



ELEVATING LIVES

SUSTAINABLE MATERIALS



■ HIGH IMPORTANCE
 ■ MEDIUM IMPORTANCE
 ■ LOW IMPORTANCE

SIGNIFICANCE

Operating six urban highways with a cumulative length of almost 260 km, our highways represent not just a vital urban transport artery but also a commitment to the highest standards of maintenance, safety, and user comfort.

Recognising our responsibility, we ensure that every stretch of the road is meticulously maintained to safeguard the safety and comfort of all road users. Our focus extends to using Sustainable Materials for road maintenance, pavement rehabilitation, and pothole repairs, as well as in our offices and buildings, to minimise our ecological footprint.

While we intensify our efforts to identify and utilise feasible sustainable materials, we are also mindful of the cost implications, as typically, eco-friendly options come at a premium compared to conventional materials. However, we are dedicated to finding a balance, recognising that the higher upfront cost of sustainable materials can be offset by their long-term benefits, such as greater durability and reduced environmental impact.

Our commitment to sourcing sustainably is a strategic choice that extends beyond fulfilling our responsibility. It is about future-proofing our business in an increasingly eco-conscious world and maintaining relevance in a competitive industry.

OUR APPROACH SUSTAINABLE MATERIALS

01 ECO-EFFICIENT INFRASTRUCTURE AND MAINTENANCE SOLUTIONS

Advancing our commitment to environmental responsibility through a dual-pronged approach:

01: In the realm of our highway infrastructure, we are progressively incorporating a higher proportion of sustainable materials. This encompasses the initial construction and ongoing maintenance, ensuring that our roadways are durable and efficient.

02 SUSTAINABLE WORKPLACE AND BUILDING MANAGEMENT

02: Our dedication to sustainability extends beyond the highways themselves. We are integrating eco-friendly practices by selecting sustainable materials for the construction and ongoing maintenance of our ancillary buildings, including offices and support structures. Efforts are also being made to increase awareness and the usage of sustainable daily consumables at our workplace.



Implementation of GlasGrid®.



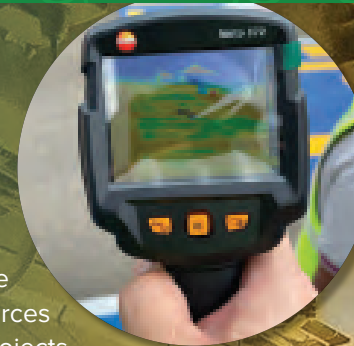
01 ECO-EFFICIENT INFRASTRUCTURE AND MAINTENANCE SOLUTIONS

In our ongoing efforts to enhance the safety and durability of our highways and reduce environmental impact, we have introduced numerous innovative solutions. This reinforces our commitment to expanding the use of sustainable materials in our infrastructure projects.

In 2020, we began consistently employing carpet patches for potholes repairs across four highways. We have since continued this practice to ensure long-lasting solutions. In 2021, we started using GlasGrid® for pavement reinforcement, contributing to the structural integrity of the highways. This was applied to the GCE highway, and we continued to use this approach in 2022 on the SILK highway.

Additionally, in 2022, we integrated premix additives from recycled waste such as plastic, rubber tires, palm oil fibres, and synthetic fibres into the asphalt for road pavement on the GCE and SILK highways. This not only reduced the environmental footprint but also promoted resource efficiency. In 2023, we successfully deployed Alle-Grip as a durable and sustainable alternative for pavement resurfacing at AKLEH. This showcased our commitment to adopting innovative solutions and ensuring the continuous enhancement of highway performance.

Our commitment to circular economy principles and continuous enhancement in performance guides our choices of materials and practices. These practices reflect our dedication to sustainable and resilient infrastructure, which harmonises with the principles of the circular economy. We will continue to prioritise sustainable materials, innovative solutions, and best practices to ensure the comfort and convenience of road users while enhancing the safety, durability, and positive environmental impact along our highways.



Delamination Spot along Lane 2 (Touch 'n Go) at AKLEH's toll booth.

KEY HIGHLIGHT

Overall Area Paved with Sustainable Materials (FY2020-FY2023):

65,363 m²

FY2023:

31,480 m²

Area Paved with Sustainable Materials



By utilising the Super Fiber Mix (SFM), not only are we able to contribute to a positive impact on the environment, but we are also able to reduce our costs by up to 40%.

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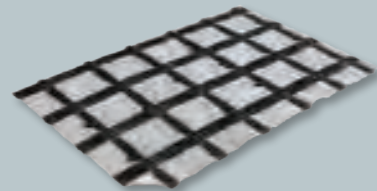


PRODUCTS

Porous Asphalt



GlasGrid®



Microsurfacing



MacRebur - MR6



WHAT

A type of pavement with high porosity that allows rainwater to pass through into the ground below. This characteristic distinguishes it from traditional asphalt pavement, which is designed to be impervious and directs water to drainage systems.

A pavement reinforcement system used to enhance the longevity and durability of road surfaces. Typically integrated between layers of asphalt, these pavements feature a robust fibre GlasGrid® that strengthens the asphalt layer, prolonging the life of the pavement.

This innovative approach yields a more resilient surface, mitigating the necessity for frequent repairs and maintenance. The GlasGrid® bonds to the surface of the road using an asphalt adhesive, contributing to a stronger, longer-lasting infrastructure.

Microsurfacing, a road maintenance technique, optimises skid resistance by enhancing the frictional characteristics of the road. This method entails applying a thin, tough layer of asphalt emulsion combined with finely crushed stone. The microsurfacing material is then spread across the road surface and compacted, resulting in a smooth finish and durable surface. This meticulous process creates a sturdy road surface and seals small cracks and imperfections, improving skid resistance and mitigating the risks of road accidents.

MacRebur MR6, a waste plastic additive, enhances pavement performance when incorporated into Hot Mix Asphalt (HMA). Comprised entirely of recycled plastic waste, MacRebur MR6 holds the prestigious My HIJAU accreditation, affirming its eco-friendly attributes.

WHY

To Reduce Accident Risk

To Reinforce Pavement Structure

To Reduce Accident Risk

To Support Circularity

WHEN & WHERE

2020 - GCE

2021 - SILK
2022 - GCE

2021 - AKLEH
2022 - GCE

2022 - GCE
2023 - SILK



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TOTAL AREA (M ²)	TOTAL LENGTH (KM)	WORKABILITY & BENEFITS
2,300 m ²	0.2 km	<ul style="list-style-type: none"> Helps mitigate aquaplaning by draining water through a permeable surface. Effective water management on roads. By allowing water to seep through the pavement and into the soil, porous asphalt reduces the amount of runoff that occurs during rainstorms. Reduces flood risks. Improves road safety in accident-prone areas during heavy rain.
2021 SILK - 12,743 m ² 2022 GCE - 7,600 m ²	2021 SILK - 3.49 km 2022 GCE - 2.08 km	<ul style="list-style-type: none"> Reduces milling thickness. Reduces asphalt usage. Reduces milling waste. Reduces working period.
2021 AKLEH - 7,200 m ² 2022 GCE - 3,600 m ²	2021 AKLEH - 0.6 km 2022 GCE - 0.15 km	<ul style="list-style-type: none"> Enhances road safety. Improves road surface friction. Significantly improves skid resistance, crucial for preventing skidding especially on wet road surfaces. Reduces accident risks. Effective in adverse weather conditions. Improves safety in emergency braking scenarios.
2022 GCE - 680 m ² 2023 SILK - 800 m ²	2022 GCE - 0.2 km 2023 SILK - 0.2 km	<ul style="list-style-type: none"> Reduces plastic waste in landfills. Creates durable and sustainable road surfaces. Reduces maintenance costs. Enhances asphalt binding properties. Extends pavement lifespan. Provides smoother and safer driving experiences.

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PRODUCTS

Alle-Grip



Geveko PlastiRoute™ High Skid Resistance Rollgrip



Crumb-Rubber Modified Asphalt



NOVACEL® Pure Palm Oil Fibre incorporated in Asphalt



WHAT

Alle-Grip is a multi-functional pavement surface treatment with excellent adhesion on asphaltic and concrete roads. It comprises green, low Volatile Organic Compounds (VOC) reactive resin, which undergoes the process of HYDROSYNTHESIS™ to form a robust yet elastic bond between special aggregates and the road. The treatment incorporates high abrasion-resistant and refractive aggregates, resulting in enhanced skid resistance, improved visibility and a maintenance-free system.

The thixotropic material, maintaining a non-levelling and non-flowing nature after rolling, yields a textured surface with superior traction for vehicles, especially in wet or slippery conditions. Ideal for preferential lanes and cycle lanes in heavy traffic zones, this permanent, easily applied, anti-slip coating reduces braking distance on both asphalt and concrete surfaces using a primer. Its high durability and quality ensure sustained performance and colour retention, minimising the necessity for frequent reapplications.

This product is manufactured from recycled rubber tire waste, offering road surfaces that are not only safer and quieter, but also more durable to meet the growing demands of increased traffic and loading pressures. It adheres to strict guidelines set by DOSH in producing Crumb-Rubber Modified Asphalt, ensuring better-performing roads that are also environmentally friendly by appropriately Putting Waste In the Right Place.

Palm Oil Fibre is incorporated into Fibre Mastic Asphalt (FMA), which constitutes a gap-graded mixture featuring a significant proportion of coarse aggregate and standard bitumen (60/70), along with the addition of cellulose fibre additives. This innovative approach was conceived to address severe pavement cracking and rutting caused by extensive damage from heavy axle loads.

WHY

To Improve Skid Resistance

To Reduce Accident Risks

To Support Circularity

To Support Circularity

WHEN & WHERE

2023 - AKLEH

2023 - DASH

2023 - GCE

2023 - SILK



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TOTAL AREA (M ²)	TOTAL LENGTH (KM)	WORKABILITY & BENEFITS
3,000 m ²	Not Available in length (km). Implemented at Toll Plaza area.	<ul style="list-style-type: none"> • Reduces environmental impact by reusing waste. • Twice as strong as conventional compounds. • Enhances skid resistance and durability of existing roads. • Improves road safety and visibility, especially on critical road sections.
1,080 m ²	0.12 km	<ul style="list-style-type: none"> • Enhances skid resistance of road surfaces. • Improves visibility of road markings. • Encourages drivers to be more cautious in specific road sections.
2,400 m ²	0.2 km	<ul style="list-style-type: none"> • Enhances skid resistance of road surfaces. • Extends pavement lifespan, reduces the need for frequent maintenance. • Diverts waste from landfills. • Reduces noise.
600 m ²	0.15 km	<ul style="list-style-type: none"> • Enhances road strength. • Reduces vulnerability to cracks. • Improves resistance to damage from heavy vehicles. • Focuses on creating durable and sustainable roads, particularly in high-traffic areas.

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PRODUCTS

FORTA-FI® Fibre (Super Fibre Mix)



Carpet Patch



WHAT

Super Fibre Mix (SFM) contains FORTA-FI®, a high tensile strength synthetic fibre blend formulated to reinforce asphalt mixes in new construction and rehabilitation projects. The combination of aramid and polyolefin fibres is designed to enhance the current mix design. Aramid fibres will not melt in the asphalt mix and are known for their strength and durability in high and low temperatures.

The traditional methods of patching potholes, such as hot mix/cold mix patching methods, have limitations in effectively resolving the pothole problem in Malaysia. One of the main issues with these methods is the inability to prevent water from seeping into the treated area, which can further weaken the supporting soil and lead to the formation of new potholes. The carpet patch could prevent water seepage and prolong the lifespan of the road surface.

WHY

To Reinforce Pavement Structure

For Pothole Patching

WHEN & WHERE

2023 - SILK
2023 - GCE

2023 - All Highways

PROLINTAS utilises Industrial Building System (IBS) components like precast crossheads, beams and parapet walls in the concrete structural elements of bridges.

Choosing sustainability paves the way for a resilient future. PROLINTAS embraces eco-friendly practices by using sustainable materials, contributing to a greener, more responsible infrastructure.





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**TOTAL AREA
(M²)**

**TOTAL LENGTH
(KM)**

WORKABILITY & BENEFITS

SILK - 8,800 m²

6.46 km

- Saves up to 40% cost compared to deep treatment.
- Reduces working period.
- Minimises traffic disruptions by eliminating the need for road closures during repair works.

GCE - 14,800 m²

Various Locations

Various Locations

- Immediate installation capability reduces downtime and inconvenience for road users.
- Sustainability is evident through using less raw materials, minimal heating and is an environmentally friendly approach.
- Successfully tested over the past three years on both low and high-speed roads in Malaysia.
- Demonstrates reliability and effectiveness in real-world conditions.



Installation of Geveko PlastiRoute™ High Skid Resistance Rollgrip at DASH to improve road safety measures.

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OUR PERFORMANCE

We track and assess the performance of our Sustainable Materials initiatives using metrics such as the proportion of sustainable materials utilised in our highway infrastructure and office consumables. As of the end of 2023, we successfully paved 13.9 km of our highways using sustainable materials, comprising 5.3% of the total highway effective length. This achievement corresponds to a substantial area coverage of 65,363 m². While still in the exploratory stage, our commitment to incorporating sustainable materials in highway pavement works reflects our dedication to environmentally conscious practices and sustainable development. This progress contributes to the longevity and resilience of our roadways and underscores our ongoing efforts to build a more sustainable and environmentally friendly transportation network.

COMMITMENT TO PROGRESS

This commitment is contingent upon factors such as the availability of technology, associated costs and the required maintenance period. As we navigate these new possibilities, our determination to contribute more to the environment remains steadfast. Each test and trial we undertake marks a step forward in our mission to develop roads that connect communities safely, and actively contribute to protecting our planet.

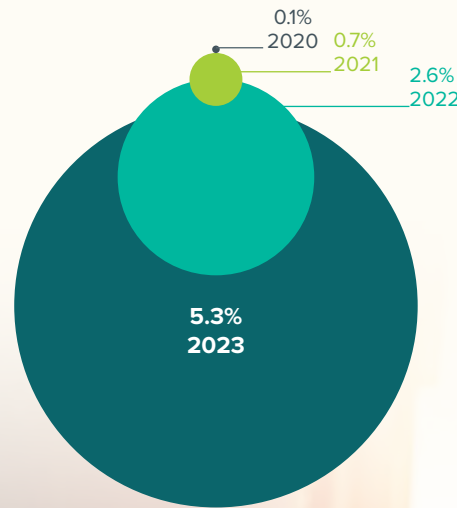
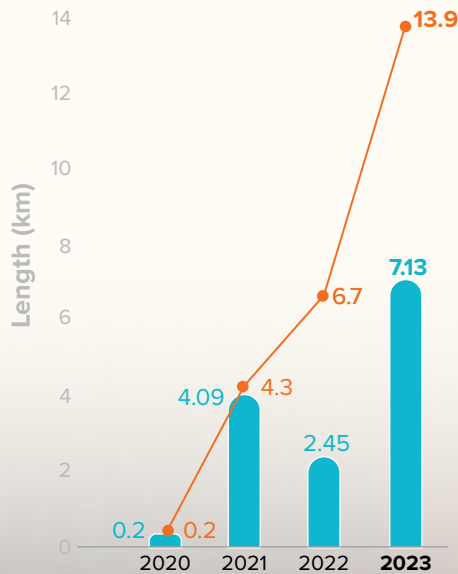
By monitoring every test and trial as a step forward in the mission, we are embracing an innovative and adaptive approach. This determination will likely contribute not only to the development of safer and more sustainable roads but also to the broader conversation around sustainable infrastructure practices. As technology and knowledge continue to advance, our efforts can serve as a model for others in the construction and infrastructure sectors.

GCE Highway : Crumb Rubber-Modified Asphalt offers a sustainable and performance-enhancing solution for road construction, utilising recycled rubber to create more durable and environmentally friendly pavements.



ANNUAL PERFORMANCE OF SUSTAINABLE MATERIALS USED IN PAVEMENT WORKS

PERCENTAGE (%) OF CUMULATIVE TOTAL LENGTH PAVED WITH SUSTAINABLE MATERIALS VS TOTAL EFFECTIVE HIGHWAY LENGTH



■ Total length paved with Sustainable Materials (Annually)
— Cumulative total length paved with Sustainable Materials

KEY HIGHLIGHT

Successfully paved **13.9 km** with **Sustainable Materials** comprising approximately **5.3%** of the total effective length of highways.

02

SUSTAINABLE WORKPLACE AND BUILDING MANAGEMENT

Our use of sustainable materials is extended to our office and service buildings, where the intent is to create sustainable work environments that enhance the wellbeing of our employees and support productivity.



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PARTNERSHIPS AND COLLABORATIONS

In a commitment to drive sustainable change, the Group actively engages in collaborative efforts with diverse companies and research institutions to explore and develop innovative eco-friendly materials. This collaborative spirit extends beyond our organisation, fostering partnerships that contribute to the enhancement and maintenance of our extensive highway network.

One notable collaboration was established with Alle Chemie Sdn Bhd between April and June 2023. This partnership aimed to implement pavement enhancement works covering 3,000 m² at AKLEH's Dato' Keramat toll plaza.

HOW

Through this collaboration we implemented a Revolutionary Road Repair Product that utilised **Reclaimed Asphaltic Pavement (RAP)**.

WHAT IT MEANS

We engage in a circular waste management approach during road repairs by recycling milling waste, improving its quality and repurposing it as a new pavement material. This practice reflects our commitment to promoting sustainability and resource efficiency in road maintenance.

BENEFITS OF USING THIS TECHNOLOGY

Enhancing our Commitment to Social Responsibility for Road Users:

- Improving skid resistance.
- Enhancing road durability to minimise repair cycles.

Environmental Responsibility:

- Responsible consumption of raw materials.
- Mitigating the impact of carbon emissions by reducing the usage of virgin materials in road repairs.



LABORATORY TESTED



Skid resistance value improvements surpassing standard benchmarks.



ECONOMIC

- Adopting advanced German technology at local supplier pricing to elevate infrastructure quality.
- Enhancing the durability and performance of pavement repairs with high-performance solutions.

ENVIRONMENTAL

- Our circular waste management approach, which repurposes milling waste, conserves raw materials and minimises our carbon footprint, demonstrates environmental stewardship.
- Fostering a sustainable supply chain by minimising raw material usage and reducing landfill waste.

SOCIAL

- Enhancements in skid resistance and durability from these high-performance solutions lead to safer, more dependable roads, fulfilling our social responsibility to our road users and the surrounding community.



For PROLINTAS



For ALLE CHEMIE

SYNERGISTIC OUTCOMES

- **Enhancing infrastructure quality through innovative practices.**
- **Cultivating a unified commitment to environmental sustainability, resulting in reduced reliance on non-renewable resources and reductions in landfill waste.**
- **Strengthening the supply chain, prioritising sustainable growth, innovation and ensuring community safety, thereby setting new standards in the development and maintenance of large-scale infrastructure.**

ECONOMIC

- Pioneering the introduction of German engineering technological advancements in the Malaysian market.
- Expanding business horizons and scaling operations through strategic partnership appointments.

ENVIRONMENTAL

- Tropicalising & enhancing German engineering excellence that is eco-friendly and sustainable to improve infrastructure resilience and performance in Malaysia.
- By eliminating the need to ship finished products from Europe, it substantially reduces transportation-related emissions.

SOCIAL

- Alle Chemie is poised to broaden its presence in the industry while contributing to the development of sustainable supply chains.

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OUR CASE STUDY

The shift to sustainable materials in road pavement rehabilitation is driven by the need to reduce environmental impact, combat resource depletion, mitigate climate change, enhance durability, achieve cost-efficiency and meet regulatory and public expectations. This transition from conventional asphalt is essential for a sustainable and resilient infrastructure.

CHALLENGES

RESILIENCE AND DURABILITY: Conventional asphalt is prone to wear and damage, requiring frequent maintenance and rehabilitation. Sustainable materials aim to provide more durable, longer-lasting solutions to reduce the frequency and cost of repairs.

ECONOMIC EFFICIENCY: Over time, sustainable materials can lead to cost savings by reducing maintenance expenses and extending the life of road pavements. This, in turn, offers an attractive benefit-cost ratio for infrastructure investments.

ENVIRONMENTAL IMPACT: Asphalt relies on non-renewable resources. This dependency is unsustainable in the long term as these resources become limited and more expensive.

BENEFITS

ECONOMIC

Saves up to **40%** of cost compared to deep treatment.

Saves time by **50%** compared to conventional methods due to less milling depth.

Easy handling and implementation.

ENVIRONMENT

Requires less frequent maintenance.

The lifespan of Super Fibre Mix (SFM) pavements extends **5 to 7 years** longer than that of ordinary Asphalt Concrete (AC), thus reducing the frequency of repairs.

Reduces use of natural resources.

SOCIAL

Enhances road infrastructure to provide greater comfort for road users, offering **increased durability** against cracks and damage.

Optimises time savings, reduces the duration of road closures during pavement rehabilitation works, and improves journey times for road users.

PROJECT SITES

In 2023, SFM was used at the following locations:



8,800 m²



14,800 m²

SOLUTION

Integration of Super Fibre Mix (SFM) contains FORTA-FI®, a high-tensile strength synthetic fibre blend formulated to reinforce asphalt mixes in pavement rehabilitation projects.



GOING FORWARD

Committed to pioneering sustainable development, our forward-looking strategy involves exploring the integration of eco-friendly materials in the construction and maintenance of our elevated highways. Reflecting our deep commitment to EESG principles, this initiative aims to enhance the quality and longevity of road infrastructure for the benefit of users and reduce the environmental impact of construction processes.

By focusing on sustainable materials, we aim to decrease the carbon footprint associated with road construction and maintenance, thereby contributing to continuously tackling climate change-related issues. This approach aligns with global sustainability goals and demonstrates our responsibility towards environmental stewardship.

Socially, our efforts are to improve the overall user experience by providing safer, more durable and comfortable road surfaces. This initiative underscores our commitment to community wellbeing and safety, enhancing the quality of life for all road users.

From a financial perspective, integrating sustainable materials into constructing and maintaining our elevated highways supports our environmental and social goals and promotes long-term cost-effectiveness. By extending the lifespan of our roads and reducing the need for frequent repairs, we anticipate considerable savings in maintenance costs. This long-term cost-effectiveness further reinforces the value of our sustainable approach, ensuring that our investments today yield benefits for generations to come.

Governance-wise, our move towards sustainable construction practices reflects our dedication to transparency, innovation and accountability. We are setting new standards in the infrastructure domain, ensuring that our projects are benchmarks of engineering excellence and sustainability.

Integrating sustainable materials into the asphalt mix is a holistic approach that benefits road users, the planet and the economy. It is a testament to our dedication to leading the way in sustainable infrastructure development, with a keen eye on environmental conservation, social responsibility, financial sustainability and exemplary governance.



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