

Palomino Road Repair Project Using Tire-Derived Aggregate



Palomino Road Slide Repair Project

Background and Timeline

Original Construction

- ❖ Privately constructed roadway acquired subsequently by County of Santa Barbara
- ❖ Cut/Fill operation, with excavated materials re-used as fill on downward side of the roadway.
- ❖ Use of highly expansive native materials as roadway sub-base and embankment fill. Optimum moisture and compaction likely not obtained during construction.
- ❖ Settlement and roadway cracking has been ongoing for last 25 years

Current Maintenance

- ❖ Roadway has been diligently crack-sealed and overlaid with fresh asphalt for last 2 decades or more.
- ❖ As the down-slope portion of the roadway has settled, new asphalt and asphalt concrete dike have been added to direct water to drainage facilities.
- ❖ Increased weight on supporting soil and embankment contributed to continuing failure of lane and AC dike.



Jesusita Fire

- ❖ Heavily used by emergency service vehicles, utility repair vehicles, and contractors to demolish and repair damaged houses (12 houses on Palomino destroyed).
- ❖ Weight and vibrations of the heavy vehicles caused further damage to already failing roadway.
- ❖ Outside lane of traffic closed due to instability

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Pre-Project Conditions

- Extensively failed roadway structure section
- Previous repairs included installation of intercept drain.
- Sole access point for 50 single family residences.
- Continued failure exacerbated by heavy equipment post-Jesusita Fire (2009) caused County to close southbound lane of traffic for safety.
- Single lane stop-controlled traffic control in place for 1 year.



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Subsurface Materials

Native Soils at Project Site

- Rincon Shale Formation
 - Marine mudstone and shale that readily degenerates into highly expansive clay
 - These clays expand when wet and then contract when dry, creating vertical cracks that allow water to seep into the ground.
 - Soil failure tendency typified as soil creep slumps and shallow landslides that are generally restricted to depths of 15 feet or less
 - Failures often occur at the interface between the weathered / un-weathered materials, where water has been able to penetrate after a period of rainfall or where percolation of irrigation or runoff water has occurred.
 - Soil readily sloughs when above optimum water content or when consolidated (compacted) to less than 90% of maximum dry density.



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Project Design Restrictions

- Maintain access to residents throughout the project.
 - 10 foot travel width maintained to allow construction and emergency vehicle access.
- Project confined to southbound (downslope) lane of traffic
- Right of way restrictions downslope constricted width of project
 - Generally confined to existing roadway width, except where failure had left vertical embankment support.
- Utility Corridors at four locations within project
 - Cells for tire-derived aggregate must avoid utility corridors, and not interrupt service.



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Roadway Repairs using Tire Derived Aggregate (TDA)

What is Tire Derived Aggregate?

- Lightweight fill product derived from the shredding of used tires.
- Used tires cut to approximately 8 inches or less, with minimal crumb rubber produced. Exposed steel minimized.
- Approximately 75 tires per cubic yard of TDA (or 100 tires per ton of TDA)
- Material is placed and compacted with standard construction equipment and techniques. Placed by bulldozer and compacted by steel drum roller. No water is needed for compaction.

Properties

- 1/3 the weight of traditional soil materials
- 1/2 the earth pressure than traditional soil materials
- 10 times the permeability of traditional soils



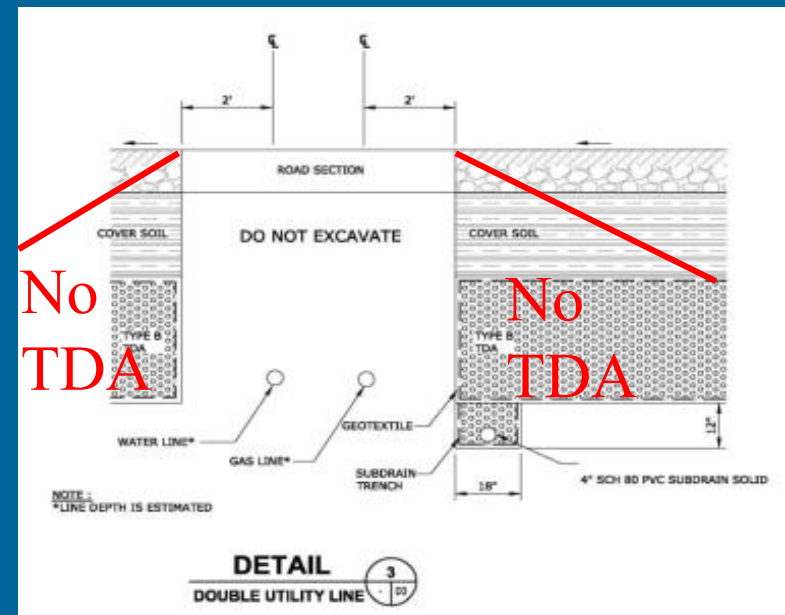
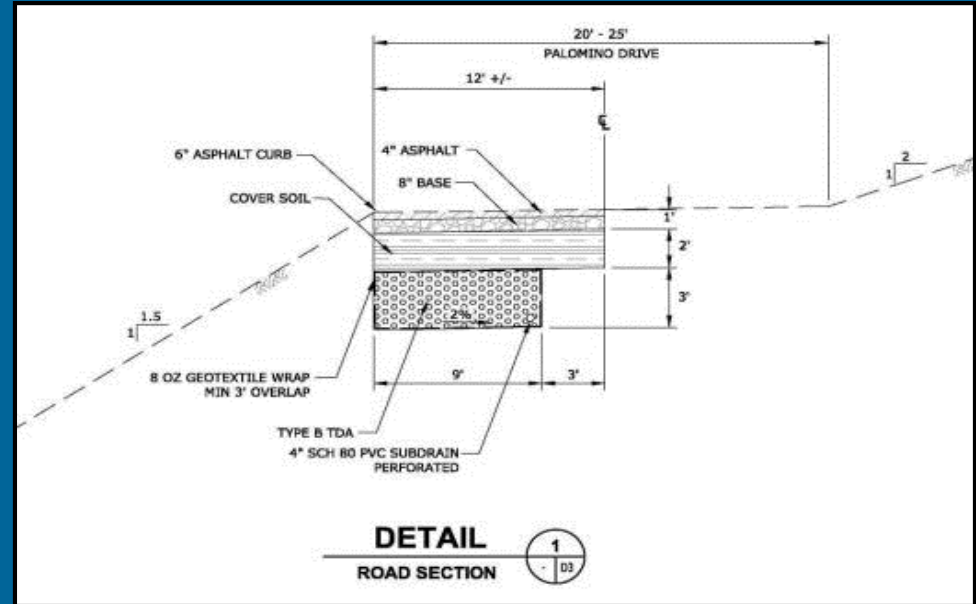
Mobile Tire Shred Mill and TDA Type B Product



Palomino Road Slide Repair Project Design

Scope of Repairs Included:

- 400 ft long by 9-12 ft wide by 6 ft deep excavation.
- TDA replaced existing subgrade materials. 2 feet of granular material for cover soil was compacted atop TDA. Full structure section constructed (4" AC over 8" CL-II AB)
- TDA wrapped in geotextile materials to prevent mixing of soils and TDA. This reduces the chance of temperature increases and maintains drainage characteristics of TDA. Sub-drain installed to intercept and redirect any subsurface infiltration of water.
- Installation of Tensar Triaxial Geogrid across width of excavation within roadway for additional support.
- The existing asphalt concrete dike was replaced for the length of the repairs, to direct storm water to an existing drainage inlet near the project.
- Adjacent lane of traffic remained open, with flagger controlled traffic. Temporary concrete railing utilized to protect traffic from excavation.



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Project Funding and Responsibilities

Pilot Project with CalRecycle

CalRecycle Responsibilities:

- Engineering Design
- Contract to Process, Produce and Deliver TDA
- Contract for: Excavation, Compaction, Placing TDA, Drainage System, Placing Low Permeability Soil Cover

SB County Responsibilities:

- All Permits, Utility Coordination and Environmental Compliance
- Peer Review and Design Approval
- Erosion Control and Roadway Structure Section Construction
- Traffic Control
- Temporary Stockpile and Disposal of Excess Materials (excluding TDA)



Project Funding

CalRecycle (formerly California Integrated Waste Management Board))

SB County - Measure D & Prop 1B (Local Gas Taxes)







End of Story??





Failures Outside the Limits of Project

