Garcia Creek Channel Stabilization

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A LOCHNER COMPANY

CASTROVILLE
THE LITTLE ALSACE OF TEXAS
1844

Location Map | Garcia Creek

Bounded by:

- Athens Street (Downstream Limit)
- Geneva Street (Upstream Limit)

Project Limits:

- 500 linear feet

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Scope Overview

- **Project Purpose**
  - Stabilize the Geneva Street Culvert Headwall
  - Improve Channel Bank Stability
  - Repair or Replace the Side Channel at Athens

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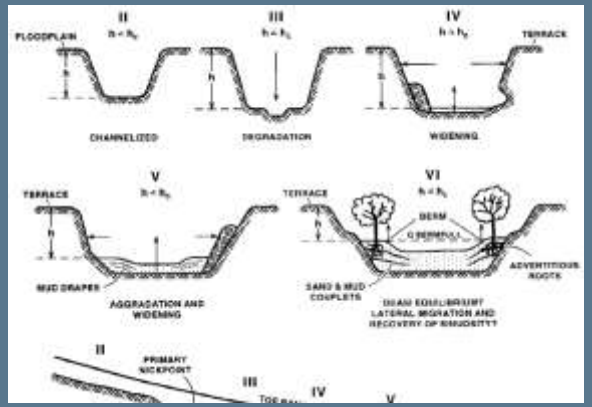
Scope Overview

- **Scope Highlights**
  - Assess existing conditions
  - Evaluate stabilization alternatives
  - Provide conceptual design recommendations and costs



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Existing Conditions | Garcia Creek

1 – Structural failure of the side channel concrete apron due to scour-induced undermining. (Facing downstream)

2a – Moderate slope failures (Facing upstream)

2b – Moderate slope failures (Facing downstream)

3 – Channel degradation. Deep incision due to steep channel bottom and constriction of flow resulting in increased velocities. (Facing upstream)

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Existing Conditions | Garcia Creek

4a – Overhanging bank condition caused by toe erosion resulting in bank collapse, vertical banks (~15 ft. height) and mass wasting.

4b – Overhanging bank condition caused by toe erosion resulting in bank collapse, vertical banks (~15 ft. height) and mass wasting. (Facing downstream)

5a – Geneva Street culvert showing scour erosion, undermining of the concrete apron to a cantilevered condition, exposure of water line, accelerated failure of the northern bank. (Facing upstream)

5b – Geneva Street culvert showing scour erosion, undermining of the concrete apron to a cantilevered condition, exposure of water line. (Facing upstream)

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Defining the Problem| Conveyance

- Sufficient culvert & channel capacity
- 100-year flow contained within the channel banks

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Defining the Problem| Velocity (2-yr)

- Elevated velocities (above 5 ft/s)
- Vulnerable to bed degradation, toe scour, and progressive bank erosion

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Defining the Problem| Shear Stress (2-yr)

Elevated shear stresses* observed primarily at:

- Culvert outfall
- Locations of flow constriction
- Confluence of side channel

**Shear Stress = Force of water pushing against the bottom and sides of a creek as it flows*

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Alternatives Evaluated | Options

- **Alt. 1** – Geneva Street Culvert and Channel Wall Stabilization ($1.1M to $1.5M)
- **Alt. 2** – Geneva Street Culvert Stabilization and Channel Armoring ($400k - $600k)
- **Alt. 3** - Reinforced Concrete Box with Secondary Bypass Channel, Geneva Street Culvert Stabilization ($2.0M to $2.5M)
- **Alt. 4** – Property Buyouts, Geneva Street Culvert Stabilization ($700k - $1M)

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Alternative 1 | Recommended Option

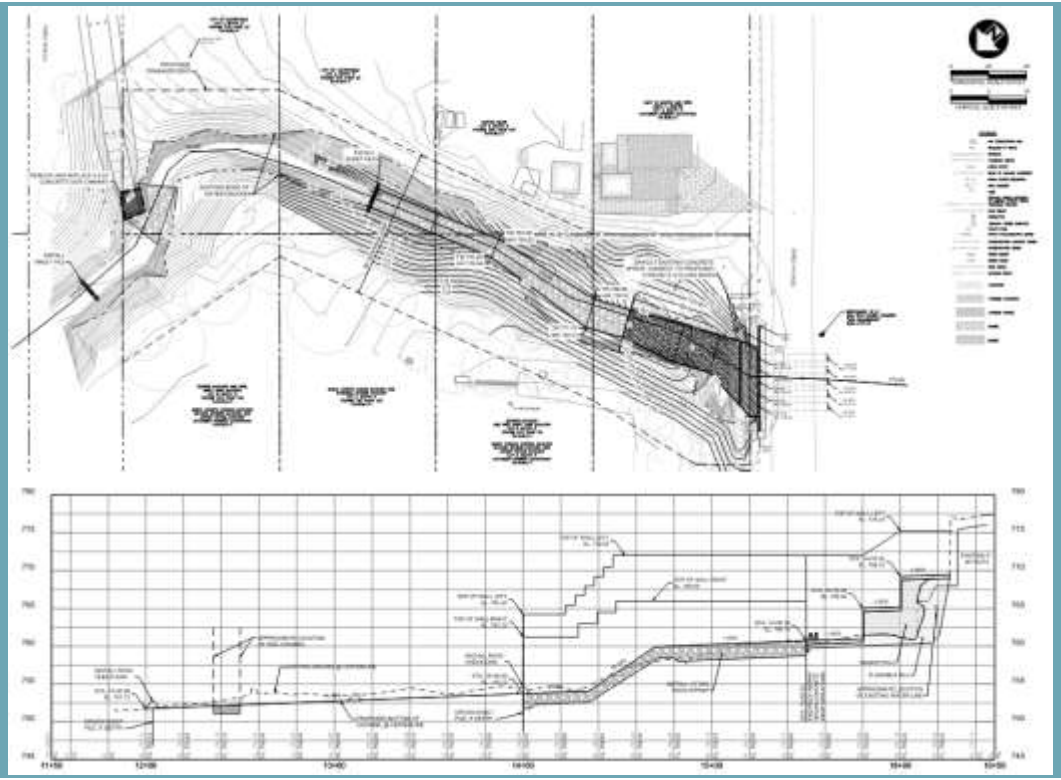
Construct concrete drop structure at Geneva Street Outfall

Install limestone block or modular concrete block wall to stabilize the banks

Rock riprap protection lining channel bottom

Driven sheet piles to anchor channel bottom

Reconstruct portion of concrete side channel



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Recommended Next Steps | Implementation

- Begin negotiations to secure permanent and temporary easements.
- Advance Alternative 1 to full design, including final wall design/grading, structural detailing, and erosion control measures. Refine project costs.
- Conduct Phase 1 Environmental Site Assessment – confirm no impacts to jurisdictional waters of the U.S.
- Evaluate future phases of improvements upstream and downstream of the current study area to improve overall channel stability

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