



# Canutillo Phase II Floodwall/Levee Design

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# Background

- **The USIBWC constructed the Rio Grande Canalization Project (RGCP) in the 1930's and 1940's as a water delivery and flood control project, covering 106 river miles from Percha Dam, NM to American Dam in El Paso, TX.**





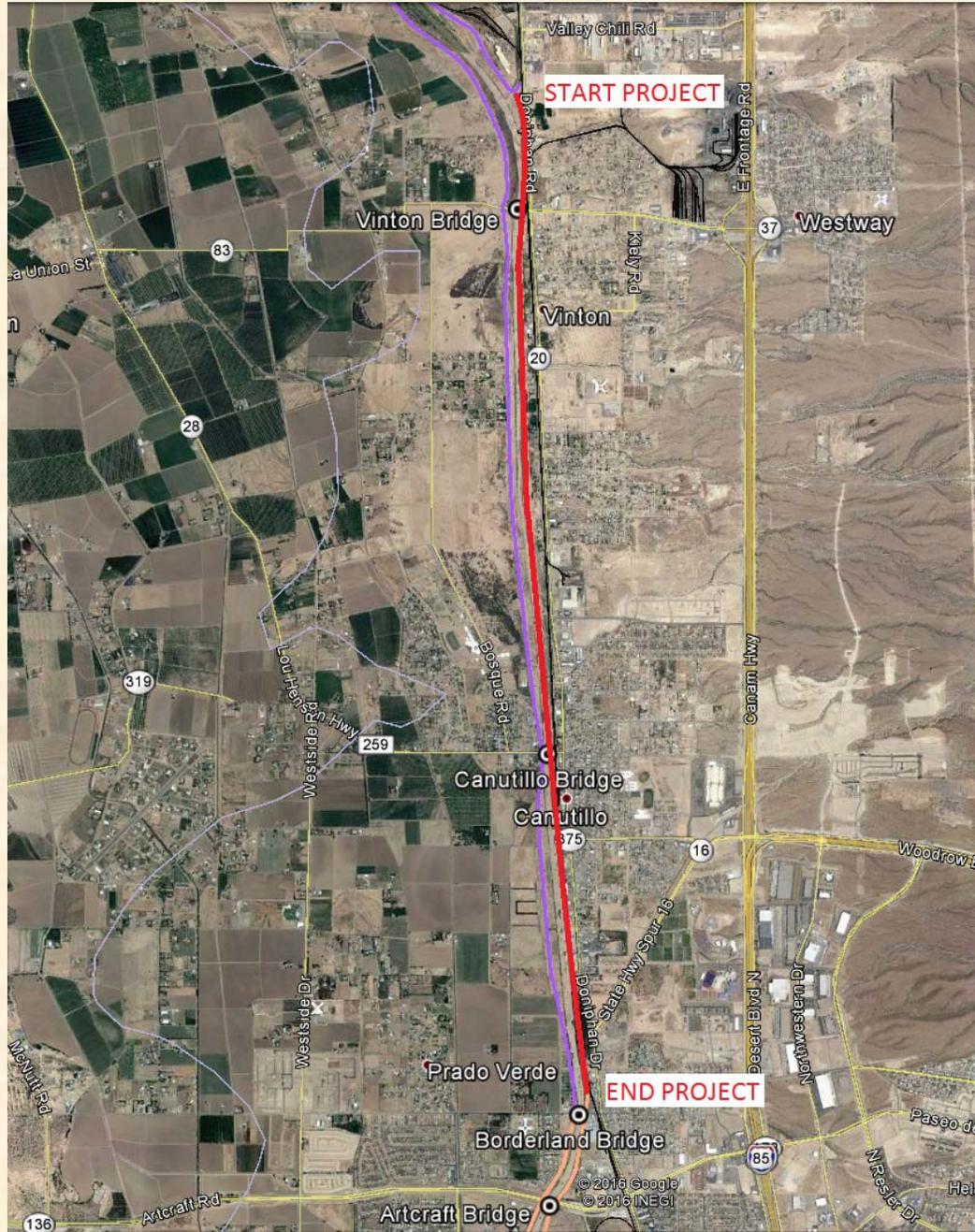
## **RGCP Levee Rehabilitation**

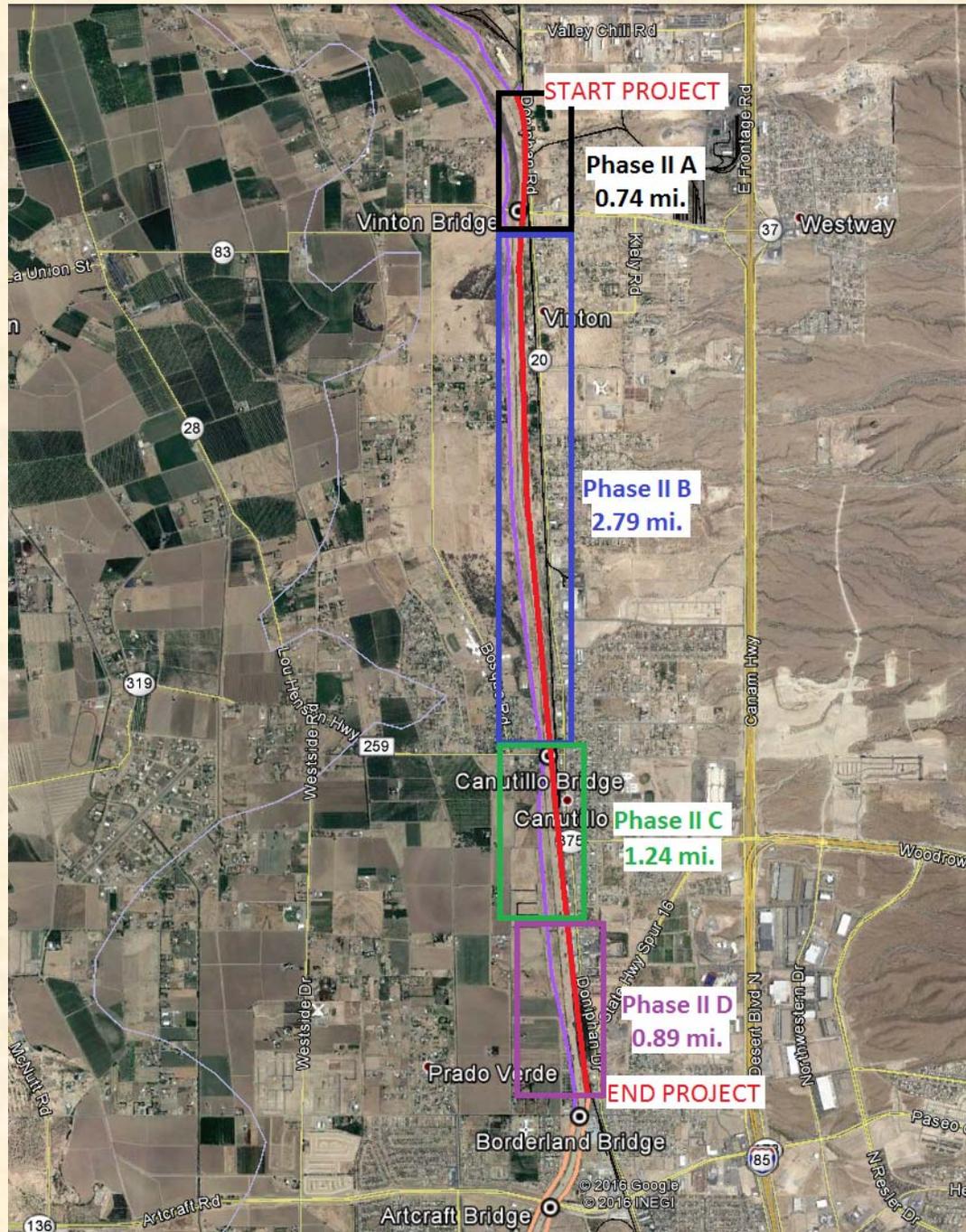
- **The American Recovery and Reinvestment Act of 2009 allocated funds to the USIBWC for the rehabilitation of levees. Also used for the Rio Grande Canalization Project levee rehabilitation to meet FEMA levee accreditation standards.**



# Project Location

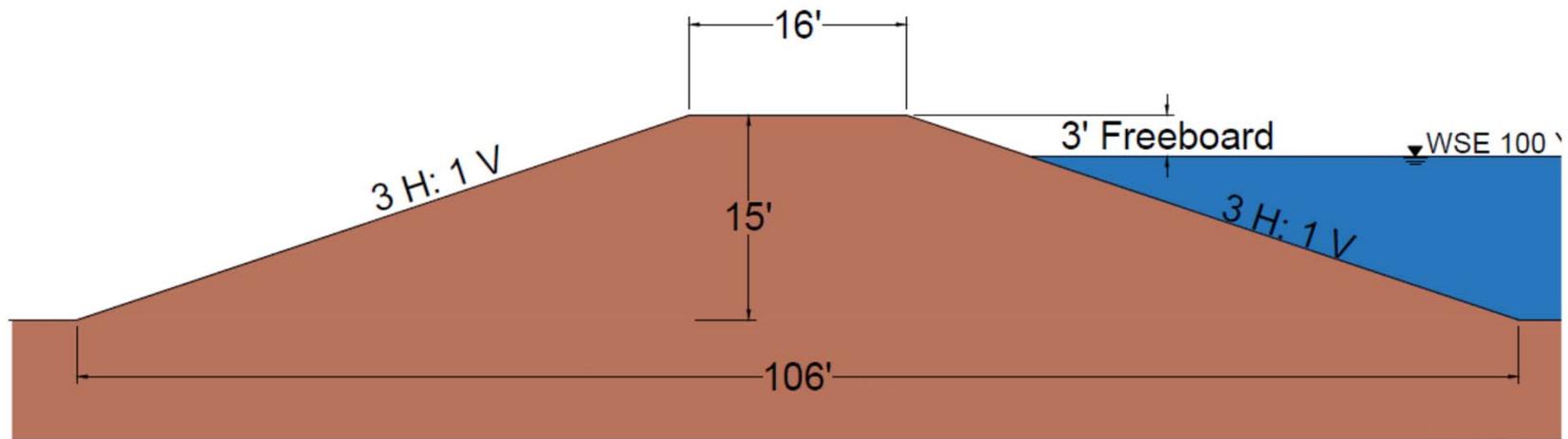
- **The Canutillo Phase II Project comprises a portion of the rehabilitation project and includes levee segment Canutillo East 2 (CE2)**
- **It extends from upstream of Vinton Bridge to upstream of Borderland Bridge on the east side of the Rio Grande**
- **It has a reach of 5.66 miles**
- **Adjacent properties consist of residential and commercial use.**







# Earthen Levee



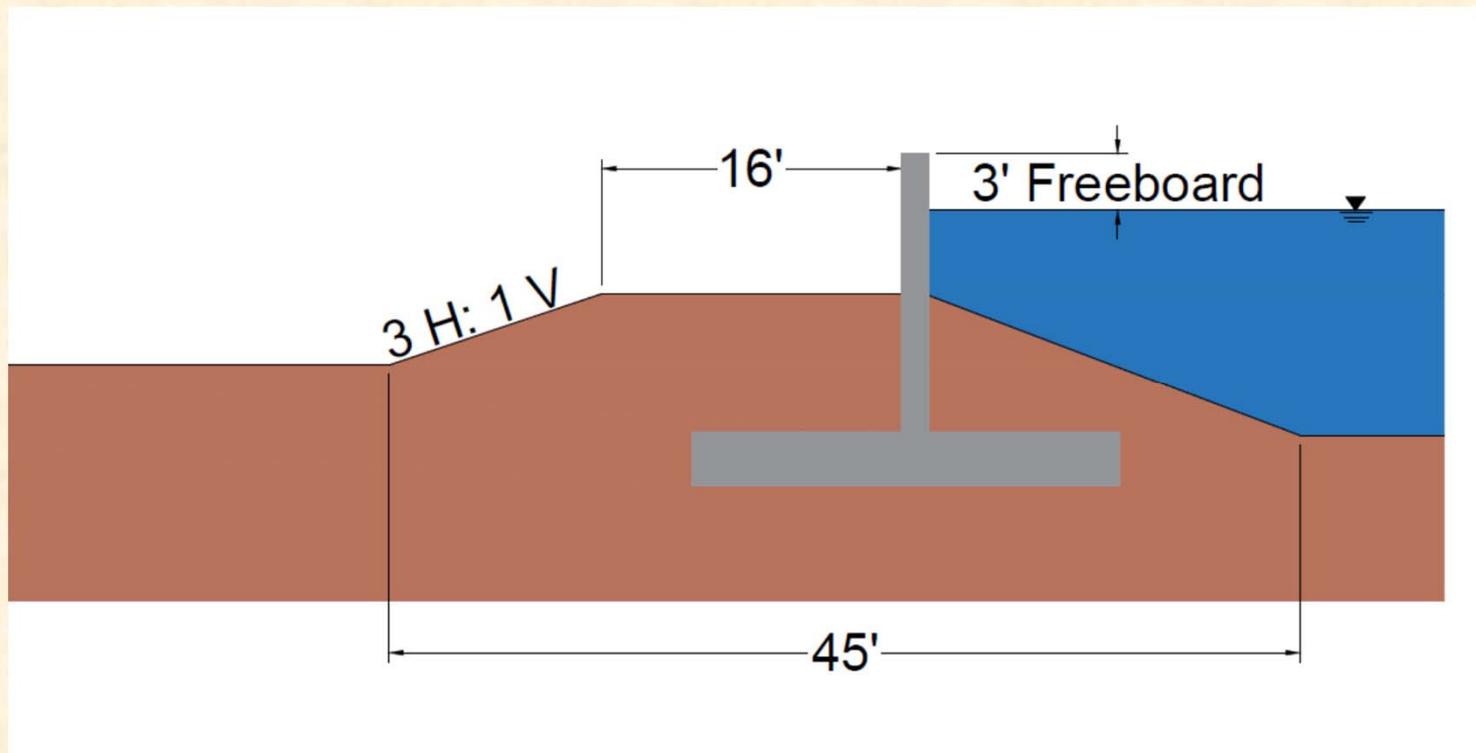


# Geographic Limitations



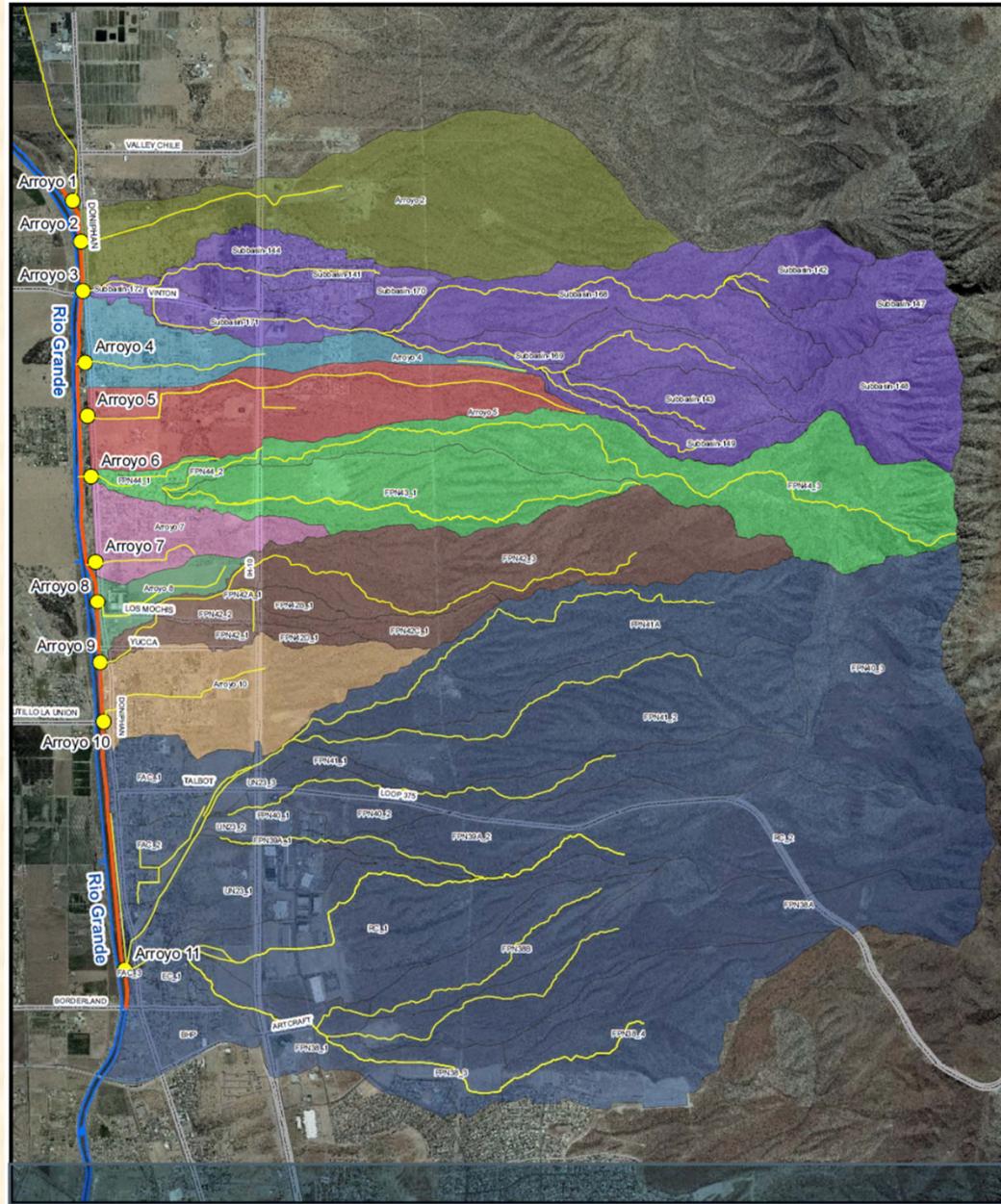


# Floodwall





# Contributing Arroyos





# Box Culvert





# Flood Protection





# FEMA Levee Accreditation

Checklist for Design Criteria:	
<input type="checkbox"/>	<b>Freeboard.</b> Minimum freeboard required 3 feet above the Base Flood Elevation (BFE) all along length, and an additional 1 foot within 100 feet of structures (such as bridges) or wherever the flow is restricted. Additional 0.5 foot at the upstream end of a levee. Coastal levees have special freeboard requirements (see Paragraphs 65.10(b)(1)(iii) and (iv)).
<input type="checkbox"/>	<b>Closures.</b> All openings must be provided with closure devices that are structural parts of the system during operation and designed according to sound engineering practice.
<input type="checkbox"/>	<b>Embankment Protection.</b> Engineering analyses must be submitted that demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability.
<input type="checkbox"/>	<b>Embankment and Foundation Stability Analyses.</b> Engineering analyses that evaluate levee embankment stability must be submitted. The analyses provided must evaluate expected seepage during loading conditions associated with the base flood and must demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability. An alternative analysis demonstrating that the levee is designed and constructed for stability against loading conditions for Case IV as defined in the U.S. Army Corps of Engineers (USACE) Engineer Manual 1110-2-1913, <i>Design and Construction of Levees</i> , (Chapter 6, Section II), may be used.
<input type="checkbox"/>	<b>Settlement Analyses.</b> Engineering analyses must be submitted that assess the potential and magnitude of future losses of freeboard as a result of levee settlement and demonstrate that freeboard will be maintained. This analysis must address embankment loads, compressibility of embankment soils, compressibility of foundation soils, age of the levee system, and construction compaction methods. In addition, detailed settlement analysis using procedures such as those described in USACE Engineer Manual 1110-1-1904, <i>Soil Mechanics Design— Settlement Analysis</i> , must be submitted.
<input type="checkbox"/>	<b>Interior Drainage.</b> An analysis must be submitted that identifies the source(s) of such flooding, the extent of the flooded area, and, if the average depth is greater than 1 foot, the water-surface elevation(s) of the base flood. This analysis must be based on the joint probability of interior and exterior flooding and the capacity of facilities (such as drainage lines and pumps) for evacuating interior floodwaters.



# DISCUSSION/QUESTIONS