

## Methods for Traffic Stripe Removal

Pavement marking removal due to changed traffic configurations is a continual construction and maintenance problem. Often the removal alters the texture and/or color of the pavement surface. The removed markings become visible under different lighting and weather conditions, which can confuse motorists, especially in cases where the removed stripe becomes more visible to drivers than the new marking.

Environmental effects of stripe removal and collection of materials must be considered. And while standard specifications describe how to remove markings, they do not provide a way to measure the effectiveness of the removal.

ODOT's Traffic Paint Stripe Removal contract allows the contractor to remove painted or thermoplastic striping material by sandblasting, shot blasting, grinding, or other Department approved method. No one method appears superior for use under all conditions.

This research note provides information about striping removal methods and discusses the results of ODOT field trials conducted in 2001.



Removal using Soda Blast



The Blastrac in action.

### Tests from Florida and New York

Although stripe removal is a challenge faced by many highway agencies, there has been little research on removal methods.

In their 1999 study, the Florida DOT investigated stripe removal using grinding, waterblasting, and a combination of the two. Eight lines (each 100 ft. in length by 6 in. wide) of different type and thickness were placed on an asphalt concrete test deck for the tests. Water-based paint, thermoplastics and pre-formed tape were removed.

The ultra-high pressure, low-volume waterblasting was found to be the most efficient removal method. Production rates were relatively high and there was minimal scarring of the pavement when this method was used. Although the water blasting method was found to be superior, researchers recommended that the Florida DOT *not* specify one method over another, because operator skill and experience significantly affected the removal results.

The table below provides a summary of the Florida paint removal tests. More information can be found at [www.dot.state.fl.us/Research-Center/792.htm](http://www.dot.state.fl.us/Research-Center/792.htm).

## Florida Department of Transportation Paint Removal Tests

Marking Type and Thickness	Removal Method	Equipment and Procedure	Removal Time (min)	Removal Rate (ft/min)	Degree of Removal*
Water-based Paint, 20 mil	Waterblast	36,000 psi, 4.5 gal/min, 2800 rpm, single pass	3.1	32.3	5
Thermoplastic, 100 mil	Waterblast	Same as above. 80% removal on first pass, 20% removal on second	5.2	19.2	4
	Grind, Flush & Waterblast	Same as above. Also, 9 HP Edco grinder	7.5	13.3	4
Thermoplastic, 90 mil	Waterblast	Same as above, but lowered nozzles closer to line surface.	5.5	18.2	4
	Grind & Overlay	Edco 9 HP grinder	3.5	28.6	4
	Grind	Edco 9 HP grinder	4.2	23.8	3
	Waterblast, Hand Unit	36,000 psi walk-behind unit, single pass	8.3	12	5
Temporary Tape, 35 mil	Waterblast	Same as above	4.2	23.8	4

\* Degree of Removal: 5 indicates complete removal and 1 represents a small fraction of removal

An earlier study by the New York DOT evaluated six methods of paint removal, including sandblasting, water- and hydroblasting (a high-pressure waterblast with sand), and grinding. Traffic paint, thermoplastic, epoxy and preformed tape were removed. Sandblasting was the most effective with nearly complete removal on all marking types. Hydro- and waterblasting provided similar results, but performance was highly dependent on the thickness of the marking and the type of equipment used. Grinding was effective in removing even thick markings at relatively fast rates, but left heavy scarring.

### ODOT Field Trials

Last summer, ODOT's Research Group invited vendors to demonstrate their stripe removal equipment at the Woodburn Maintenance Yard. Three vendors accepted the offer:

- The Soda Works – Soda Blaster
- USF Surface Preparation Group – Grinder and scarifier
- Ingersoll-Rand Bobcat® of Portland – Bobcat loader with planer attachment

The test area used twelve painted stripes, 16 m long, painted on the existing asphalt pavement. Six stripes were 0.375 mm (15 mils) thick and six were 0.75 mm (30 mils) thick, and all were 100 mm wide.

ODOT observers viewed each removal process and recorded production rates. Demonstrations occurred in late June and October.

### Soda Blaster

Fred Hansen General Contracting demonstrated the Soda Blaster, an air compressor, tank and hose.

The blasting media was baking soda propelled by compressed air, with the force of the blast controlled by how high the nozzle is held



The Soda Blaster

above the pavement. The process was relatively slow, but very effective in removing the stripes with little scarring. Substantial residue required cleanup by broom or vacuum. According to Soda Works, the soda media is environmentally safe, with the soda not considered an environmental hazard nor are small amounts of non-lead-based paint removed from the pavement surface.

### USF Surface Preparation Group Equipment

USF Surface Preparation Group demonstrated two types of equipment. The larger Blastrac® RM 320 scarifier worked well in removing both the 0.375 mm and 0.75 mm stripes. The Edco Traffic Line Remover is a grinder using tungsten carbide



USF Surface Preparation Grinders

cutters. In the first pass, it removed about 95% of the 0.375 mm stripe, but only about 50% of the 0.75 mm stripe. Both pieces of equipment were faster than soda

blasting, but each scarred the pavement. They also left a residue of asphalt, aggregate and paint. For high production operations, both have fittings for air hose connections to mobile dust collectors.

### Ingersoll-Rand Bobcat®

Bobcat® of Portland used a Bobcat loader fitted with a planer attachment. The operator sat in an enclosed cab, eliminating the need for operator protective gear. The operator cut a 150 mm

swath, but teeth can be added or removed to vary the width of the grind path. The 0.75 mm stripe was removed completely, but only 75% of the 0.375 mm stripe was removed in the first pass, as the operator was adjusting the cutting depth of the planer to match the stripe thickness.

The table shows the ODOT demonstration results. It includes stripe removal rates, estimates of how much of the stripe had been removed and the extent of scarring after removal.



Bobcat and planer demonstration

### Results of ODOT Stripe Removal Tests

Equipment	Removal Rate (m/min)		% Removed First Pass		Degree of Scarring*	
	0.375 mm	0.75 mm	0.375 mm	0.75 mm	0.375 mm	0.75 mm
Soda Blaster	0.26	0.10	100	100	1	1
Blastrac® RM 320 Scarifier	3.11	4.58	95	95	2	3
Edco Line Remover	7.20	4.91	99	50	3	2
Bobcat® Planer	13.42	4.45	75	100	3	4

\* Degree of Scarring: 5 indicates heavy scarring and 1 represents minimal scarring

### Summary

The field trials show that there is no one method that is superior to others. The Soda Blaster was slower but removed 100% of the lines with minimal scarring. The Blastrac® RM 320 scarifier and Edco line remover performed faster, but also removed some of the underlying

pavement. The Bobcat® planer was comparable to the USF equipment, but it too, scarred the pavement surface. Pavement scarring is possible with any of the mechanical removal methods, and operator skill and experience can affect the results in all methods.

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***For more information on ODOT's Research Program and Projects,  
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**<http://www.odot.state.or.us/tddresearch>**