



GUARDIANTM

RETENTION SYSTEMS

**NORTHERN CALIFORNIA
DEMONSTRATIONS**

NORTHERN CALIFORNIA DEMONSTRATIONS



In 2013 Guardian Retention Systems, LLC performed a demonstration for San Francisco Water Power Sewer. This demonstration consisted of (3) different sites.

SITE 1)

ISSUE: Sediment reaching Hetch Hetchy Aqueduct

SOLUTION: Install 4' FlexiShield™ system at source of runoff to slow velocity and filter rainwater of sediment caused from erosion

SITE 3)

ISSUE: Water runoff presenting erosion issues for existing headwall

SOLUTION: Install 2' PermaShield™ system at edge of headwall to create erosion protection and help solidify headwall wing

SITE 2)

ISSUE: Water runoff from mountain side presenting erosion issues for unprotected roadside slope

SOLUTION: Install 4' FlexiShield™ system and 2' PermaShield™ system to divert water to area that roadside slope contains vegetation and protect roadside shoulder from erosion

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SITE 1) Hetchy Hetchy Aqueduct Sediment Protection

It was determined to use FlexiShield™ system to provide a multi-purpose barrier. The FlexiShield™ system would be used to slow down velocity of flowing hillside rainwater, and to provide a filter system to keep sediment out of Hetch Hetchy Aqueduct. The 4' FlexiShield™ required mild excavation to accept the width of the system. The system sat directly onto existing soil.



Hillside where water source originates



Culvert leading to Hetch Hetchy aqueduct

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SITE 1) Hetchy Hetch Aqueduct Sediment Protection

Rainwater would be halted at system edge and slowly enter through backside bottom opening. After filtering through granite stone, water would exit out frontside and flow into under road culvert.



FlexiShield™ system installed and ready

Final touches after excavator dumped 3" Granite Stone into FlexiShield™

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SITE 2) Unprotected Roadside Slope

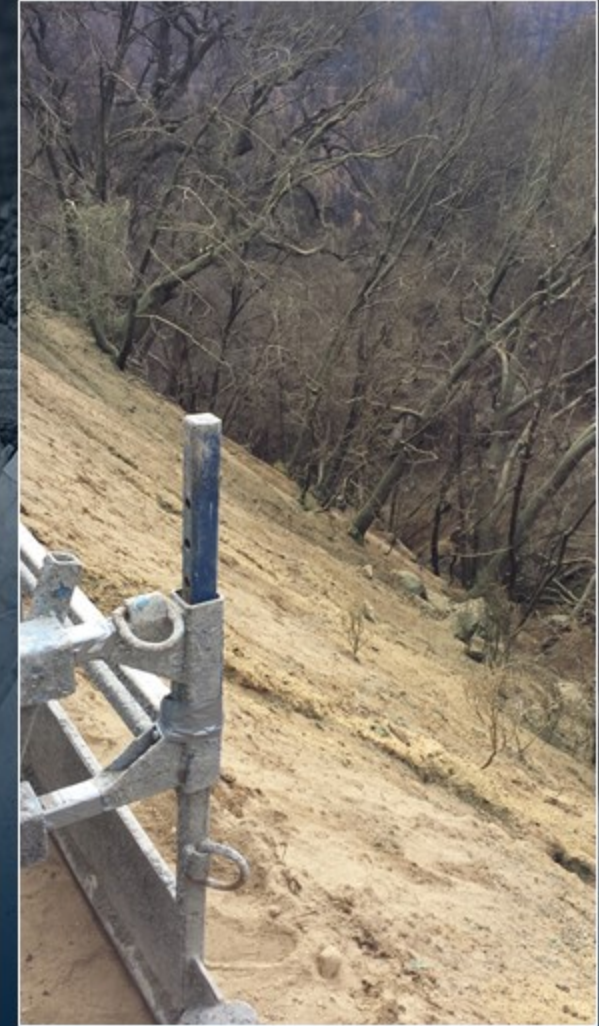
It was determined to use a combination of 4' FlexiShield™ and 2' PermaShield™ to divert rainwater to area of vegetation protection. The PermaShield™ system was buried 1' into roadway edge and filled with natural sand.



Hillside where water source originates



Road shoulder concern area



Roadside bank concern area

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SITE 2) Unprotected Roadside Slope

The FlexiShield™ will serve to divert the rainwater into the PermaShield™ system on the edge of the highway. The PermaShield™ system will carry the water to an area where it can flow down the hill through vegetation causing no damage.



FlexiShield™ installed beneath runoff source



PermaShield™ buried 1' beneath surface



Looking at water diversion path to PermaShield™

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SITE 3) Unprotected Headwall

It was determined to use 2' PermaShield™ filled with concrete to protect from erosion around existing headwall. The system was partially buried 1' and butted against headwall wing.



Looking uphill where rainwater generates velocity



The PermaShield™ installation sled is set into place at edge of headwall

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SITE 3) Unprotected Headwall

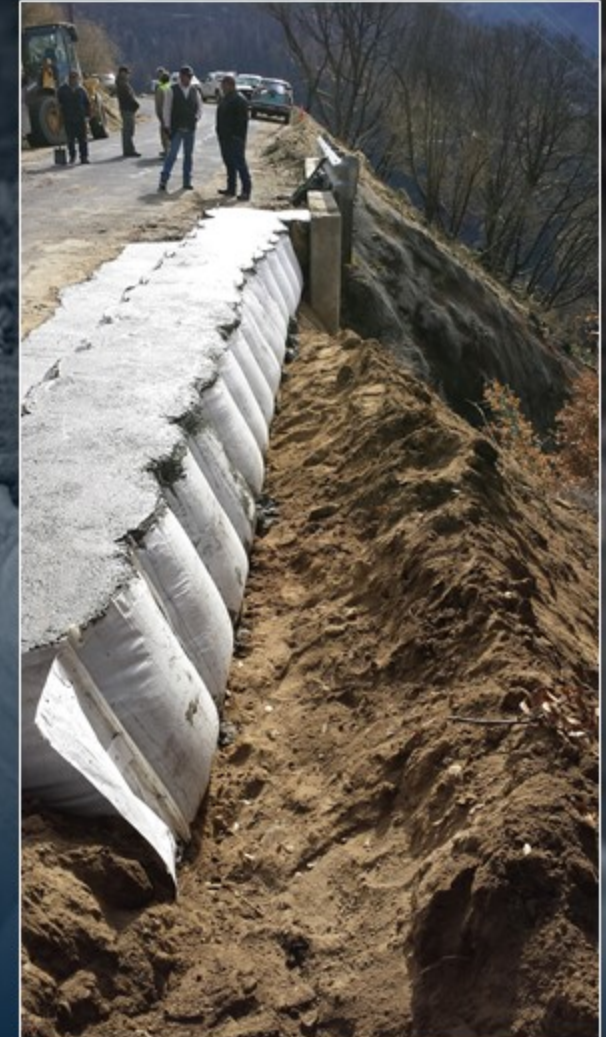
The buried system was installed with hand poured concrete gutter to ease direction of water flow. This system will serve as roadside shoulder and slope protection.



PermaShield™ filled with concrete and gutter being established



PermaShield™ system is turned to key into edge of existing headwall



Headwall and highway edge protected against rushing rainwater

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DEMONSTRATIONS FOR:

REFERRAL:

Hetch Hetchy Water & Power

Ray Klein

Superintendent

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