Bio-Technical Stabilization

Streambank Stabilization – Arlington, TX

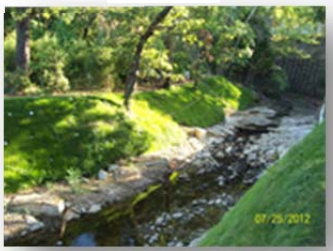
JEA HydroTech was part of the team providing Design-Build services for stabilizing 1,000 feet of an eroded streambank in North Arlington (Tributary WFA-1 to the Trinity River). Methods involved bio-technical stabilization measures and reinforced earth technology. Scope of services included determining the creek's hydraulic characteristics; backwater and floodplain modeling; attaining required 404 permitting; designing and specifying stabilization processes; and, providing construction oversight responsibilities. Related services involved delineating easement boundaries, attaining necessary topography, and providing records of final construction drawings.

Special requirements from the City of Arlington included; protection of an existing sanitary sewer line; establishing a natural channel environment; slope stabilization of the channel embankment; and, restoring the streambank to its original hydraulic state and verifying the backwater model results.

Before

Before

After



After

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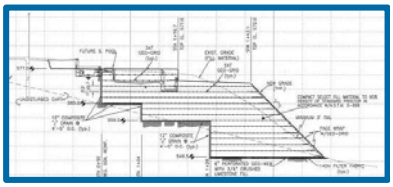
behind every great accomplishment…
is an even greater team

January 2015

Ivie Residence Landslide & Pool Installation – Highland Village, TX

Designed building structures (pool, concrete decks, cabana feature, and decorative masonry walls); and, determined the cause(s) of "landslide" slope failures. During the site observations, we identified super saturated soil conditions, which contributed to unstable soil mass. To determine other causes of soil mass instability, more extensive analyses were needed which revealed that soil mass fill material was placed directly over a natural waterway.

The design and remediation consisted of stabilizing the support soil mass employing reinforced earth techniques; installing a "Geo-Web" containment structure at the base of the new reinforced soil mass; installing "composite drainage systems" along the face of the exposed soil slope to collect and discharge "free water"; and, place grass seed along the slope face and secure a temporary erosion control mat to allow "seeding" to germinate.



Upon accomplishing soil mass stabilization, the desired building structures were designed to bear directly over the new supporting soil mass – without the use of sub-surface pier supports.

Special considerations taken into account included limitations covered by the Corps of Engineers, city building regulations and the owners desire to preserve the natural state of the site.

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Preston Trail Golf Club – Dallas, TX

Provide a soft armor installation to stabilize the existing eroded banks of approximately 2,000 LF of White Rock Creek. The design and installation required the involvement of an interdisciplinary team of professionals to perform the initial investigation of the channel condition and provide the design criteria required to stabilize the channel and provide the desired soft armor installation.

Due to the limited load bearing capacity of the creek channel bottom and the desire of the owner to reclaim sections of the eroded creek bank, geogrid reinforcement was used to provide a stable base in specific areas requiring the introduction of additional fill. The reconstruction of the eroded bank required that approximately twenty-five feet (25') of the channel be reclaimed for approximately two hundred feet of the initial repair. To protect the newly established toe of the bank, a combination of steel piles and gabion baskets and rolls were used to secure the toe of the bank, beneath the water level. The gabion baskets and rolls were secured with a series of earth anchors. Following the installation of the toe structures, the new fill to construct the bank was put into place as a reinforced earth structure. Upon completing the reconstruction of the earth bank, the surface was covered with a grass sod and a high velocity erosion mat. The erosion mat was secured to the surface of the bank with a series of earth anchors and steel pins.

A variety of similar remediation techniques were implemented for the remaining sections of the eroded channel. Upon completion of the project, the original eroded channel banks were stabilized and successfully covered with a vegetative cover.

Embankment Stabilization – (portion of Prairie Creek) – Richardson, TX

Project consisted of stabilizing of a highly eroded creek bank. The desired installation was to provide a soft armor that would protect the streambank without encroaching onto the defined creek limits. We proposed the use of reinforced earth to establish a growing medium on the surface of the creek bank and high tensile strength wire reinforced erosion mat to provide structural stability. The bank was cleared of all loose debris and a layer of top soil was installed over the face of the bank to develop a growing medium. The top soil was reinforced with geotextile materials that were anchored to the face of the streambank. Upon completing installation of the geotextile materials and top soil, the bank was covered with a select grass sod. Due to the steepness of the bank, the grass sod was pinned into place. Following the installation of the grass sod, the wire reinforced erosion mat was installed. The base of the erosion mat was secured into the bottom of the stream by installing a series of steel dowels into the stone bottom. The mat was then stretched over the surface of the new grass sod and secured into position with a series of earth anchors and steel sod pins. The earth anchors were installed a minimum of thirty-six inches (36") into the native bank and secured to the face of the wire reinforced mat with four inch (4") square galvanized anchor plates

Land Use Restoration - Bass Estates – Fort Worth, TX

This land restoration forensic, planning and design project employed the use of "reinforced earth" technology, which incorporates a LEED design element.

In addition to stabilizing a failed slope/embankment, the project's objective included restoring and maximizing the effective land use and, preserving the estate's overall landscape and aesthetic qualities.

The failed slope/embankment was the result of total saturation of the soil mass, which led to a "landside" failure of the existing embankment. The soil mass failure affected an area of approximately 2,300 square yards requiring the stabilization of 25,000 cubic yards of soil.

After confirming the causes of the embankment's failure, through forensic studies, initial stabilization design elements were determined. These design elements included installing: sub-surface permanent drain systems; geotextile fabrics and geogrid materials; and, sub-surface piles.

In considering soil mass draining techniques, the use of "geo-web" drainage systems were placed as the base of what would be the new embankment. To re-plant trees, a galvanized steel frame system was designed. Steel galvanized piles were installed to support existing planter and masonry features. The newly restored soil mass (slope/embankment) employed the use of geogrid earth reinforcement material as the main stabilizing component.

To maintain the estate's overall development and landscape characteristics, hardscape masonry retaining walls were eliminated. LEED design concepts and features were incorporated as part of the estate's landscape qualities.

Lakeside Montessori Academy - The Colony, TX

Retained to restore support soils (soil mass failure) and re-build a collapsed existing masonry modular wall. Forensic Engineering investigations were performed to determine the cause of failure and determine the appropriate remediation procedure.

Forensic investigations revealed existing wall system had been built across a natural waterway with no drainage provisions. The existing wall system collapse was primarily due to "hydrostatic pressure" acting on the wall system leading to an "overturning" failure.

The remediation implementation plan specified to restore the soil mass structure employing reinforced earth technology with the installation of pipe drainage systems. The original masonry modular blocks/stones were salvaged and placed as a stone veneer face anchored to the reinforced soil mass.

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Embankment Stabilization – Willow Bend – Arlington, TX

Evaluated embankment failure and designed stabilization elements for a portion of a natural waterway located downstream of Willow Bend Drive. Professional Services we provided were:

- Performed topographic/design surveys and site reconnaissance
- Initiated forensic engineering investigations
- Determined the extent of embankment instability (soil erosion), and
- Prepared plan design documents specifying the elements required to stabilize the embankment.

Stabilization specifications included placing "select fill" material to define the embankment slope, applying a geotextile turf reinforcement material to stabilize the new embankment slope; and designing directional weirs (Bendway Weirs) to adequately direct runoff flows into the receiving creek channel (Kee Branch Creek).

Special attention was also required to protect large caliper trees within the streambank from the effects of soil erosion and maintaining the aesthetic character of the neighborhood.