

WESTSIDE CREEKS ENVIRONMENTAL RESTORATION

Appendix E: Civil Engineering

CIVIL ENGINEERING APPENDIX

METHODOLOGY

The Westside Creeks Ecosystem Restoration Feasibility Study is located along the west side of San Antonio, TX. The study encompasses defined limits within the following creeks: Apache, Alazan, Martinez, and San Pedro. The defined study area limits for these creeks are as follows: San Pedro Creek extends from its confluence with the San Antonio River to the Camp Street bridge crossing (near hydraulic station 126+76), Apache Creek extends from its confluence with San Pedro Creek to Southwest 19th Street bridge crossing (near hydraulic station 143+44), Alazan Creek extends from its confluence with Apache Creek to the Josephine Tobin Drive South bridge crossing (near hydraulic station 175+71), and Martinez Creek extends from its confluence with Alazan Creek to the Hildebrand Avenue bridge crossing (near hydraulic station 147+26).

In order to complete this study, the San Antonio River Authority (SARA) provided data for existing site features, structures, roads, utilities, topography, etc. via GIS files. However, the existing GIS utility data was limited to only domestic water, sanitary sewer, and storm sewer. For all other utilities, SARA has coordinated with local utility companies to obtain locations of existing gas, electrical, and communication lines. Through SARA's coordination efforts, utility companies with utilities in our study area became known and are as follows: San Antonio Water System (SAWS) (domestic water and sanitary sewer), CPS Energy (natural gas and electric), Grande Communications (communication), and Williams Communications (communication). Drawings in PDF format were provided by the aforementioned utility companies illustrating utility crossings within our study area.

For all four creeks, excavation will be required to produce pilot channels and lower channel bottoms for implementation of the ecosystem restoration alternatives. Pilot channels are being proposed for the defined study limits as stated above except for within Apache Creek. The pilot channel limits proposed for Apache Creek extend from its confluence with San Pedro Creek to a point approximately half between the South Brazos Street and South Trinity Street crossings (near hydraulic station 42+70). In order to implement proposed ecosystem restoration measures within the creeks, locations exist requiring lowering of the flood channel bottom, in addition to executing the pilot channel, to ensure there is no increase in water surface elevation. The Hydraulics & Hydrology Section for the U.S. Army Corps of Engineers – Fort Worth District is producing the excavation quantities for the proposed channel sections using the HEC-RAS software program. Additional excavation quantities were calculated to account for stripping and utility relocations.

Clearing, grubbing, stripping, and ripping will take place along the full length of all four creeks within the defined study limits, from the right descending top bank to the left descending top bank with exception to Apache Creek upstream of hydraulic station 42+70. In this reach, clearing, grubbing, stripping, and ripping will only take place where no impervious areas exist within the flood channel. The alternative plans propose stripping 6-inches of natural ground and replacing with organic topsoil. Ripping of natural ground will take place to a depth of 12-inches below the stripped soil finish grade. Ripping will not take place in sensitive areas that would negatively impact existing utilities or other structures designated to remain. Additional topsoil is included within the estimated quantities to account for blending operations within the ripped soil layer. In order to treat invasive plants and unwanted growth during and after clearing, grubbing, stripping, and ripping operations, herbicides will be used. The same acreage determined for

clearing and grubbing has also been used to quantify herbicide treatments. Quantities provided to cost estimating account for two herbicide treatments per creek.

The GIS data and aerials show a few patches of existing concrete within the flood channels of Alazan and Martinez Creeks. The concrete lining within these two creeks will be demolished, excluding storm drain outfalls. Concrete channel lining for storm drain outfalls, in all creeks, not affected by excavation will remain in place. No demolition of existing concrete or channel lining will be implemented for the study alternatives upstream of hydraulic station 42+70 within Apache Creek. GIS data did not show San Pedro to have existing concrete except at the confluence with the San Antonio River. This concrete is to remain. In addition, no demolition quantities will be provided for removal of existing retaining walls within the four creeks. The PDT decided for the purposes of this study, all existing retaining walls will remain. As-builts of Apache Creek show the concrete lining to be 8-inches in thickness, reinforced with #5 bars @ 12-inches O.C. E.W. All concrete within the study limits designated to be demolished were assumed to have the same thickness and reinforcement as the concrete lining for Apache. In order to account for shear stresses at proposed concrete removal locations, Turf Reinforcement Mats (TRM's) will be used and were quantified for the study alternatives. A TRM was chosen that accounts for shear stresses up to 12 pounds per square foot. Storm water pollution prevention quantities, to include stabilized construction accesses, were determined for all four creeks and were incorporated into the cost estimate accordingly.

For all identified existing utilities, determinations were made concerning the need for relocations in order to implement specific ecosystem restoration alternatives. Utility relocations were quantified for the entire lengths of channel within the study area for Martinez, San Pedro, and Alazan Creeks. For Apache Creek, utility relocation quantities were only quantified for the reach where excavation will take place to construct the proposed pilot channel, which is from its confluence with San Pedro Creek to hydraulic station 42+70. Sanitary sewer relocations were determined by analyzing the impact of the proposed channel section on the existing sanitary sewer pipe using the provided GIS data. Using the cross sections, provided by H&H, a digital terrain model (DTM) was created. Then using the manhole invert elevations, provided in the GIS data, profiles of the sanitary sewer pipes were created. In locations where the proposed channel section exposes the existing sanitary sewer pipe or decreases the ground cover to an unacceptable level, relocation and/or modification quantities were determined and provided to cost estimating. There are some cases where existing sanitary sewer pipe affected by the proposed channel excavation will only require concrete encasement versus relocation. Existing domestic water and natural gas pipe elevations are not known. Therefore, where excavation depths exceed 1-foot below the existing channel bottom, relocation of these utility lines were quantified and submitted to cost estimating. For all four creeks, storm sewer utilities consisted of pipes entering the channel predominately on the flood channel banks. There are numerous storm drain outfalls in all four creeks. No alteration of existing storm pipe is required to implement the proposed channel sections. However, modifications of existing concrete channel lining for storm sewer outfalls will be required in order to implement the proposed channel sections. Quantities were provided to cost estimating to demolish existing concrete lining impacted by the proposed excavation and to add Turf Reinforcement Mats (TRMs) from the end of the remaining concrete lining down to the channel bottom of the proposed pilot channel. All existing CPS Energy and Grande Communication electric and communication utility lines were found to be aerial; therefore, no relocations were necessary. The communication lines owned by WilTel run along the top bank of Apache; therefore, no relocations are necessary. There is one known underground communication line (owned by Williams Communication) crossing beneath San Pedro Creek upstream of Interstate 35, immediately upstream of and within the Union Pacific Railroad Right-

of-Way. The information provided is not sufficient to determine whether this line will require relocation. This uncertainty is captured in the abbreviated risk analysis.

STRUCTURAL

The measures proposed in the Westside Creeks Ecosystem Restoration Feasibility Study include excavation to produce pilot channels and lower channel bottoms for implementation of the ecosystem restoration. It has been determined that these measures do not affect the supports for existing pedestrian and vehicle bridges. Additionally, with no raise in water surface elevation there is no change in the hydraulic loading on bridge superstructures. Therefore at this point there is no structural engineering scope of work. The structural section follows development of the study and in the event new pedestrian bridges or modifications to existing bridges are incorporated in the proposed ecosystem restoration measures the scope will be defined and quantified for the cost estimate as necessary.