

BACKGROUND – Waste tires can function as source of fill material to raise the road profile to correct drainage problems and curb sediment pollution caused by severely entrenched roads. The use of tires as sub-base is consistent with sound environmental maintenance. Plus, this innovative use of tire bales helps to reduce the state’s growing volume of waste tires. Waste tires are readily available, provide a sturdy sub-base, and allow natural drainage processes to occur. Different roads require different forms of fill, and waste tires can be processed in several ways in order to meet these different needs. Shredded tires can be used to raise comparatively shallow road beds, while severely entrenched roads require a greater amount of fill. Tire bales, 2.5x4.5x5’ rectangular cubes of whole compacted tires, provide a cost effective alternative to shreds where a considerable amount of fill is needed to raise driving surface to an elevation higher than the surrounding terrain.



A tire bale consists of approx. 100 tires, measures 2.5x4.5x5’ and weighs approx. one ton.



Tire bales are placed across the bed of Diehl Road, Madison Township, Columbia County.

PURPOSE – A severely entrenched road, often referred to as “sunken,” is a section of road where the road surface is lower than the surrounding terrain. Roads become entrenched over time as a result of traffic wear and tear, erosion, and routine maintenance activities of grading and snowplowing. During rain events an entrenched road functions like a stream channel, accepting precipitation, concentrating drainage from surrounding land areas and receiving stormwater from driveways, farm lanes, and other intersecting “tributaries.” This funneling causes the water to gain volume and velocity, become “hungry” and aggressively consume erodible surface material and soil in the ditches and banks along its path. Often, the most cost-effective solution to stop the continuing cycle of costly erosion and harmful pollution caused by severe road entrenchment is to fill the void space by “raising the road profile.” Waste tires are a suitable, low cost material to use as road fill to raise the road surface to an elevation higher than the surrounding terrain so that natural drainage patterns are restored.

BENEFITS OF TIRE BALES– For severely entrenched roads (i.e., exceeding 3-4 feet below surrounding terrain), tire bales can be an ideal source of road fill. Tire bales have many positive physical characteristics for use as road base:

- In rectangular form, bales can be processed, stored, transported and placed with simple machinery;
- Tire bales are permeable and well insulated, allow free drainage and resist frost heave;
- Lightweight and sturdy, bales are highly resistant to compressive force and shear stress; and
- Tire bales are non-toxic to groundwater quality.

WHERE TO USE – Tire bales are ideal for roads:

- Deeply entrenched causing drainage problems and snowplowing difficulties;
- In reasonable proximity to waste tire source (tire pile).

CONSIDERATIONS – Waste tires pose dangerous health and environmental risks when collected in large piles that provide a breeding ground for West Nile Virus -carrying mosquitoes and threaten catastrophic tire fires. Tire bales as road fill present a beneficial end use by eliminating these threats.

TIRE BALE ROADS IN PENNSYLVANIA –

Pennsylvania's first "tire bale road" has recently been completed in Jerseytown, Columbia County. This demonstration involved a nearly mile-long stretch of the Diehl Road and incorporated nearly 210,000 waste tires from nearby Starr Tire Pile, home to Pennsylvania's largest waste tire pile with an estimated 6-8 million tires. Funds for the project were granted through PA-DEP's Starr Waste Tire Reuse Grant Program, established to eliminate the pile through application of innovative, efficient, and beneficial waste tire uses. The program funds projects that create new products/uses from waste tires and encourages new technology, innovation, and the creation of new markets and economic opportunities in local communities.

CONSTRUCTION SEQUENCE

- Identify and shape severely entrenched sections as necessary to establish slightly sloped sub-base to allow drainage to low side.
- Set tire bales across the roadbed.
- Backfill void spaces in tire bales with fine grain, well-draining material such as sand or bottom ash (used at the Diehl Road site) and spread over the entire tire bale sections.
- Apply three (3) distinct 6-inch lifts of shale cap and compact between each layer. Shape sub-base to form adequate road crown or slope (1/2 to 3/4 inch rise per horizontal foot).
- Apply 8-inches Driving Surface Aggregate (DSA) through paving machine and compact to 6-inches with vibratory roller per DSA placement specification. DSA is abrasion resistant stone mixture choked with fines and placed at optimum moisture to maximize compaction for a durable driving surface.

RAISING THE ROAD PROFILE WITH TIRE BALES AS SUB-BASE

BEFORE



DURING



AFTER



Above: Photo sequence of tire bale section along Diehl Road demonstration site. Compare roadbed to surrounding vegetation and notice how the road profile has been significantly raised.