

Indonesia - 3M™ Stamark™ 380AW Pavement Markings shown to enhance visibility and reduce accident rates.

The Cipali Toll Road in Indonesia, known for heavy traffic, faced significant safety challenges during nighttime and rainy conditions. Within the first six months of the Cipali Toll Road's opening, there were 88 accidents caused by various factors, including driver behavior. To improve visibility and reduce accidents on this toll road, spanning 233.6 km (144.8 centerline miles) with multiple lanes in each direction, a prominent infrastructure company collaborated with 3M to implement 3M™ Stamark™ 380AW Pavement Markings.

Recognizing the Need for Safer Roads:

The tropical climate of Southeast Asia is characterized by high temperatures and high humidity. With significant rainfall throughout the year, this can contribute to high accident and fatality risks due to reduced visibility. Growth in the region has led to increased traffic volumes and greater investment in road infrastructure with a focus on safety.



3M™ Stamark™ All Weather Tape Series 380AW

Project: Cikopo-Palimanan (Cipali) Toll Road Skip Line Extensions

Location: Indonesia

Countermeasures: Wet Reflective Pavement Markings



Image above: White arrows indicate 3M™ Stamark™ application.

Improved Road Safety with Increased Visibility:

The 3M™ Stamark™ Pavement Marking Tape Series 380AW was selected for its ability to provide excellent visibility in wet and nighttime conditions. This tape is designed to be durable and highly visible in all weather conditions with long-lasting durability. The markings, which include lines, symbols, and legends, offer visibility in both dry and wet conditions, making them suitable for various climates, budgets, and needs.

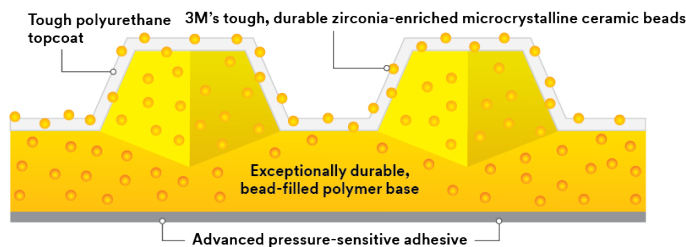
Case Study

Skip Line Extensions:

Skip line extension refers to extending a dashed or "skip" line pavement marking beyond its usual length, while maintaining the same spacing between dashes. This is done to provide drivers with an extended visual cue, especially in areas where lane positioning is critical. It is typically used in situations where additional visual guidance is needed, such as when approaching a curve, lane change area, or intersection. This helps alert drivers to a potential lane change or hazard ahead.

Enhanced Durability:

3M™ Stamark™ 380AW Pavement Markings are designed to be durable and perform well in all weather conditions. They are tougher and more resistant to harsh conditions than traditional glass beads, ensuring they remain visible for a long time.



A cross-section of 3M™ Stamark™ All Weather Pavement Marking Tape Series 380AW.

Easy Application:

The application process for 3M™ Stamark™ 380AW is straightforward and efficient, involving just a few simple steps: clean road surface, apply adhesive and wait for it to dry, apply the pre-cut tape, then tamp down. This method eliminates the need for complex tools and long pre-application steps required for thermoplastic markings, reducing installation time and minimizing traffic disruptions.



Easy application of 3M™ Stamark™ 380AW Pavement Markings

Reduced Accidents on Cipali Toll Road:

The Cipali Toll Road was divided into sections with different accident trends detailed below to evaluate the effectiveness of 3M™ Stamark™ 380AW Pavement Markings on road safety. The team collected and categorized accident data by day (06:00 to 18:00) and night, as well as by dry (April to September) and wet seasons.

Before Improvement / Implementation - Total Data

Total Number of Accidents Before Implementation			Total Number of Accidents Before Implementation by Season		
			Dry Season	Wet Season	
Day Time	178	41%	82	96	
Nighttime	255	59%	128	127	
TOTAL	433		210	223	

Key Findings:

The implementation of 3M™ Stamark™ 380AW Pavement Markings on the Cipali Toll Road led to significant improvements in road safety. The results from the evaluation project suggest that these all-weather pavement marking tapes provide positive safety benefits, especially during nighttime and rainy conditions.

Case Study

Nighttime Accident Reduction

With 3M™ Stamark™ Installed		
	Before Implementation	Post Implementation
Accident Rate	130	116

Accident rate REDUCED by **10.8%** ↓

Non-Installed Locations		
	Before Implementation	Post Implementation
Accident Rate	125	149

Accident rate increased by **19.2%** ↑

Since implementing the use of 3M™ Stamark™ 380AW Pavement Markings, 3M has continued its collaboration with the road operator team to monitor the sites' performance over the 12 months following installation. Visually, the operator also observed improved performance, especially during nighttime and rainy seasons, when installed as an extension of the existing thermoplastic application.

Nighttime accident rates decreased by 10.8% at locations with 3M™ Stamark™ 380AW installed, while non-installed locations saw a 19.2% increase.

Wet Nighttime Accident Reduction

With 3M™ Stamark™ Installed		
	Before Implementation	Post Implementation
Accident Rate	73	61

Accident rate REDUCED by **16.4%** ↓

Non-Installed Locations		
	Before Implementation	Post Implementation
Accident Rate	54	76

Accident rate increased by **40.7%** ↑



The road was divided into four sections, each with distinct characteristics and accident trends:

Site 1 - 25.8 km (16.03 miles):
Accident count reduced by 16.4% at 3M™ Stamark™ 380AW locations, while non-installed locations saw a 40.7% increase.

Site 2 - 131.4 km (81.64 miles):
Accident count reduced by 14.3% at 3M™ Stamark™ 380AW locations, while non-installed locations saw a 31.3% increase.

Site 3 - 54.7 km (33.99 miles):
Accident count reduced by 31.8% at 3M™ Stamark™ 380AW locations, while non-installed locations saw a 4.5% decrease.

Site 4 - 17.5 km (10.87 miles):
Accident count increased by 50% at 3M™ Stamark™ 380AW locations, while non-installed locations saw a 75% increase.

The implementation of 3M™ Stamark™ 380AW Pavement Markings on the Cipali Toll Road led to significant improvements in road safety.

Learn more at <http://go.3M.com/pavementmarkingsau>
or https://www.3m.com.au/3M/en_AU/p/d/b5005178004/.

Appendix

Data Collection

Total Project					
Occurance During Night Time	No. of Accident Count		Occurance During Night Time & Rainy	No. of Accident Count	
	3M™ Stamark™ 380AW Installed Location	Non-installed Location		3M™ Stamark™ 380AW Installed Location	Non-installed Location
Before Implementation	130	125	Before Implementation	73	54
Post Implementation	116	149	Post Implementation	61	76
Percentage Change	-10.8%	19.2%	Percentage Change	-16.4%	40.7%
Accident Count Change	-14	24	Accident Count Change	-12	22

Site 1					
Occurance During Night Time	No. of Accident Count		Occurance During Night Time & Rainy	No. of Accident Count	
	3M™ Stamark™ 380AW Installed Location	Non-installed Location		3M™ Stamark™ 380AW Installed Location	Non-installed Location
Before Implementation	13	31	Before Implementation	10	14
Post Implementation	15	32	Post Implementation	7	13
Percentage Change	15.4%	3.2%	Percentage Change	-30.0%	-7.1%
Accident Count Change	2	1	Accident Count Change	-3	-1

Site 2					
Occurance During Night Time	No. of Accident Count		Occurance During Night Time & Rainy	No. of Accident Count	
	3M™ Stamark™ 380AW Installed Location	Non-installed Location		3M™ Stamark™ 380AW Installed Location	Non-installed Location
Before Implementation	68	33	Before Implementation	35	16
Post Implementation	58	40	Post Implementation	30	21
Percentage Change	-14.7%	21.2%	Percentage Change	-14.3%	31.3%
Accident Count Change	-10	7	Accident Count Change	-5	5

Site 3					
Occurance During Night Time	No. of Accident Count		Occurance During Night Time & Rainy	No. of Accident Count	
	3M™ Stamark™ 380AW Installed Location	Non-installed Location		3M™ Stamark™ 380AW Installed Location	Non-installed Location
Before Implementation	37	39	Before Implementation	22	22
Post Implementation	27	39	Post Implementation	15	21
Percentage Change	-27.0%	0.0%	Percentage Change	-31.8%	-4.5%
Accident Count Change	-10	0	Accident Count Change	-7	-1

Site 4					
Occurance During Night Time	No. of Accident Count		Occurance During Night Time & Rainy	No. of Accident Count	
	3M™ Stamark™ 380AW Installed Location	Non-installed Location		3M™ Stamark™ 380AW Installed Location	Non-installed Location
Before Implementation	21	32	Before Implementation	6	12
Post Implementation	16	38	Post Implementation	9	21
Percentage Change	-23.8%	18.8%	Percentage Change	50.0%	75.0%
Accident Count Change	-5	6	Accident Count Change	3	9

IMPORTANT NOTICE: The results and outcomes of case studies or testimonials should not be interpreted as a guarantee or warranty of similar results. You are responsible for evaluating the product and determining whether it is suitable for your application. Please refer to applicable 3M specifications for product and warranty information.



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