Matilija Dam Ecosystem Restoration Project

Spring 2022 Technical Updates
Dam Removal 65% Design
4/7/2022
Dam Removal 65% Design
Construction Phase Overview

• Phase 1 – Dam Modification
  • Access, Work Pads and Creek Diversion
  • Orifices
  • Optional Gates
  • Protected Access to Orifices
  • Reservoir – Clearing & Grubbing/ Pilot Channel

• Sediment Flushing
  • Storm Prediction
  • Plug Blasting

• Phase 2 – Dam Removal
  • Access, Work Pads and Creek Diversion
  • Dam Removal Sequence
  • Material Disposal

• Restoration and Management
Dam Removal 65% Design

Submittal Overview

• Drawings
  • 31 sheets total
  • 12 sheets for general and existing conditions
  • 10 sheets for Phase 1 construction (access/staging, demolition, clearing & grubbing, pilot channel, orifice, gates)
  • 9 sheets for Phase 2 construction (dam demolition, disposal grading, post-removal channel)

• Design Report
  • Main body of report ~ 120 pages
  • Pdf with appendices ~ 205 pages

• Engineer’s Opinion of Probable Cost
Table of Contents

1. Introduction
2. Project Objectives and Design Criteria
3. Existing Conditions
4. Description of 65% Design
   a. Phase 1 – Dam Modification
   b. Sediment Flushing
   c. Phase 2 – Dam Removal
   d. Restoration Approach
   e. Borrow Sites
   f. Disposal
5. Stability Analyses
   a. Material Characterization
   b. Stability Analyses of Dam with Orifices
   c. Stability Analysis of Tunnel Plugs
   d. Analyses of Stress Mitigation Measures
6. Project Hydrology
   a. Flows During Construction
   b. Flows During Non-Construction Season
   c. Fish Passage Flows
7. Geomorphic, Geologic and Fish Passage
   a. Reservoir Valley Morphology
   b. Channel Morphology of Post-Flush Creek
   c. Potential for Landslides in Reservoir Area
   d. Fish Passage Assessment
8. Restoration Approach
9. Engineer’s Opinion of Probable Cost
10. Tasks for Future Design Stages
11. References
Dam Removal 65% Design
Design Report

• Table of Contents

• Refined Technical Analyses/Components
  • Design Criteria
  • Creek Diversion Systems
  • Pilot Channel
  • Vegetation Removal
  • Sediment Freezing Approach
  • Flows During Non-Construction
  • Potential For Landslides in Reservoir Area
Dam Removal 65% Design
Design Report

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Dam Removal 65% Design
Design Report

- Table of Contents

- Refined Technical Analyses/Components
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  - Sediment Freezing Approach
  - Flows During Non-Construction
  - Potential For Landslides in Reservoir Area
Dam Removal 65% Design – Phase 1 Dam Modification

Drawings

- Access, Work Pads and Creek Diversion
- Orifices
- Optional Gates
- Protected Access to Orifices
- Reservoir Clearing & Grubbing/Pilot Channel
Dam Removal 65% Design – Phase 1
Drawings: Access, Work Pads and Creek Diversion
Dam Removal 65% Design – Phase 1
Drawings: Orifices
Dam Removal 65% Design – Phase 1
Drawings: Optional Gates
Dam Removal 65% Design – Phase 1
Drawings: Optional Gates
Dam Removal 65% Design – Phase 1
Drawings: Reservoir Clearing & Grubbing/Pilot Channel
Dam Removal 65% Design – Phase 1
Drawings: Reservoir Clearing & Grubbing/Pilot Channel
Dam Removal 65% Design – Phase 2 Dam Removal Drawings

- Access, Work Pads and Creek Diversion
- Dam Removal Sequence
- Material Disposal
Dam Removal 65% Design – Phase 2
Drawings: Access, Work Pads and Creek Diversion
Dam Removal 65% Design – Phase 2
Drawings: Dam Removal Sequence
Dam Removal 65% Design – Phase 2
Drawings: Disposal at Matilija Hot Springs
Dam Removal 65% Design – Phase 2
Drawings: Disposal at Matilija Hot Springs
Dam Removal 65% Design
No Drawings: Restoration and Management

- Goals: natural vegetation recruitment and restoration of natural habitats in the former reservoir area post dam removal
- Activities:
  - Invasive exotic vegetation removal
  - De-compact and hydoseed construction work areas
  - Monitor natural vegetation recruitment
  - Seed and re-seed stable reservoir areas out of compliance with goals
  - Monitor fish passage conditions in former reservoir
Dam Removal 65% Design
Engineer’s Opinion of Probable Cost

- AACEI Class 3
- Assumptions:
  - Contractor Job Office OH: 22.5%
  - Contractor Home Office OH: 5%
  - Bonds: 1.5%
  - General Liability Insurance: 1.5%
  - Contractor Profit: 7%
  - Taxes (material and equipment): 7.25%
  - Design Contingency: 20%
  - Construction Contingency: 10%
  - Client SIOH: 6.5%
## Dam Removal 65% Design

### Engineer’s Opinion of Probable Cost

<table>
<thead>
<tr>
<th>Work Item Number</th>
<th>Work Item Description</th>
<th>Quantity</th>
<th>Unit of Measure</th>
<th>Cost</th>
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<tr>
<td>01</td>
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<td>11-foot steel corrugated metal pipe</td>
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<td>Fish ladder demolition</td>
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**Subtotal** $37,684,177

**Owner’s Construction Contingency** $3,768,418

**SIOH** $2,694,419

**Total** $44,147,013
Dam Removal 65% Design
Items Not Covered in this Submittal

• Orifice and reservoir drawdown hydraulics analyses (covered under pending FEMA grant)
• Orifice tunnel and gate structural analysis and detailed design (covered under pending FEMA grant)
• Public access road deficiencies for construction traffic/loads
• Geology and geotechnical considerations at potential borrow sites
• Geology and geotechnical considerations at potential disposal sites
• Hazardous materials characterization (Phase I or II Environmental Site Assessment) for dam or other facilities
Downstream Erosion Screening

Scope

• Scope: Assess the likelihood of riverbank erosion given available information related to bank properties and hydraulic variables
1. Erosion Rate is proportional to the excess shear stress above a critical value
   • Important parameters
     § constant of proportionality (erodibility coefficient) -- larger values have higher erosion rates
     § applied shear stress – larger values cause more erosion
     § critical shear stress for erosion – larger values result in less erosion
     § height of inundated bank – taller banks can erode more

2. Critical Shear Stress - function of bank material weight and angle of bank relative to angle of repose
   • Important parameters
     • Weight of material
     • Angle of bank
     • Angle of repose of dominant bank material
Downstream Erosion Screening
Data Used in Analysis

- Range of critical shear stress:
  - \( t_c = 14 \text{ to } 43 \text{ N/m}^2 \)
  - \( t_c = 0.029 \text{ to } 0.898 \text{ lbf/ft}^2 \)
Downstream Erosion Screening
Changes in Velocity and Shear Stress (based on 2-D model results)

Proposed – Existing Velocity (552 hr)

Proposed – Existing Shear Stress (552 hr)

Friend’s Ranch area
Kennedy Canyon
Robles Diversion Structure
Oso Residences
Downstream Erosion Screening
Erosion at Friends Ranch

Areas of Deposition
Proposed – Existing Velocity (ft/s)
Erosion Rate (ft/hr)

Existing flood boundary
Downstream Erosion Screening
Erosion at Kennedy Canyon

Areas of Deposition
Proposed – Existing Velocity (ft/s)
Erosion Rate (ft/hr)

Existing flood boundary
Downstream Erosion Screening
Erosion at Oso Road

Areas of Deposition

Proposed – Existing Velocity (ft/s)

Erosion Rate (ft/hr)