CUY-90-14.90

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APPENDIX DR-09

Flood Hazard Analysis Report
(Reference Document)

State of Ohio
Department of Transportation
Jolene M. Molitoris, Director

Innerbelt Bridge
Construction Contract Group 1 (CCG1)

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FLOOD HAZARD ANALYSIS REPORT
CENTRAL VIADUCT BRIDGE
(CUY-90-14.52)

Central Viaduct Bridge

Project Scope of Work

The purpose of this project is to construct a new structure to carry westbound I-90 traffic across the Cuyahoga River Valley. Along with the construction of the new viaduct structure, approximately one mile of approach roadway is included in this project, including interchanges with Abbey Rd./W. 14th Street, Ontario, E.9th Street, E. 18th Street, and I-90WB/I-77 SB. Additionally, local roadway improvements on E.22nd Street, Cedar Avenue, E.18th Street extension, and Commercial Road are included.

This report addresses the construction of the new Central Viaduct Bridge and its minimal impacts on the Cuyahoga River. A detailed hydraulic analysis was not been performed as part of this report, though significant analysis and documentation has already been performed for the Cuyahoga River in the vicinity of the project site. A detailed list of references is included at the end of this report.

Historical Data/Background

The existing Central Viaduct Bridge connects Interstate 90 to downtown Cleveland. The Cleveland Innerbelt Study identified the need for the proposed westbound structure. Eastbound traffic will be maintained on the existing Central Viaduct. The new structure will be approximately 250 feet northwest of the existing.

Aerial of Existing Structure over Cuyahoga River

The Cuyahoga River is 100 miles long from its source near Chardon to its mouth at Cleveland Harbor. The drainage area of the Cuyahoga River encompasses 798 square miles, including Geauga, Portage, Summit, Medina and Cuyahoga Counties. The subject structure is approximately 2.5 miles from the river mouth. The river is navigable and has frequent shipping traffic. Sheet pile dock walls contain the river to an approximate 200-foot width in the vicinity of the project. The top of dock wall elevations in the vicinity of the project are approximately 583.7 to 578.7.

Based on 1997 CUY-90-15.24 Slope Stabilization Plans, normal water elevation is 575.0, the low water elevation 570.5, and the river dredging limit 545.5. According to Flood Insurance Rate Map 390104 0010 B, the proposed Central Viaduct Bridge crosses over Zone A2 in the City of Cleveland, which was identified June 1, 1978. This zone has a 100-year floodwater elevation of approximately 576.0 using the NAVD 88 coordinate system. This elevation is identical to the elevation of Lake Erie during the 100-Year flood. The width designated in the Flood Insurance Rate Map, in addition to the elevations referenced herein, indicates that the Cuyahoga would likely not run over the top of dock walls during a 100-year flood event. There are no regions designated as 500-year flood below or immediately adjacent to the existing or proposed Central Viaduct Bridge structures.

River flows have not been recorded near the subject structure. The nearest location of documented flows is USGS 040208504 in Newburg Heights, where the annual stream flow has averaged 1,455 cfs from 1992 to 2004.

No records of major floods of the Cuyahoga were found in the project vicinity. The principal flood damage recorded on the Cuyahoga has been in the lower reaches of the main stream below the mouth of Tinkers Creek and above the upstream limits of Cleveland Harbor.

Proposed Work

The scope of work for this project is to construct a new structure on a new northerly alignment. Several bridge types are currently under study. No option being considered involves piers or other structures located in the river. The proposed span over the river will meet or exceed the existing Central Viaduct with regard to vertical clearance.

Scour Analysis

Bedrock in the project vicinity near the Cuyahoga is located at an approximate elevation of 445.0. The existing bridge is founded on deep friction pile foundations. The soils consist primarily of silt and clay. The presence of sheet pile dock walls along the river in the project vicinity would preclude any scour issues. The existing piling will be evaluated and repaired if necessary. The USACE is also currently developing an emergency management plan regarding dock walls in the area.

Conclusions

Based on the project scope to construct new structure foundations outside of the 100-Year Flood Boundary and no existence of 500-Year Flood Boundaries, the bridge construction will not significantly impact existing flows. Our review of existing studies, reports, and technical documents yielded no evidence that the existing Central Viaduct piers act as a catalyst for a flood event. The proposed piers will have no effect on the flows of the Cuyahoga River. No effect will be made to 100-year flood boundaries.

Scour will not be an issue because foundations will not be located inside the limits of Cuyahoga River or its 100-Year Flood Boundary and are protected by sheet pile dock walls. Please refer to the attached references and technical information.

References:

U.S. Army Engineer District, Buffalo Documents:

Cuyahoga River, Ohio Restoration Study, September 1971, First Interim Report.

Cuyahoga River, Ohio Restoration Study, November 1979, Third Interim Preliminary Feasibility Study on Erosion and Sedimentation.

Second Interim Feasibility Report on Cuyahoga River Flood Control Study, March 1976.

Environmental Assessment, CUY-West Third Street Vertical Lift Bridge, January 1988.

Independent Studies:

Report on Flood Control Studies, Cuyahoga, Chagrin, and Rocky Rivers Ohio. Board of County Commissioners, Cuyahoga, County Ohio. Prepared by Stanley Engineering Company, 1960.

Other Resources:

FEMA Flood Insurance Rate Map 390104 0010 B, City of Cleveland Ohio, Cuyhoga County. August 1, 1978.

Ohio Department of Transportation, CUY-90-15.24, PID 12374, Stabilize Pier 1 and Relocate Truss Span 1, 1997.

USGS Water Resources Data, Big Creek, Hydrologic Unit 04208504

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