April 28, 2004
File: 8190-2-3-3

Waterborne Durable Paint (HD-21A) Line Trial Project

Subject: **HD-21A Waterborne (Durable) paint lines applied to Hwy. 623**
"Summary of Field observations, April 28, 2004 and related discussion"

HISTORY

Lafrentz Road Marking of Edmonton applied HD-21A durable waterborne line paint (white and yellow) at Highway 623 (E. of Hwy. 814 for approx. 10km) in September 2002. The application of the HD-21A durable waterborne paint consisted of two layers:

White lines (edge lines)
An initial thin layer of 7.2 mil (184µm) and a second layer of 9.2 mil (233µm)

Yellow lines (centerline)
An initial thin layer of 7.95 mil (202µm) and a second layer of 8.4 mil (213µm)

Note: Two layers (applications) of HD-21A paint was applied due to new construction (new pavement) on this project. Ontario's experience with the use of HD-21A paint is to apply it in two thin layers for new pavement. This is due to shrinkage in the paint which will cause the new asphalt to crack. With two thin layers the cracking of the new asphalt is reduced.

One 15mil application is sufficient for roads that are being repainted, where the asphalt is a minimum of 1 year old.

SITE INSPECTION

Observations

Observations of the HD-21A paint lines were conducted by Joe Filice and Ron Stoski on April 28, 2004. Retro-reflective readings were taken at previously determined points using the Mirolux 30 Retro-Reflectometer.

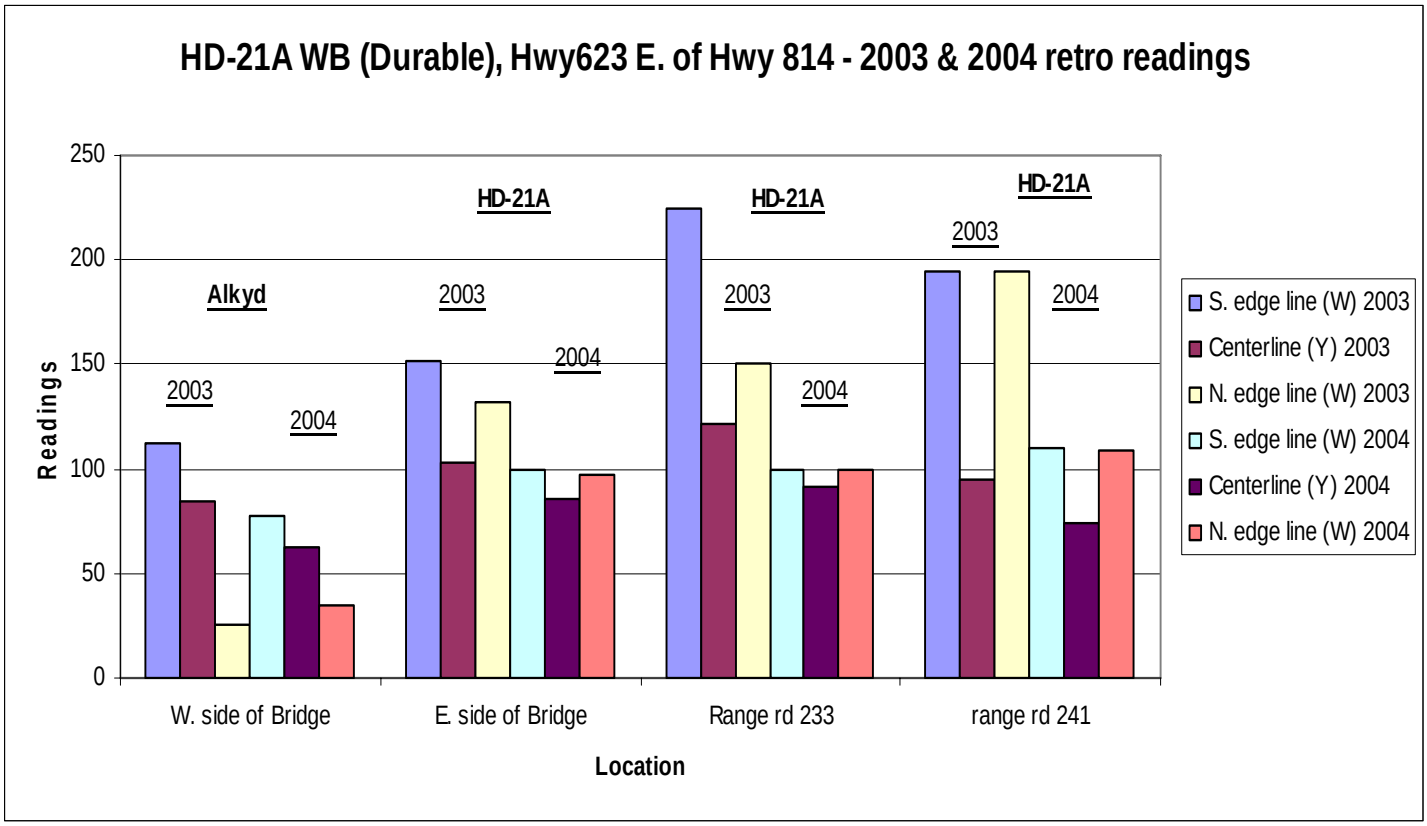
Visual
The paint lines are still performing well and providing very good delineation after 2 winters (see attached photographs taken on April 28, 2004). The paint lines show more wear at intersections due to vehicle turning movements. Some snowplow scraping was also noted in some areas. The HD-21A paint lines up the hill to the east of highway 814 are in poor shape and may need repainting in 2004 (heavy salting may have contributed to the poor performance on the hill). Other

than the poor performance on the hill, the HD-21A paint lines could possibly provide one more season of service at this highway 623 location.

Visual Comparison of HD-21A paint (2 years old) vs Alkyd paint (1 year old)
From a visual perspective the 2 year old HD-21A durable waterborne paint lines are performing better or equal to the 1 year old Alkyd paint. The HD-21A paint lines appear to demonstrate better bead retention than Alkyd paint.

Retro-Reflectivity readings
Retro-Reflectivity readings were taken and compared to readings taken in 2003. Readings have come down since the high readings recorded in 2003 as expected due to bead loss during snowplowing. As illustrated in Chart 1, the two year old HD-21A paint line retro-reflectivity is higher than the Alkyd paint lines applied in 2003. Many of the retro readings for the HD-21A shoulder lines were over 100 millicandelas (MCD) the cut-off value being considered for repainting white paint lines in the United States.

Chart 1



SITE OBSERVATIONS CONCLUSION

The HD-21A durable waterborne paint lines have provided very good delineation after two winter cycles. This type of marking has proven to provide 2 years of service on this section of

highway. Based on the condition of the line markings at this time they could ultimately provide 3 years of service. We must keep in mind that the 2003 annual average daily traffic (AADT) for this stretch of highway is 1890 vehicles per day. Roadways with higher traffic volumes may not perform as well.

RECOMMENDATION

It is recommended that consideration be given to extending this trial for another winter.

Input from regional personnel will be solicited for their opinion on extending this trial.

RELATED DISCUSSION

Other Jurisdictions Experiences

Ontario has evaluated the HD-21A durable waterborne paint on several highways. There findings are as per the following:

- HD-21A durable waterborne paint has performed well for 2 years on a high volume roadway
- On low volume roadways it has perform well for 3 years and possible 4 years.

COST COMPARISONS

Summary

	Alkyd	**HD-21A (new construction)**	**HD-21A (Annual paint program)**
2002 paint application	$8,337.00	$15,969.00	$9,969.00
1-year total	$8,337.00	$15,969.00	$9,969.00
2003 paint application	$5,558.00	$0	$0
2-year total	$13,895.00	$15,969.00	$9,969.00
2004 paint application	$5,558.00	$0	$0
3-year total	**$19,453.00**	**$15,969.00**	**$9,969.00**

Note: See attached cost comparisons for details

The cost comparison shows that the HD-21A durable waterborne paint is only cost effective over 3 years for new construction projects.

The HD-21A durable waterborne paint applied to the Highway 623 trial project has performed very well and will likely provide one more year of service. Therefore for new construction

projects HD-21A durable waterborne paint will likely provide three years of service, which makes it a cost effective alternative to alkyd paint.

For paint lines applied to pavement that have existing paint lines (annual paint program), the HD-21A durable waterborne paint is cost effective over 2 years ($13,895 alkyd vs. $9,969 HD-21A).

DISCUSSION of FINDINGS

The HD-21A Durable Waterborne line marking has proven successful on the Highway 623 trial project. The HD-21A paint lines have performed well on this stretch of highway for the past two years and based on our observations a three year service life is attainable.

On new construction a three year service life is required for the HD-21A paint to be cost effective. For our annual paint line program (painting over worn existing lines) a two year service life would make the HD-21A paint cost effective. However, based on this trial project, 3 year service life seems attainable, making it even more cost effective.

Joe Filice

cc Roger Skirrow
Moh Lali
Nick Bucyk
Ron Stoski
Wilf Cousineau

Cost Comparison based on 10 kilometers (HD-21A WB vs Alkyd) 3 years

Alkyd Paint:

Paint Material costs

2002

Application rate is 38 liters per line kilometer
There are 20 line kilometers of white edge line paint and 10 kilometers of yellow centerline paint for a total of 30 line kilometers (note: roadway centerline is painted yearly with edge lines painted in alternating years).
Cost of Alkyd paint - $2.05 per liter
30 line kilometers X 38 liters/km X $2.05 = $2,337.00

2003
(note: only one edge line painted)
20 line kilometers X $38 liters/km X $2.05 = $1,558.00

2004
(note: only one edge line painted)
20 line kilometers X $38 liters/km X $2.05 = $1,558.00

Total paint material cost = $5,453

Application costs

2002

Cost of applying paint is $200 per line kilometer
30 line Kilometers X $200 = $ 6000

2003

20 line Kilometers X $200 = $ 4000

2004

20 line Kilometers X $200 = $ 4000

Total application cost = $14,000

Total cost for applying alkyd paint for 3 seasons = **$19,453**

HD-21A Durable Waterborne Paint applied to new pavement:

Paint Material costs

2002

Application rate for HD-21A paint is 42 liters per line kilometer (this was applied in two applications)
There are 20 line kilometers of white edge line paint and 10 kilometers of yellow centerline paint for a total of 30 line kilometers.
Cost of HD-21A paint - $3.15 per liter
30 line kilometers X 42 liters/km X $3.15 = $3,969.00

2003
No painting required - $0
2004
No painting required - $0

Total paint material cost = $ 3,969.00

Application costs

2002

Paint was applied in two thin applications
Cost of applying paint is $200 per line kilometer

First application

30 line kilometers X $200 = $6000

Second application

30 line kilometers X $200 = $6000

2003
No paint required - $0
2004
No paint required - $0

Total application cost = $12,000

Total cost for applying HD-21A paint for 3 seasons = **$15,969.00**

HD-21A Durable Waterborne Paint on existing paint lines:

Paint Material costs

2002

Application rate for HD-21A paint would be 38 liters per line kilometer (this is applied in one application).
There are 20 line kilometers of white edge line paint and 10 kilometers of yellow centerline paint for a total of 30 line kilometers.
Cost of HD-21A paint - $3.15 per liter
30 line kilometers X 38 liters/km X $3.15 = $3,591.00

2003
No painting required - $0
2004
No painting required - $0

Total paint material cost = $ 3,591.00

Application costs

2002

Cost of applying paint is $200 per line kilometer
(only one application required for repainting lines)
30 line kilometers X $200 = $6000

2003
No paint required - $0

2004

No paint required - $0

Total application cost = $6,000

Total cost for applying HD-21A paint for 3 seasons = **$9,969.00**

Photographs of the HD-21A paint applied to Hwy. 623

Alkyd Paint lines

Alkyd S. edge line looking west

Alkyd centerline looking west

Alkyd N. edge line looking west

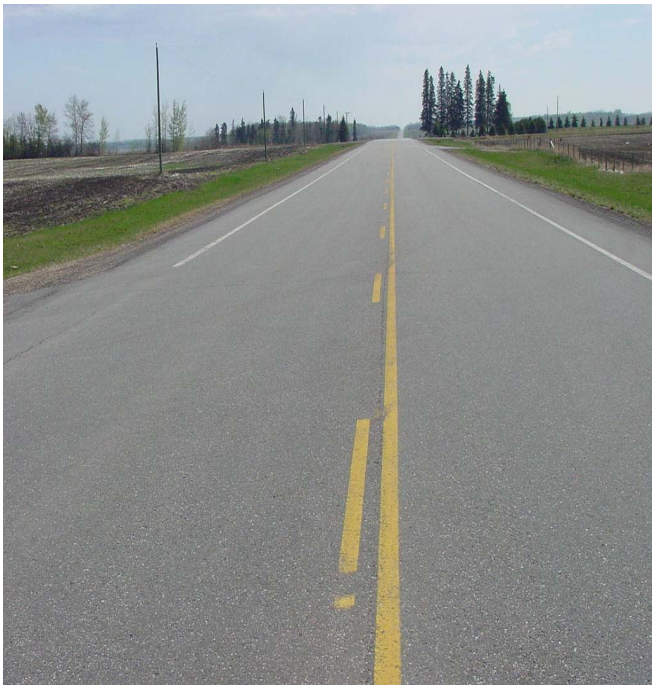
Alkyd paint lines, (looking west)

HD-21A Durable Waterborne Paint Lines

HD-21A paint lines, (looking west)

HD-21A, S. edge line looking west

HD-21A paint lines, looking west



HD-21A paint lines, looking east

Alkyd Paint

S. edge line
(1 year old)

Centerline
(1 year old)

N. edge line
(2 year old)

HD-21A Durable Waterborne Paint

S. edge line
(2 year old)

Centerline
(2 year old)

N. edge line
(2 year old)

Trial of HD-21A Durable Waterborne Paint

Location: Hwy 623
Placed: 2002
Inspected: May 12, 2005-05-17

The HD-21A waterborne paint is still providing delineation after 3 years.
However, there are some areas that are badly worn and need be repainted this year.

Yellow center line

Overall view

Shoulder edge line