

Las Virgenes Creek Rehabilitation Project

City of Calabasas

*Questa Engineering
Corporation*

Santa Monica Mountain Trust



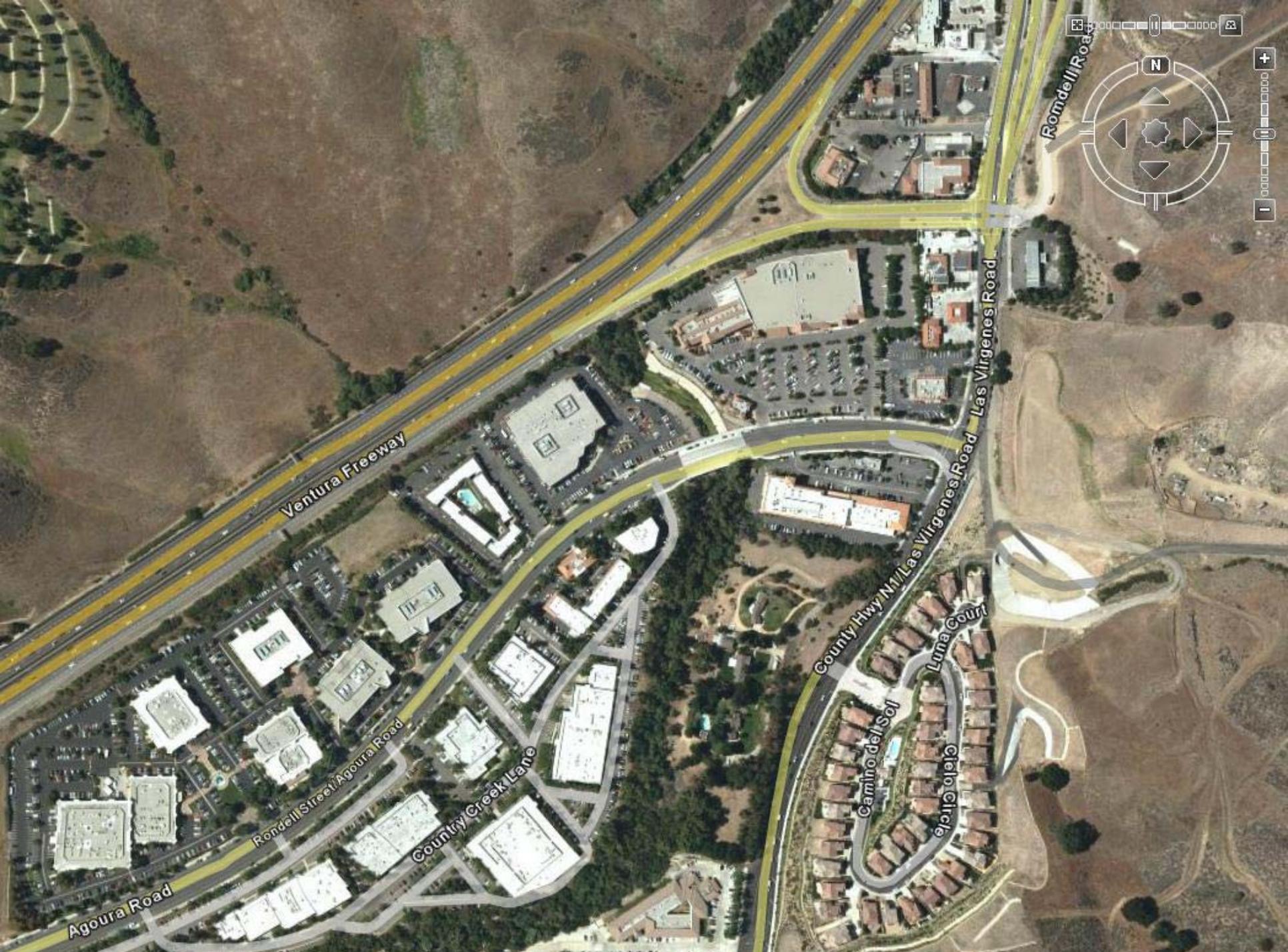


Funding Sources

- State Water Resources Control Board
- California Coastal Conservancy
- Department of Water Resources
- City of Calabasas
- County of Los Angeles

Introduction

- Existing site and project goals
- Project constraints and issues
- Analyses completed for design
- Design concepts
- Project construction progression



Ventura Freeway

Rondell Road

Las Virgenes Road

County Hwy N1 / Las Virgenes Road

Rondell Street / Agoura Road

Country Creek Lane

Agoura Road

Camino del Sol

Luna Court

Cleto Circle



Project Description/Goals

- Restore 400 feet of trapezoidal concrete channel within a urban setting
- Create a stable channel that:
 - Increases the wildlife corridor, and
 - Creates and extends riparian zone
 - Protects existing infrastructure
 - Maintains current level of flood control
 - Creates a community amenity

Project Constraints/Issues

- Constraints included;
 - Channel bottom sewer and water supply lines
 - Top of bank commercial use
 - High design flows
 - Sandy and fill sub-soils
 - Significant channel bed slope - 1.7%
 - Adjacent Power lines and sewer laterals
 - Right-of-Way boundary constraints

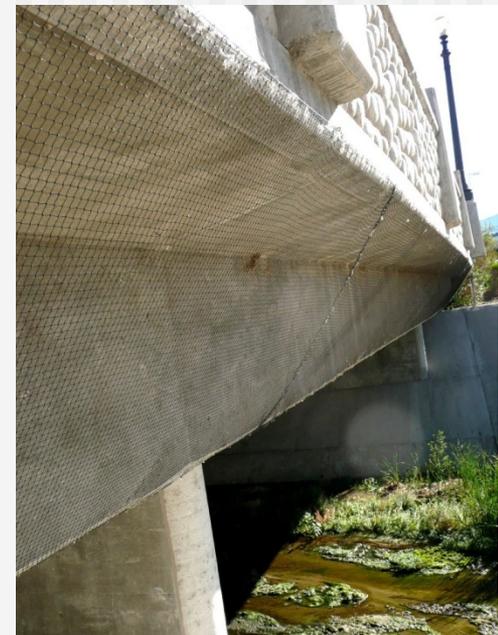






Biologic Issues

- No special status wildlife likely to occur
- No special status plant species
- Arroyo Chub is present downstream
- Nesting swallows on bridge



Design Analysis

- Hydrologic analysis
- Geomorphic - new channel characterization
- Engineering Analysis

Hydrologic Data

- Watershed Size 12.5 sq.miles (8,000 ac)
- 2-year recurrence 1,310 cfs
- 10-year recurrence 4,670 cfs
- 25-year recurrence 7,030 cfs
- Capitol Flood 14,200 cfs

Geomorphic Analysis

- Geomorphic analysis and Reference Reaches were used to determine key stable channel components:
 - Low flow channel geometry
 - Stable channel slope
 - Sediment bedload
 - Width vs depth ratios



Channel Slope

- Channel slopes:
 - Site concrete channel- 1.7%
 - Natural Upstream and Downstream slopes – 0.4%
- Design slopes within Project - 0.35% to 0.45%

Channel Design Data

- Low flow channel discharge - 150 to 250 cfs
- Low flow channel width/depth – 20 to 30 feet; 1 to 2 feet deep
- Channel bed would be predominately low slope .005 or less

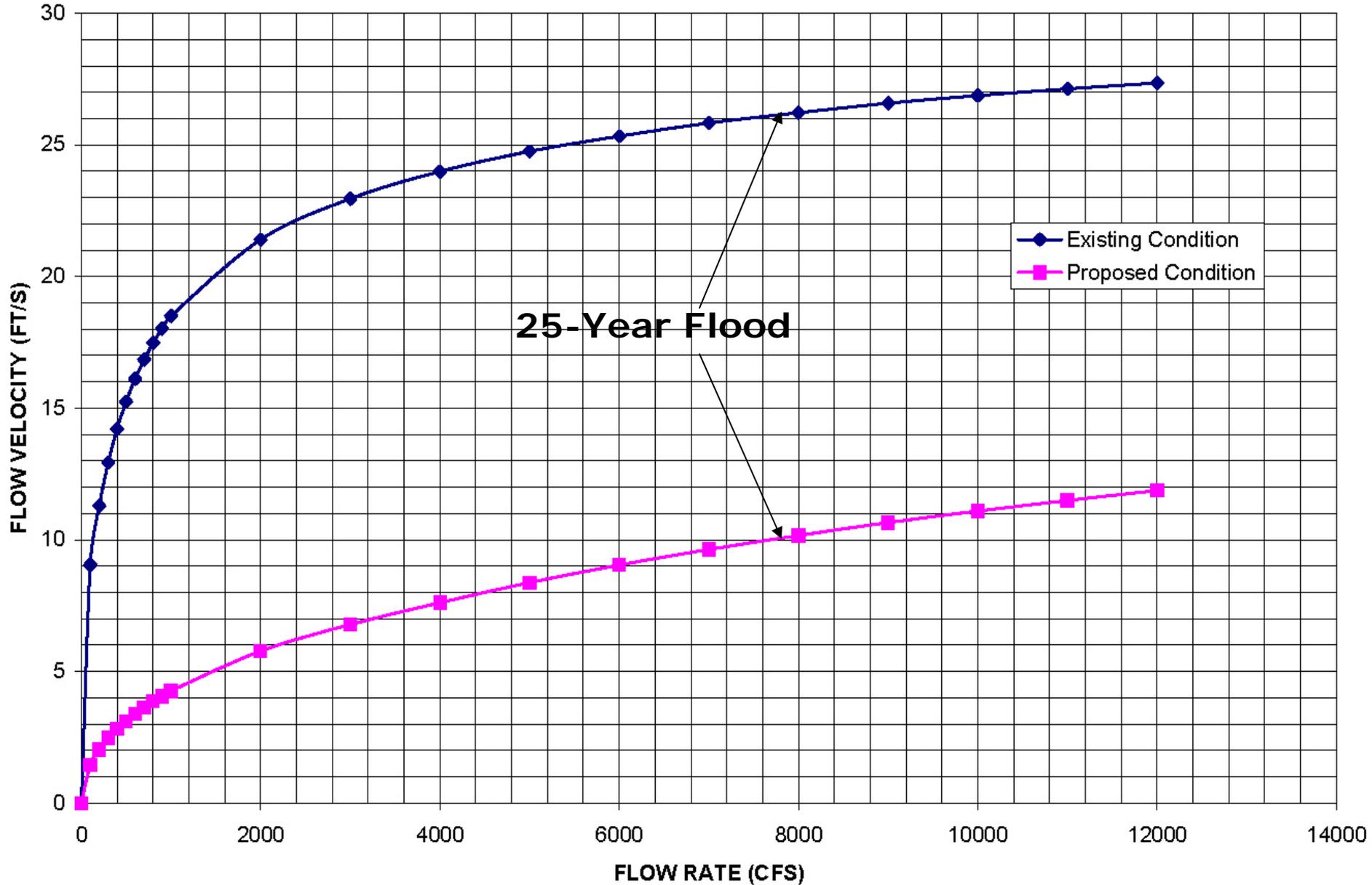




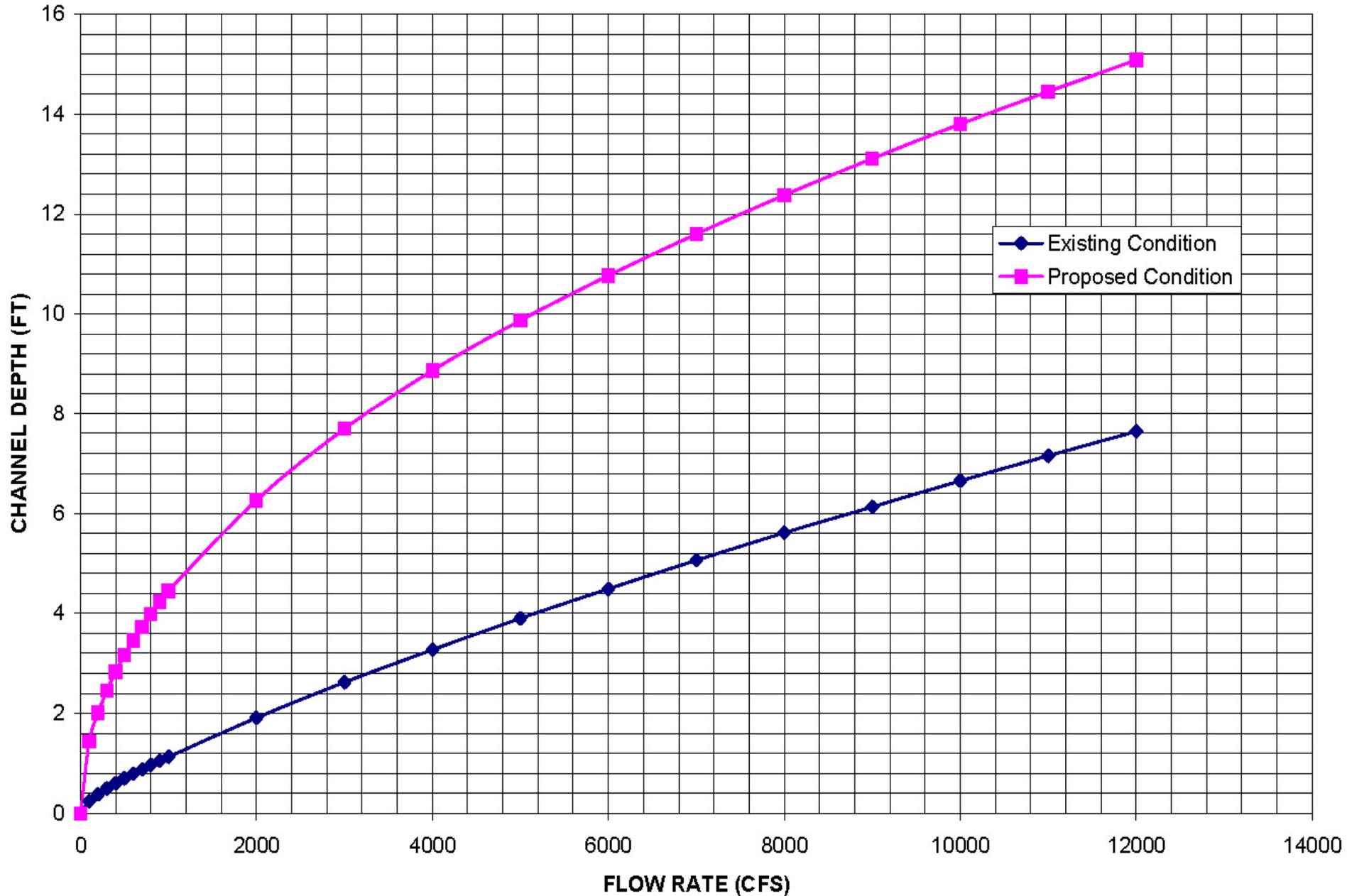
Engineering Analysis

- Channel Flow
 - Existing vs future flow velocity conditions
 - Existing vs future depth conditions
 - Bed and bank shear stress analysis
 - Geotechnical/slope stability analysis
 - Bridge scour analysis

RATING CURVE - FLOW VELOCITY V.S. FLOW RATE
STA 5+00 (~MIDPOINT OF CONCRETE CHANNEL)

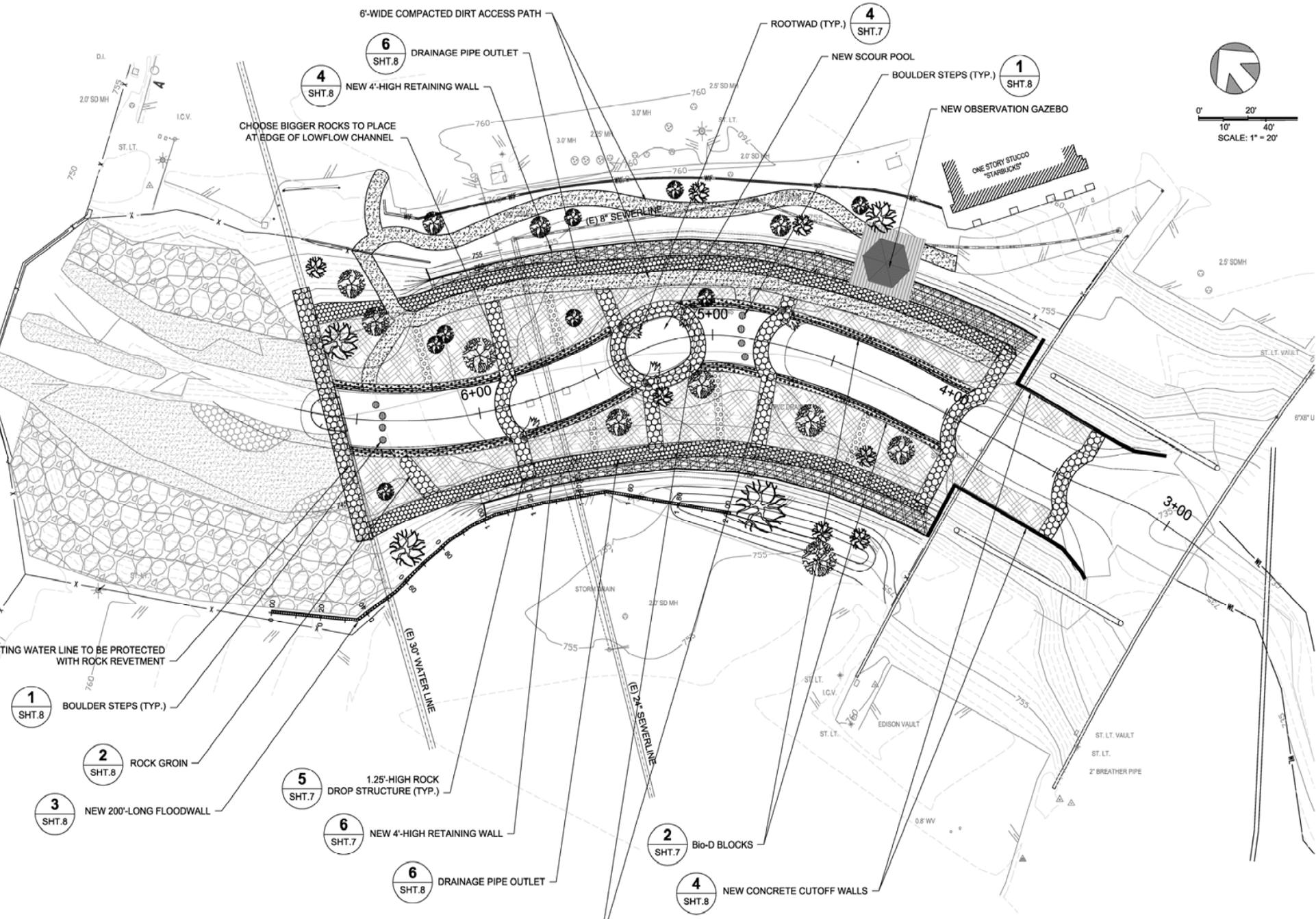


RATING CURVE - CHANNEL DEPTH V.S. FLOW RATE
STA 5+00 (~MIDPOINT OF CONCRETE CHANNEL)



Project Design Concepts

- Utilize compound channel geometry
- Maintain existing right-of-way
- Protect in-place existing utilities
- Use steps or grade breaks to reduce channel slopes
- Provide long-term scour protection for bank slope stability



6'-WIDE COMPACTED DIRT ACCESS PATH

4
SHT.8
NEW 4'-HIGH RETAINING WALL

6
SHT.8
DRAINAGE PIPE OUTLET

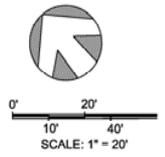
4
SHT.7
ROOTWAD (TYP.)

NEW SCOUR POOL

1
SHT.8
BOULDER STEPS (TYP.)

NEW OBSERVATION GAZEBO

CHOOSE BIGGER ROCKS TO PLACE AT EDGE OF LOWFLOW CHANNEL



ONE STORY STUCCO "STARBUCKS"

6+00

5+00

4+00

3+00

TING WATER LINE TO BE PROTECTED WITH ROCK REVETMENT

1
SHT.8
BOULDER STEPS (TYP.)

2
SHT.8
ROCK GROIN

3
SHT.8
NEW 200'-LONG FLOODWALL

5
SHT.7
1.25'-HIGH ROCK DROP STRUCTURE (TYP.)

6
SHT.7
NEW 4'-HIGH RETAINING WALL

6
SHT.8
DRAINAGE PIPE OUTLET

2
SHT.7
Bio-D BLOCKS

4
SHT.8
NEW CONCRETE CUTOFF WALLS

CHOOSE BIGGER BOULDERS TO PLACE

Flood/Erosion Control Features



- Retaining walls used to maintain widen channel area
- Flood walls to provide capitol flood protection and maintain FEMA freeboard requirements

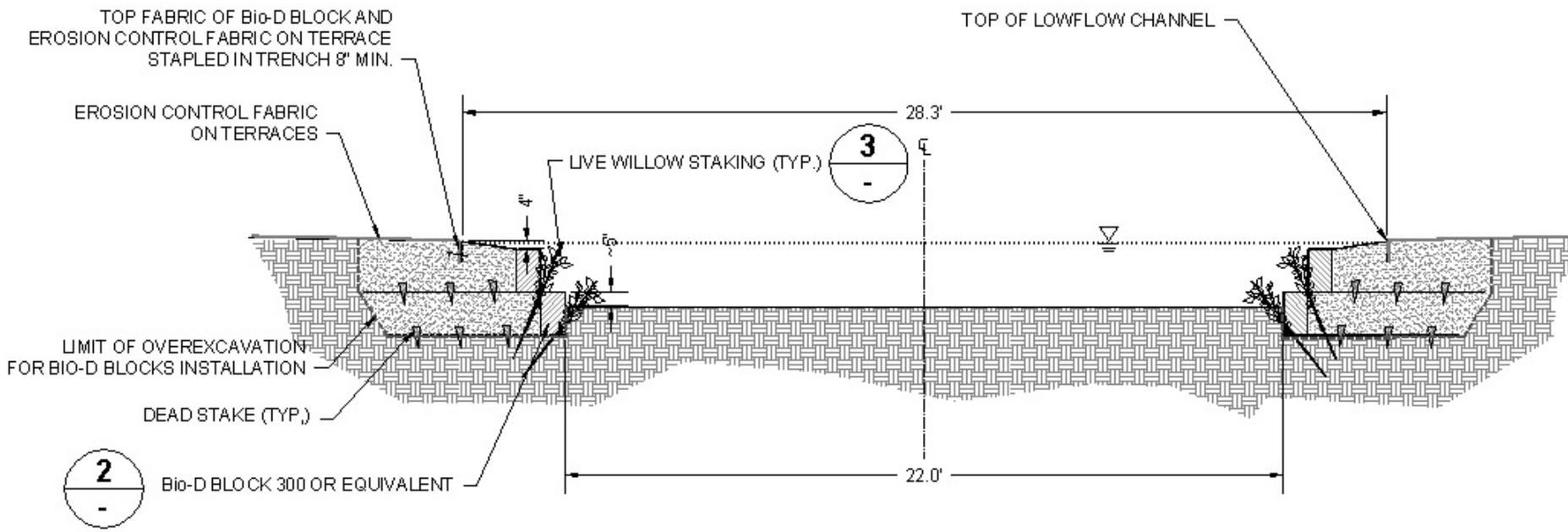


- Channel grade control
 - Interlocking lateral and vertical rock keyways



Low Flow Channel design

- Step pools incorporating rock cut off walls/steps
- Biotechnical bank treatments along low flow channel, quickly provides canopy cover
- Planted rock toe scour protection



1 **TYPICAL LOWFLOW CHANNEL CONSTRUCTION**
 SCALE: 1"=3'





Project Planting Plan

- Southern California Native riparian plant assemblage
- Utilization of deep willow pole planting of willows during trenching operations
- Designed to create dense channel canopy cover quickly
- Utilized drought tolerant upper bank zones



08/01/2007







10/11/2007













Maintenance

- Maintenance
 - Reverse maintenance effort
- Initial Maintenance Requirements
 - Irrigation system
 - Fall Inspection
 - Replanting
 - Minor erosion repair

Monitoring

- Annual reports – Five years
 - Revegetation success
 - Canopy development
 - Erosion conditions
 - Remediation activities

Summary



- Balanced design that makes some compromises for:
 - Infrastructure safety
 - Right-of-way constraints
 - Cost considerations
 - Implementation ease
- Project Cost
 - Construction = \$900,000
 - Design, permitting, Admin = \$150,000
 - Cost per lineal foot = \$2,000 to \$2,600