacts Analysis

PURPOSE

The purpose of this analysis is to determine the effects on water surface elevation by locating an island or islands in Peoria Lake. There are four options for locating islands in the Peoria pool. These options are presented in the main report, and it was decided to combine Options 2 and 3 for this analysis. This scenario will cause the greatest difference in water surface elevation between the existing conditions model and a model with any of the alternative project configurations. Analysis of this combined configuration, considered to be the fully developed worst-case condition, is the basis used to evaluate the permitting and the need for mitigation. Additionally, an evaluation of a fully encroached condition (an unrealistic assumption) is presented for comparison (Figure D-4-1).

DESCRIPTION

This study utilizes the UNET model, which was developed for the Illinois River to generate the current published profiles (reference 1). The analysis that was performed was to determine the effects of locating islands in Peoria Lake near the Highway 24 Bridge. This required altering the cross-section data of the existing Illinois UNET model to simulate the existence of islands in Peoria Lake.

This analysis compares the existing conditions UNET water surface profiles to the profiles calculated for the selected plan (called Option 2 & 3). In the selected plan, one mid-sized island (Option 2) upstream of the U.S. Highways 24/150 bridge and two islands (Option 3) below the bridge would be constructed. The mid-sized island above the bridge is located at approximately a 45 degree angle to the flow of water in the river. The mid-sized island has a top elevation of 450 feet and side slopes of 6 horizontal to 1 vertical. This mid-sized island has a top width of 350 feet and is approximately 2,200 feet along the centerline of the island. The two islands below the bridge consist of two parallel islands located downstream of Highway 24 at cross section 165.3, with top elevations at 450 feet and side slopes of 6 horizontal to 1 vertical. These islands have top widths of 450 feet and 150 feet with a length of approximately 4,000 feet and are situated roughly parallel to the flow of the Illinois River. The attached map, Figure D-4-2, shows the positioning of these islands and the location of cross sections used in the analysis.

ANALYSIS

The model of the Illinois River was run using the UNET program to obtain the peak water surface profile for the Illinois River for various frequency events. The peak elevations for selected cross

sections were then compared to the Illinois River profiles (reference 1) to verify the UNET model. Upon verification of this model, it was classified as the “Base Conditions” model.

The Base Conditions model was then altered by changing appropriate cross sections to create the new model termed Option 2 and 3. The island at cross section 165.94 is at an angle to the flow, so even though the island is 350 feet wide, the actual obstruction to flow is more. Through standard engineering practices of determining the obstruction to flow, it was determined that the island would have an effective top width of 830 feet. The islands located at cross section 165.3 are parallel to the flow, so the actual top width of the islands was used as the area obstructing the flow. Figures D-4-3 and D-4-4 show cross sections used in the Base Conditions model and can be compared to Figures D-4-5 and D-4-6, respectively, which depict the same sections for the with-project conditions.

RESULTS

The attached Table D-4-1 shows the peak water surface elevations on the Illinois River for the 50%, 20%, and 1% exceedance flood events for existing conditions and the scenario combining Options 2 and 3. The spreadsheet also shows the difference in water surface elevation for these conditions. The data on the spreadsheet show that the addition of the islands has minimal effect on the water surface elevation of the Illinois River. The fact that there is not a significant effect on the water surface elevation due to the addition of the islands can largely be attributed to the fact that the velocities in Peoria Lake are very small.

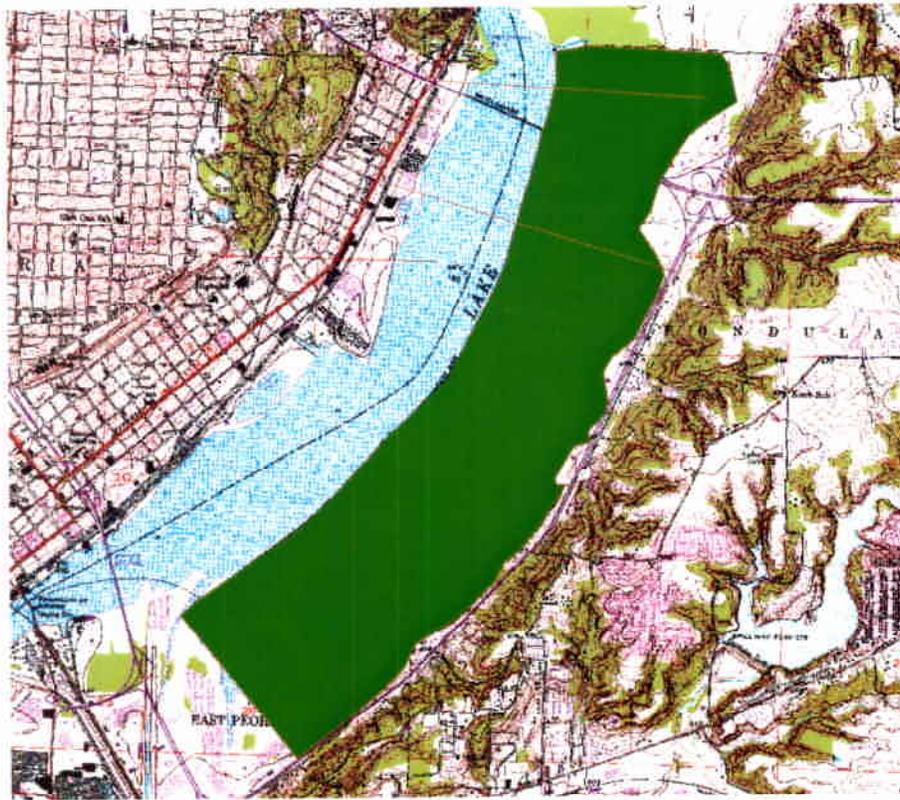
As previously discussed, an unrealistic assumption of confined encroachment up to elevation 460 as shown on Figure D-4-1 was also analyzed. The results of that analysis are also presented in Table D-4-1.

Based on these results, it is concluded that construction of the proposed islands in Peoria Lake will not significantly impact flood levels.

REFERENCES

1. Illinois River Water Surface Profiles, US Army Corps of Engineers, Rock Island District, 1992.

Peoria Lake



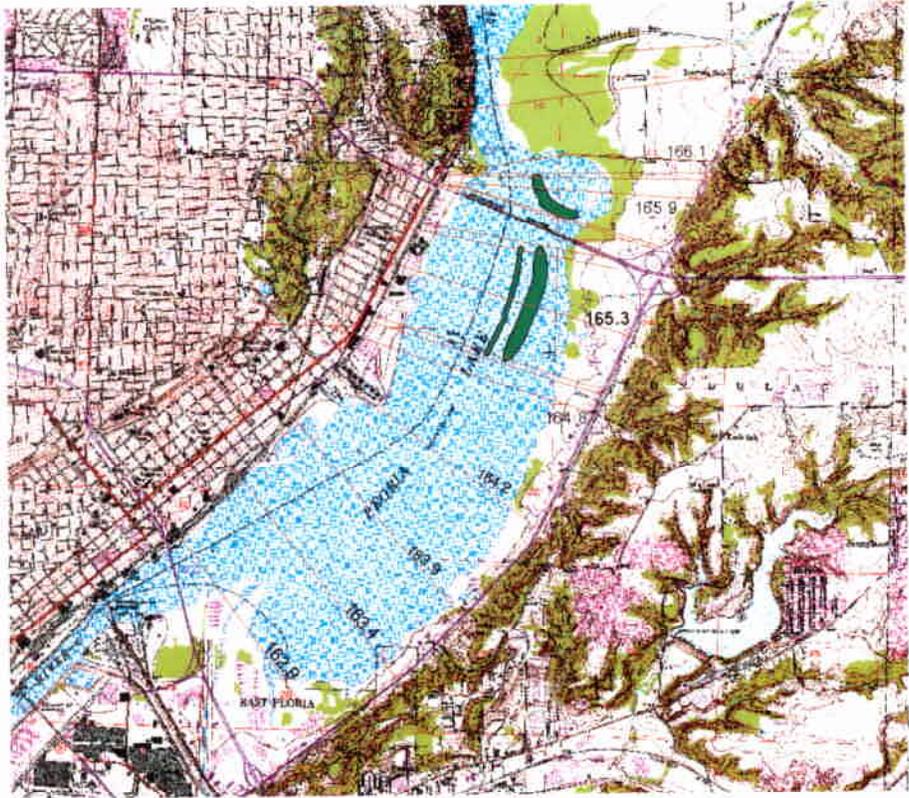
2000 0 2000 4000 6000 8000 10000 12000 Feet

 **Block**
Block



FIGURE D-4-1

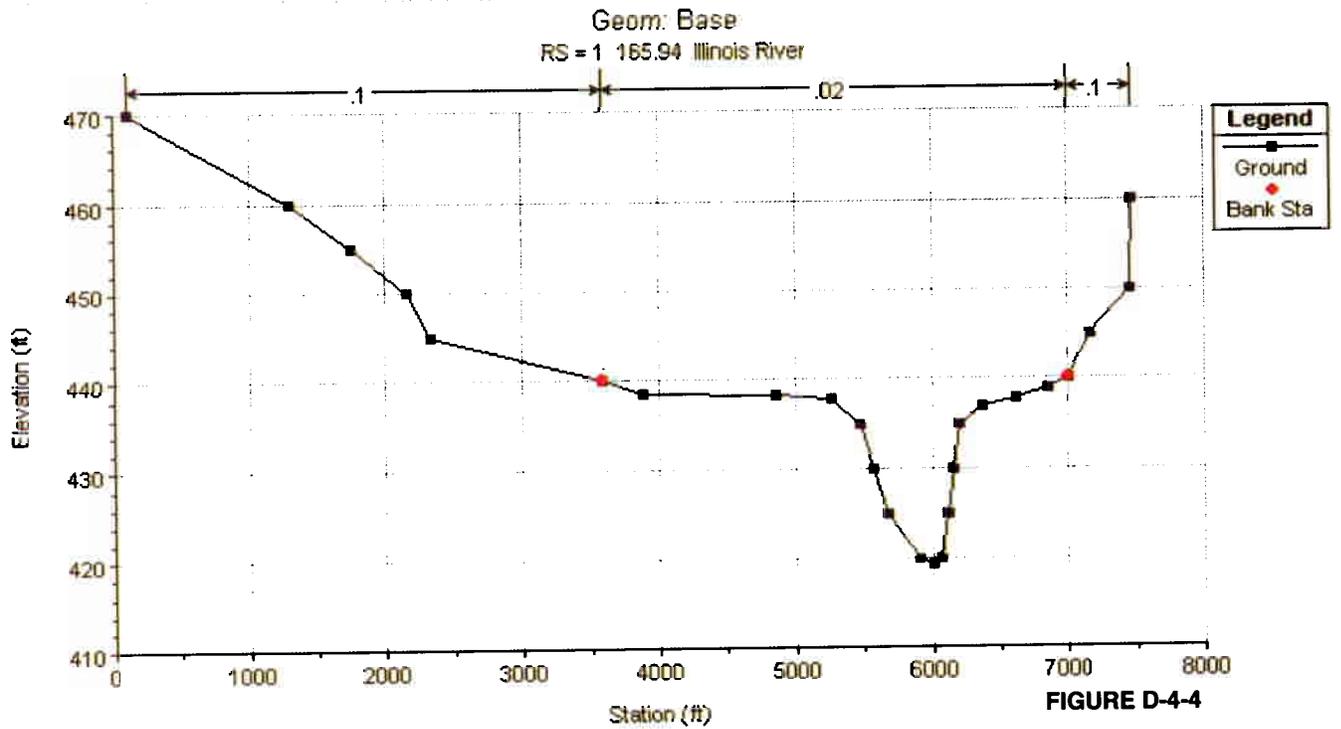
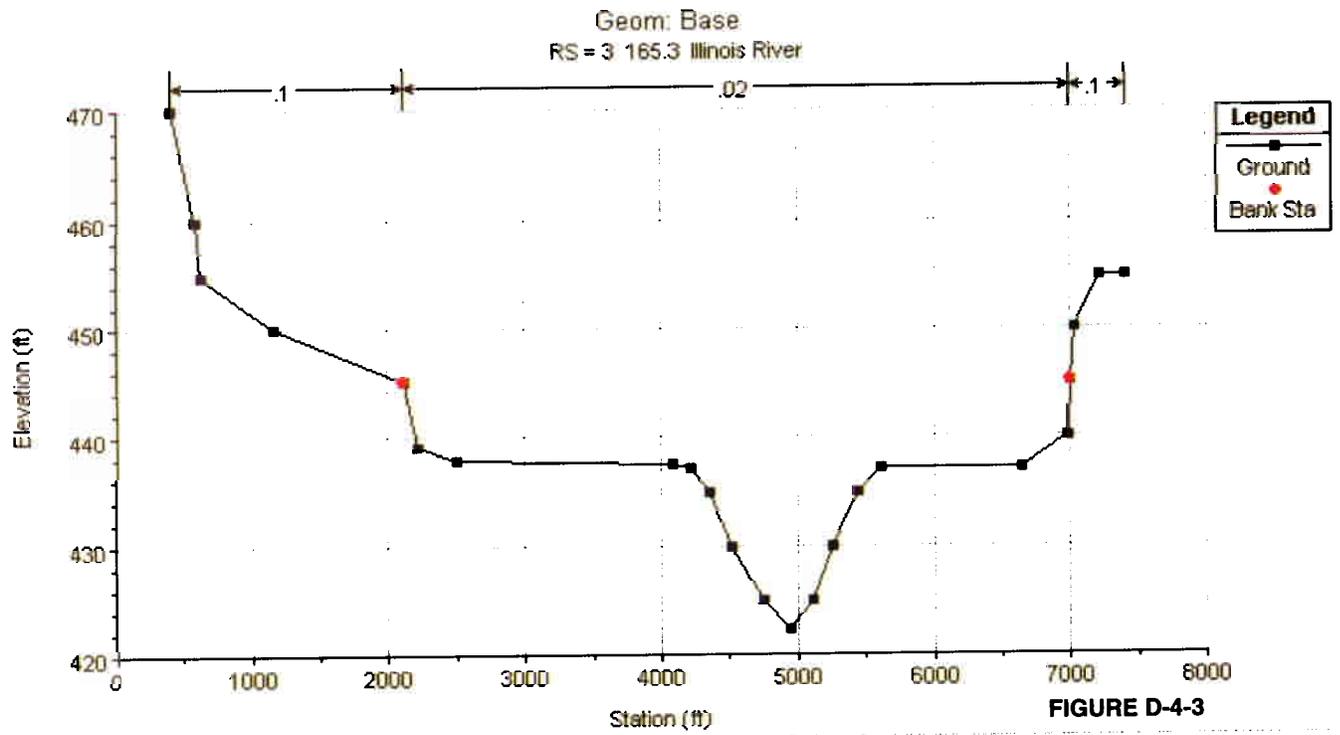
Peoria Lake



Xsec
Pislands



FIGURE D-4-2



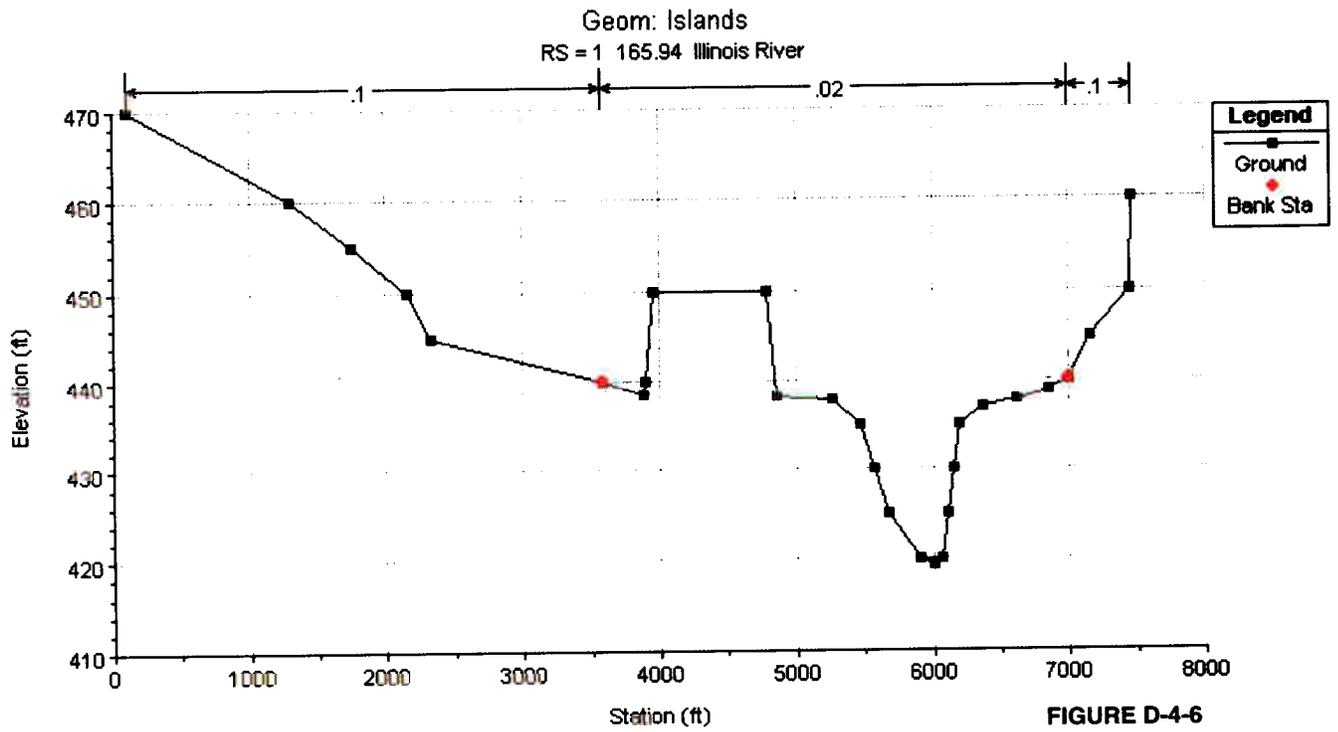
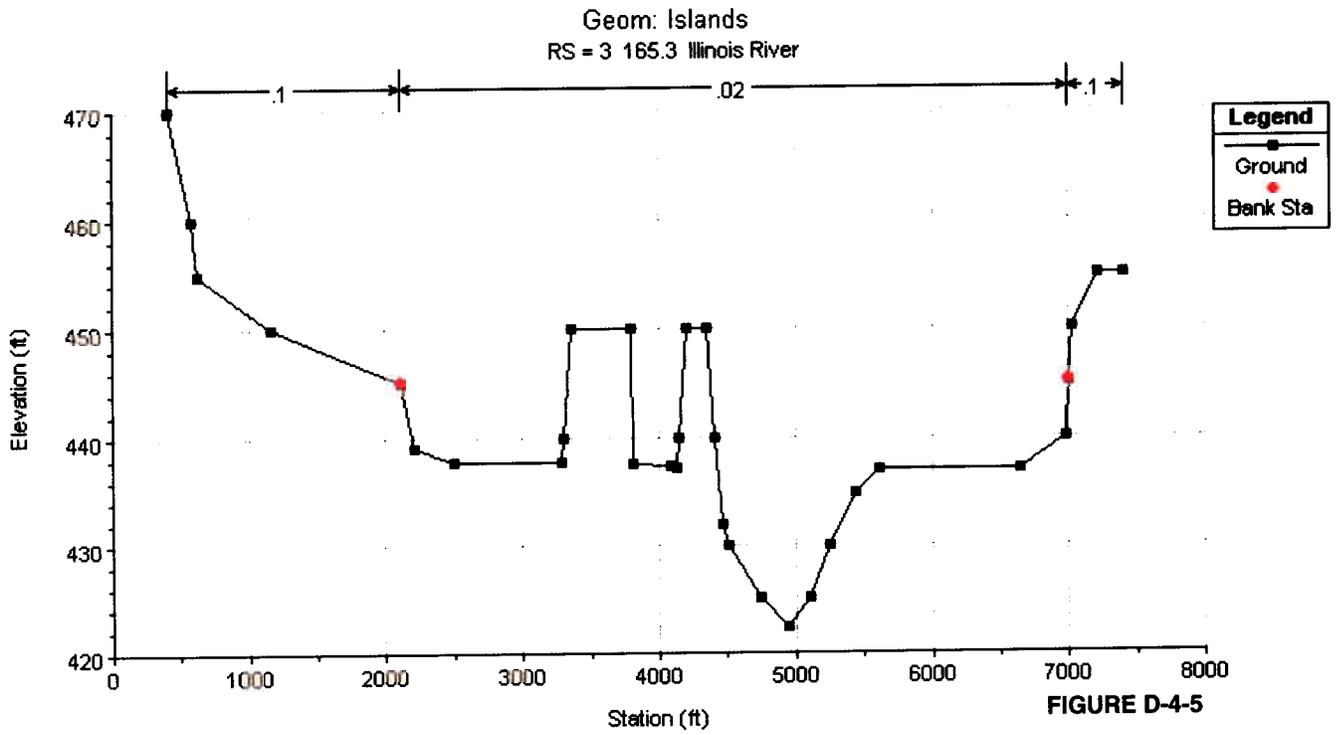


TABLE D-4-1

x-sec	Base Condition			test	Options 2 & 3			test
	2-yr flood	5-yr flood	100-yr flood		2-yr flood	5-yr flood	100-yr flood	
196.1	448.99	452.72	459.68	450.84	449	452.73	459.68	450.85
166.75	448.2	451.91	458.89	450.04	448.2	451.92	458.9	450.05
166.45	448.19	451.89	458.87	450.03	448.19	451.9	458.87	450.04
166.1	448.18	451.87	458.84	450.02	448.18	451.88	458.84	450.02
165.9	448.2	451.89	458.86	450.04	448.2	451.9	458.86	450.04
165.8	448.2	451.89	458.85	450.04	448.21	451.9	458.86	450.04
165.3	448.2	451.89	458.85	450.04	448.2	451.89	458.85	450.04
164.8	448.19	451.89	458.85	450.03	448.2	451.89	458.85	450.04
164.2	448.19	451.88	458.85	450.03	448.2	451.89	458.85	450.03
163.86	448.19	451.88	458.85	450.03	448.2	451.89	458.85	450.03
163.4	448.19	451.88	458.84	450.03	448.19	451.88	458.84	450.03
162.9	448.15	451.85	458.82	450	448.16	451.85	458.82	450
157.8	447.22	450.97	457.96	449.11	447.22	450.97	457.96	449.11