

# Draft Appendix G – Civil Engineering

River Road Aquatic Ecosystem Restoration  
Feasibility Study

November 2020



**US Army Corps  
of Engineers®**  
Fort Worth District

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## **G-1 GENERAL**

### **G-1.1 Existing Conditions within the River Road Study Area**


The River Road Aquatic Ecosystem Restoration (ER) Feasibility Study is located in San Antonio, Texas (Exhibit 1), and consists of a reach of the San Antonio River approximately 4,000' long and bounded by East Mulberry Avenue on the north, Davis Park, River Road, and Brackenridge Park Municipal Golf Course on the west, Brackenridge Park Municipal Golf Course on the east, and McAllister Freeway (US HWY 281) to the south. There is an asphalt roadway (Avenue A) on the east side of the river approximately 15' wide that runs roughly parallel to the river from East Mulberry to a gated drive into the golf course approximately 2,000' to the south, and then approximately 600' west and south to a turnaround area. The asphalt surface course of Avenue A is in poor condition. Within the study area there are three low-water-crossings (LWCs) and two bridges crossing the river. The northern most LWC (LWC-1) is near the Avenue A turnaround and is primarily used by the residents of the River Road neighborhood. The other two LWCs (LWC-2 & LWC-3) are used by golfers and by golf course grounds keeping personnel.

The grounds keepers are also using the north portion of Avenue A, from Mulberry to the gated drive, as a means to access a storage and maintenance area just south of the gated drive.

There is evidence that the LWCs are contributing to both erosion of the river banks and sedimentation of the river bed. All three of the LWCs impound stream flow on the upstream side. Additionally, approximately 80% of the vegetation within the study area consists of non-native or invasive species.




### Legend

 Study Area



**River Road Study Area  
San Antonio, Texas  
July 2019**

0 0.075 0.15 0.3 Miles  


## Exhibit 1

### **G-1.2 Ecosystem Restoration Alternatives**

Several alternative measures were considered in order to restore the ecosystem to a more natural state. Among those considered are the following:

- Removal and replacement of non-native plants with native plant species;
- Removal or modification of one, two, or all three of the LWCs;
- Removal of all or part of Avenue A;
- Partial removal of River Road;
- River bank shaping or sculpting;
- Various instream channel modifications and habitat enhancements.

The complete list of alternatives can be found in the Integrated Feasibility Report.

### **G-1.2.1 Removal and Replacement Non-Native Plant Species**

Removal and replacement of non-native plant species is not a Civil Engineering issue and will be discussed in more detail in the Environmental, and Plan Formulation sections of the Integrated Feasibility Report.

### **G-1.2.2 Removal and Replacement of Low Water Crossings**

The PDT considered various combinations of removing LWCs, modifying the LWCs to impound less water upstream, replacing the LWCs with box culvert bridges, or replacing the LWCs with prefabricated free span bridges.

The box culvert bridge replacement option was quickly dismissed as causing more harm than good to the ecosystem. Quantities and costs were estimated for the other options in order to compare various alternative combinations.

### **G-1.2.3 Removal of Avenue A**

Two options were considered for Avenue A removal. Option 1 was to remove the entire length (approximately 2,000 LF) of the roadway. Because Avenue A is often used by the golf course groundskeepers, this option would require widening of approximately 1700 feet of golf cart pathway to be used as an alternate. Option 2 was to remove approximately 750 LF of roadway from the gated drive into the golf course to the turnaround near LWC-1. This would allow the groundskeepers to continue to use Avenue A for their access.

Quantities and costs were estimated for both scenarios. Roadway removal includes removal of the asphalt surface course and road base, replacing the roadway volume with imported native soil, and replanting the area with native plant species.

### **G-1.2.4 Partial Removal of River Road**

The partial removal of River Road will be covered in the Integrated Feasibility Report.

### **G-1.2.5 Channel Modifications and Habitat Enhancements**

Bank sculpting, instream channel modifications, and habitat enhancements will be covered in the Integrated Feasibility Report.

### **G-1.3          Quantity Estimates**

For the purpose of comparing the relative costs of the various alternatives presented in this report, Civil Engineering was tasked with developing estimated quantities for a variety of features being considered. More specifically, estimated quantities were generated for the following features:

- Completely removing Avenue A
- Partially removing Avenue A
- Removing a Low Water Crossing
- Modifying a Low Water Crossing
- Constructing a new Low Water Crossing
- Constructing 2,450 feet of ADA/ABA compliant Pedestrian Walkway
- Constructing a new small parking lot
- Constructing a new access control gate with automatic gate opener/closer
- Widening +/- 1,700 feet of existing golf cart path
- Constructing bollard and chain, and boulder barriers to limit access to certain areas