

Safety Surface Strategies

The application of a safety pavement wearing course is proposed as a major safety element for this project. Placement of the wearing surface is commonly used in Europe to improve visibility in wet weather (due to truck and car spray), improve wet weather skid resistance, and reduce the potential for hydroplaning. The use of this surface in the United States has been increasing in the last ten years.

The Safety Surface Treatment Process has the capability of placing a thin lift ($\frac{1}{2}$ inch – $\frac{3}{4}$ inch) of gap-graded hot mix wearing course over a polymer-modified tack coat/membrane using only one piece of equipment. This specialized equipment/paver can evenly distribute the polymer-modified membrane immediately in front of the paver augers and apply/level the wearing course concurrently at a rate of 30 to 90 feet per minute. The paver incorporates a hopper to accept hot mix from trucks, a storage tank to hold the polymer-modified tack coat/membrane, emulsion spray bar, heated vibratory screed, auger system, and electronic controls for surface tolerance.

Hot mix asphalt is delivered and laid at the specified lift thickness within seconds of the polymer-modified membrane application. Because the polymer-modified emulsion is applied almost simultaneously with the hot mix, the emulsion rate can be increased. The typical application range for the polymer-modified membrane is 0.20 ± 0.05 gallons per square yard. The thicker emulsion tends to seal the entire surface, including small cracks, and promotes bonding to the existing surface. The hot mix is smoothed over the full lane width in one pass using a heated screed to ensure an even mat. Lift thicknesses of $\frac{1}{2}$ - inch to 1 inch are typical.

Compaction of the wearing course is carried out using multiple passes of a steel wheel roller of sufficient weight to properly seat the aggregate without crushing it. Compaction is easily attainable since this gap-graded mix seats quickly. Generally, no vibration is allowed except at the transverse joints.

Another advantage in using open-graded mixes is to the ability to reduce pavement tire friction which is a major component of highway noise. The NCHRP has reported the open-graded mixes, such as the safety surface proposed here, has the greatest potential for noise reduction for passby noise. Reductions when compared to dense-graded asphalt ranged from 1 to 9 dB(A). However, the noise reductions seem to decline with surface age and in approximately 5 to 7 years, the noise benefit diminishes, although the surface is still quieter than most PCC pavements. Preventative maintenance is planned to reduce plugging, freeze/thaw impacts, and reduce effectiveness of deicing agents. These treatments are intended to increase the noise reduction performance life of this surface until its planned replacement date of ten years

(2022). For further information see the report at:
<http://books.google.com/books?id=wt3Pchyc0FAC&pg=PP1&dq=NCHRP+Synthesis+268#v=onepage&q=NCHRP%20Synthesis%20268&f=false>

The AHTD has considerable experience with the use of this safety wearing course. To date, AHTD has completed 16 jobs, for a total of 130.04 miles at a cost of \$12.6 Million. See the table on the following page. This table shows the cost for each job that was completed in the last four years; all estimates for the safety wearing course for the proposed bypass were based on these costs.

Job #	Title	Date Completed	Age of Pavement	Total Job Length	Cost	District	County	Route	Section	BegLM	EndLM	Length	Depth
061131	Hwy. 70-Westinghouse Rd.	11-2005	3 year 10 months	4.3	\$664,758.45	6	26	270	06B	0	4.52	4.52	3/4"
070274	Hwy. 79 - Hwy. 82B	04-2005	4 years 5 months	13.2	\$1,998,045.00	7	14	82	040	2.2	15.4	13.20	3/4"
070274	Hwy. 79 - Hwy. 82B	04-2005	4 years 5 months	13.2	\$1,998,045.00	7	70	82	050	0	4.8	4.80	3/4"
070274	Hwy. 79 - Hwy. 82B	04-2005	4 years 5 months	13.2	\$1,998,045.00	7	70	82	050	6.5	9.8	3.30	3/4"
070274	Hwy. 79 - Hwy. 82B	04-2005	4 years 5 months	13.2	\$1,998,045.00	7	70	82	050	10.5	11.9	1.40	3/4"
070274	Hwy. 79 - Hwy. 82B	04-2005	4 years 5 months	13.2	\$1,998,045.00	7	70	82	050	15.1	16.4	1.30	3/4"
070300	Hwy. 82-Quachita Co. Line	07-2006	2 years 2 months	10.01	\$785,391.00	7	14	79	020	0.17	10.18	10.01	not known
070322	Hwy. 51- Hwy. 182	09-2008	1 year	4.01	\$916,460.00	7	10	30	140	53.67	58.53	4.86	5/8"
080291	East Fork Cadron Creek - I-40	10-2005	3 years 11 months	4.03	\$650,041.00	8	23	65	090	15.2	19.3	4.10	3/4"
080308	Centerville - Hwy. 27	09-2006	3 years	8.13	\$557,441.00	8	75	7	130	6.36	14.49	8.13	5/8"
100591	South of Truman-Payneway	09-2004	5 years	6.55	\$200,000.00	10	56	63	080	6.96	13.51	6.55	not known
S10608	Ison Creek - Peasant Valley Dr. Hwy. 10	10-2008	11 months	3.1	\$680,664.48	6	60	10	080	5.3	8.4	3.10	1/2"
S10701	Hwy. 367 - Bearden	10-2007	1 year 11 months	2.23	\$1,047,448.00	7	52	79	040	8.7	16.04	7.34	3/4"
S10701	Hwy. 367 - Bearden	10-2007	1 year 11 months	2.23	\$1,047,448.00	7	52	7	030	12.76	14.99	2.23	3/4"
S10704	Hwy. 79B-Hwy. 97	10-2007	1 year 11 months	4.82	\$696,712.00	7	20	8	080	0	3.67	3.67	3/4"
S10704	Hwy. 79B-Hwy. 97	10-2007	1 year 11 months	4.82	\$696,712.00	7	7	8	090	0	1.14	1.14	3/4"
S10704	Hwy. 79B-Hwy. 97	10-2007	1 year 11 months	4.82	\$696,712.00	7	13	8	100	0	4.82	4.82	3/4"
S10706	Hwy. 51-West	12-2007	1 year 9 months	4.9	\$381,156.00	7	10	8	050	20.95	25.85	4.90	3/4"
S10709	Magnolia-Welcome (Sel. Secs.)	08-2008	1 year 1 month	16.12	\$1,458,771.00	7	14	371	070	2.78	5.28	2.50	3/4"
S10709	Magnolia-Welcome (Sel. Secs.)	08-2008	1 year 1 month	16.12	\$1,458,771.00	7	14	371	070	12.14	20.9	8.76	3/4"
S10709	Magnolia-Welcome (Sel. Secs.)	08-2008	1 year 1 month	16.12	\$1,458,771.00	7	14	371	070	21.8	26.9	5.10	3/4"
S10802	Houston - Ferryville	11-2007	1 year 10 months	7.07	\$616,991.00	8	53	60	010	11.2	18.27	7.07	5/8"
S10804	UPRR Overpass - Hwy. 7	01-2008	1 year 8 months	3.01	\$653,453.00	8	58	64	060	7.88	10.89	3.01	5/8"
S10904	Green Forest East & West	09-2007	2 years	5.8	\$478,978.00	9	8	62	050	12.3	13.9	1.60	not known
S10904	Green Forest East & West	09-2007	2 years	5.8	\$478,978.00	9	8	62	050	2.54	6.74	4.20	not known
S10905	Marion Co. Line - West	10-2008	11 months	8.43	\$807,154.00	9	5	62	070	1.31	9.74	8.43	not known
TOTAL					\$12,593,463.93							130.04	