



SAFER ROADS SAVE LIVES

**Social and Environmental Responsibility
Task Force Report: Guardrail Committee**

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TO: ATSSA Operating Committee

FR: ATSSA Guardrail Committee
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RE: Social and Environmental Responsibility Task Force Report

Can we meet today's transportation needs while remaining responsible stewards of the environment? This question has been asked for several years now and has yielded some impressive answers, especially in the recycling and reuse of transportation materials such as asphalt, concrete, and rubber. However, the transportation industry continues to search for ways to maintain the traffic network with limited budgets while at the same time maintaining the environment. In this effort to maintain the safety of current roads, save money, reduce landfill usage and reduce the use of our limited natural resources, several sectors of the transportation industry have turned their focus to guardrail as a potential cost-saving and environmentally responsible measure.



Efforts to maximize the potential in guardrail have come from several sources. These sources include several state DOT's, the transportation research sector, the private sector, and the guardrail industry itself. Here are some examples.

State Departments of Transportation

Washington

Contractors have the option to purchase recycled products when contracted to work on WSDOT projects. Currently, WSDOT specifications allow for recycled content in guardrail posts and blocks.

Virginia

Existing galvanized guardrail that is to be removed and is acceptable for reuse as determined by the project field inspection, may be reused in accordance with the Special Provision for Reuse Guardrail.

North Carolina

Maintenance staff and contractors are encouraged to use guardrail posts as landscape timbers.

Kentucky

The Kentucky Department of Highways has an in-house recycling operation for used guardrail and guardrail posts. The used materials are obtained from removal of existing guardrail included in normal contracts for reconstruction, rehabilitation, and widening of existing highways, mostly from interstate highways. The guardrail from these projects is delivered to a



yard operated in Frankfort, KY. Prison labor straightens damaged or bent rail and posts using a rolling machine that can straighten the rail and posts and restore the "W" shape to the rail element. The straightened rail and posts are then picked up, regalvanized, and returned to the yard by a contract vendor.

The used rail and posts are then furnished to maintenance crews for repairs. The state also lets contracts for replacement of old guardrail or

installation at new locations on existing roads. These contracts include a Special Provision that specifies that the state will furnish the rail and posts to be picked up and erected by the contractor or new timber offset blocks from stock. The bid unit is linear feet of guardrail system installed. Cost savings can be documented by the difference in average unit bid costs for all new rail systems compared to the average unit bid costs for recycled systems plus the unit prices for the regalvanizing operation. Recent savings have been in the range of \$2.00 per linear foot. Due to the recent spike in the steel commodity prices, anticipated savings this fiscal year will be greater.

Use of recycled guardrail on new construction projects or major reconstruction/rehabilitation projects is not allowed. These projects must always use all new materials.

The Department also reuses guardrail as cribbing for roadway slides.

Texas

Almost all metals contain some recycled content. Steel and aluminum are common in road construction, both are highly reusable and recyclable. Salvaged from automobiles, appliances, and construction materials, steel is vital to bridge building and repairs and reusing aluminum signs is cheaper than buying new ones. Also, state roadways contain recycled-content metals in concrete reinforcing bars (rebar), guardrails, sign posts, and manhole covers.

Research Institutes

Texas Transportation Institute

A study on recycled guardrail focused on TxDOT's efforts to recycle. In Texas, guardrail systems are categorized as strong-post guardrail systems. In a strong-post guardrail system, the guardrail posts are relied on as an integral part of the system to help dissipate the energy of an impacting vehicle and control lateral deflections. For a recycled guardrail post to be a viable alternate in strong-post guardrail applications, it must be capable of providing continuity of dynamic deflections with conventional wood and steel posts.

A testing program indicated one of the tested products had desirable characteristics for use as a guardrail post in strong-post guardrail applications. The post is comprised of recycled HDPE with recycled chopped fibers added for additional strength and stiffness. The dimensions, strength, and energy dissipation characteristics of this recycled post were found to be similar to those of conventional wood guardrail posts. Moreover, flexure tests performed on these posts indicated a high degree of performance consistency both within and between two different shipments of posts from different production runs.

Private Sector (Standard Construction)

By focusing on recycling during the planning stage, the cost savings and environmental savings can be significant. Here is one case study.

Ford

Ford's Michigan Proving Ground is undergoing a \$13 million overhaul to its high-speed test track in Romeo, Mich. The investment is significant not only for what it will do – increase the

company's vehicle quality testing capabilities – but also for what it won't do. Thanks to its green approach, the construction project won't contribute 130,000 tons of debris to local landfills.

Rather than hauling away tons of demolition debris from the old track and trucking in new materials, the plan was to reuse nearly every bit of existing material, sending whatever couldn't be repurposed to a recycling center.

The process works like this: The old track is shattered into pieces, removed and transported to an onsite crusher, which processes the asphalt and concrete into recycled aggregate that is appropriately sized for road construction. The recycled aggregate is then transported back to the track, placed eight inches thick, compacted in place and covered with four layers of asphalt.

Meanwhile, the guardrail – all 20,420 linear feet of it – is unbolted and inspected to determine which portions can be reinstalled at the end of the project. The unusable steel beams are sent to a recycling center and the wood posts are mulched.

“Between the 130,000 tons of asphalt and concrete and the miles of guardrail, we're reusing and recycling around 200,000 cubic yards of material that would have ended up in a landfill,” says Scott Redmon, development engineer at MPG. “That's the equivalent of a 12-story building on a one-acre footprint.”

Private Sector (Post-Market)

It is possible to “up-cycle” – take something (in this case, guardrail) and turn it into something of more value. Many companies, as part of their business plan, retask used guardrail. By retasking the used guardrail, the savings are increased due to bypassing the scrap yard totally and avoiding the costs in melting the steel down. Here is an example of a company based on retasking used guardrail.

Livestock fencing business

Livestock Steel, <http://www.livestocksteel.com/home.html>, purports to offer the strongest, most durable, yet the most cost-effective fencing solution for your livestock. According to their website, used guardrail or bridge guardrail offers the best bang for the buck for corral fencing. Guardrail fencing is bulletproof, cost effective and easy to install.



Guardrail Manufacturing Industry

Many of the most effective recycling efforts come directly from the guardrail manufacturing industry. Here are some of the initiatives currently underway in the industry.

Environmental Initiatives

- All products are 100% recycled materials. Galvanized steel guardrail is a 100% recyclable material – no “end of life” environmental impact (zinc and steel are 100% recyclable). This would include the posts and panel.
- The materials they purchase are also recycled,
- Galvanized process – uses less lead and less gas to heat the kettle,
- Raw materials that are bought from mills to make new guardrail is recycled,
- Use of plastic materials – flexible delineation, plastic-blocks and barrier products all use recycled content. Certain DOTs have mandated plastic blocks have to have a portion of contents recycled,
- Environmentally friendly wood and recycled composite “block-outs” are used between the guardrail post and panel,
- Equipment around mills to reuse rolling oils,
- Scrap bin onsite,
- Sort materials onsite,
- Pick up directly from jobsite – save time, money, and fuel to truck materials to scrap yard or different location,
- Run an efficient jobsite – stack materials appropriately.

End terminals

- Yielding action minimizes roadside debris often found with conventional wood post options.
- Reduction in parts inventory.
- Galvanized steel reduces issues with wood posts caused by weather.
- Recycled steel offers environmentally sound options as compared to chemically treated wood posts.



Offset Blocks

- Block is considered a “green” product, environmentally safe and recyclable.
- Molded product reduces inconsistencies sometimes seen in wood blockouts.



Social Initiatives

- We have a social responsibility to protect those who drive our nation's highways – the intent is to save drivers from harm in the event they are involved in an accident caused by themselves or others
- Guardrail products (posts, panel, blockouts) are highly engineered and crash tested to perform correctly upon impact – intended to save lives by slowing the vehicle down in a controlled manner. They protect against steep slopes, cross over accidents, and areas with run-off-the road implications.
- Guardrail end treatments and impact attenuators are used in high risk areas or to shield blunt objects and slow vehicles down in a controlled manner
- Aesthetically pleasing wood guardrail and powder coated rail are used in public parks, recreation areas, and projects with aesthetic importance

Summary

The guardrail industry continues to make great strides in our social and environmental initiatives. The industry continues to recycle and reuse an immense amount of product every year. One estimate calculated that 14 million pounds of guardrail panel, guardrail posts and hardware is recycled or reused and more importantly, not sent to a landfill. These items go into various projects such as municipal highway safety, industrial safety, private, agricultural, erosion control, raceways, export for foreign use, homeland security and many other applications.

By maintaining a growing, solid base for re-usability of guardrail materials we can continue to out-bid scrap prices for our customers and also reduce the amount of energy used in the entire process.