

## **Update on Physical Barriers for Weed Control**

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Caltrans Integrated Vegetation Management Program consists of seven different methods of vegetation control. When using structural or physical barriers, Caltrans has a variety of materials and products to choose from. Hardscape (or hardscaping) and structural methods are interchangeable terms. Basically, hardscape is the use of hard inert material surfaces such as stamped asphalt, patterned concrete and rock cobble – in comparison to living soft material surfaces such as organic mulches and fully landscaped areas. Caltrans has ten different highway hardscaping treatments. Four products will be discussed further in detail - fiber weed control mats, rubber weed control mats, CRMCrete and cullet.

When choosing an appropriate vegetation management strategy, Caltrans considers safety for our highway maintenance workers, safety for the traveling public, and how structural controls can lead to increased mobility. Generally, structural methods involve higher costs during initial installation (which sometimes get expensive), but they lead towards reduced maintenance needs, resources and costs in the long run. Structural elements are the best way designers can assist maintenance forces in achieving Caltrans' herbicide reduction goals. Hardscaping can unify and tie elements together and be aesthetically pleasing. There are a wide variety of treatments, colors and patterns available. Structural methods can also decrease sight distance concerns, improving safety. Hardscaping works best is in small areas that are difficult to access and maintain, such as under guardrails and bridgerails, around signs and delineators, and in narrow areas that motorists drive into, such as gores and areas between ramps.

It is important to really KNOW your site before deciding upon which type of product might work best for you and your site. Are there defined edges such as concrete borders or curbs? Is the site an unusual shape or area – such as a triangular area being covered with rectangular products? Is the site inconvenient for worker and equipment access? How much time is allowed in your work window? Every site has slightly different characteristics and issues to consider before choosing one product over another.

Fiber Weed Control Mats are synthetic polyester fibers spun together to create a mat that prevents weed growth but allows water and air to percolate. Steel guardrail posts have fabric collars slipping over their top, which are then sealed to the mat below with caulking to prevent openings.

Fiber weed mats have been installed at Caltrans sites since 1999. The first installation was at the Mad River Bridge approach area, between two raised separated two lane highways going each way. The product was installed in the narrow, steeply-sloped center drainageway where vegetative growth was unwanted. The product is still performing well today, 12 years later.

Recent new three-beam and guardrail project installations are bladed evenly down the center divide, then installed with excellent ground preparation work. Wrap the product up and around the guardrail to tie it off above the ground when doing paving overlays directly adjacent to the product. A site near Garberville in Northern California has performed well over the past 12 years. Fiber weed control mats are considered a successful treatment by Caltrans. Current installation costs (at prevailing wage) are approximately \$35 - \$80 per square yard.

Rubber Weed Control Mats were originally developed for the recreation industry to address playground safety surfacing and the American Disabilities Act. The product consists of recycled tire rubber bonded together with a resin through a cold press process into a mat that lies directly on the ground. Rubber weed control mat tiles prevent sunlight and water from reaching the ground surface, thus retarding seed germination and plant growth. Flammability can be a safety concern due to toxic smoke produced when burning. The first Caltrans installation was underneath median guardrail over 8 years ago in the Santa Cruz area.

Rubber Weed Control Mat Installation includes uses under new and existing guardrail, three-beams, and bridgerails, around sign posts and under fences. The tile's weight keeps the mat in place, so normally staking or stapling is not required. Tiles are joined together with an overlap that is usually sealed with asphalt crack filler or resin adhesive. Manufacturers have different methods of joining their products. Staples, overlaps, glue strips, caulking, and sealants have been used, depending upon the specific manufacturer. However, after time, the rubber product tends to shrink and pull away from wood posts. Follow-up maintenance is necessary.



Installation methods have improved over the years. No more kneeling, gluing and sealing small squares or mats. Break out the big equipment! Use long linear rolls of product and drive the new steel guardrail posts directly through it. Use individual large mats for curving areas and rolled mats for the straight-aways. Costs now run approximately \$25 to \$45 per square yard (at prevailing wage).

CRMCrete stands for Crumb Rubber Modified Concrete. CRMCrete is a concrete-based product that includes recycled scrap tire crumb rubber material and homopolymer polypropylene high performance reinforcing fibers, all blended into a slurry. CRMCrete utilizes a product that currently adds to California's existing waste stream. It helps to keep tires out of our landfills and gives a 'gold star' to agencies willing to partner with other agencies.

Caltrans has installed CRMCrete around sign posts and guardrails. Placement/installation is similar to that of concrete and stamped concrete. Typical CRMCrete installation includes pouring CRMCrete into place, tamping and leveling as necessary, and finishing. CRMCrete normally doesn't require the same level of formwork as standard concrete. Polypropylene fibers act like rebar or welded wire mesh. 'Leave-out sections' around the posts are necessary to allow the safety rail post to twist and bend upon impact. It also allows simple repairs for maintenance crews, since the leave-out section is the only area typically needing repairing. It breaks first upon impact due to its grout mix (instead of concrete in the leave-out sections), thus saving the rest of the area from breakage.

Caltrans crash tested the product in 2006 to determine if FHWA safety guidelines have been achieved. Caltrans' Standard Plans have been revised to include this product statewide as a standard for use in guardrail, bridgerails and thrie-beam installations.

Current installation techniques also became bigger, faster and included larger paving equipment. A recent application covered 3,000 feet in one day. The cost has been greatly reduced too – the product came in at \$3.25 per square foot, or just under \$30 per square yard installed on the recent Redding Interstate 5 site (at prevailing wage). CRMCrete is closer in price to that of fiber and rubber mats and has longer durability and lifecycle costs. CRMCrete has become a successful hardscaping product for Caltrans.

Cullet is the professional term used when referring to recycled glass mulch. Results are not yet conclusive, with half the sites passing and the other half failing. Cullet is applied similarly to wood mulch. Lay a barrier between the soil and the recycled glass mulch (just in case it may need removal at a later date). We have tried Visquene and the typical black weed fabric. Dump the glass mulch on top and spread it out to an even thickness. Caltrans typically uses cullet in the



$\frac{1}{2}$ " to  $\frac{5}{8}$ " size, in a wide variety of colors, and sometimes up to 1" size. If you want to be creative, pick specific colors of glass for aesthetics.

Once successful cullet location is downtown Los Angeles in the median along Highway 101, behind the guardrail, installed to prevent homeless from setting up their tents and living in this area. It has been very successful at this location in reducing homeless squatting, although currently there are some weeds sprouting through the recycled glass mulch. At a northern California site, Caltrans put cullet under guardrail without an underlayment. Seven years later, cullet is still successful in the compacted areas underneath the guardrail! Unfortunately, cullet has not been successful in landscaped areas with weeds coming through the product in less than 3 years after application. More test sites are needed to determine whether or not cullet will be successful.