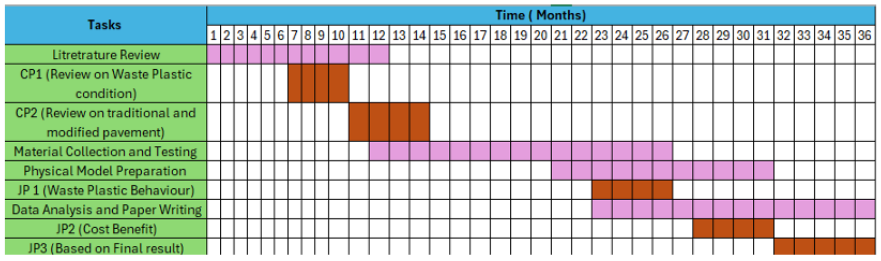
Program Profile		
Program	Program name	Sustainable Road Construction Using Waste Plastic Pavements
	Category	A7: Technology Development and Application A8: SDG-Based Responses to Global Challenges

Summary of Program	
Program Name	Sustainable Road Construction Using Waste Plastic Pavements
Category	A7: Technology Development and Application A8: SDG-Based Responses to Global Challenges
Abstract of Program	Plastic pollution is one of the most pressing environmental crises, with an estimated 350 million metric tons of plastic waste generated annually. This project explores the innovative use of recycled plastics—50% HDPE, 20% PET, and 30% PP—in pavement base layers to address both infrastructure and environmental challenges. Laboratory experiments evaluate mechanical and durability properties, including compressive strength, flexural strength, impact resistance, abrasion, permeability, and chemical resistance. The plastic-based pavement material is expected to exhibit superior load-bearing capacity, reduced maintenance needs, and enhanced resistance to environmental degradation. By repurposing waste plastic, the program reduces reliance on natural resources, cuts construction costs, and supports circular economy principles. The initiative directly aligns with SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities), offering a scalable model for sustainable infrastructure development.

Details of Program		
Planning		
Objectives	Long-term Goals	• Establish plastic pavements as a mainstream material for road networks in Bangladesh and beyond. • Promote circular economy practices by integrating waste plastic supply chains into infrastructure development. • Support national policies for green infrastructure.
	Short-term Targets	• Complete laboratory testing of plastic-based pavement prototypes within one year. • Publish 2 conference papers and 3 journal papers on material performance and design methodology. • Develop practical guidelines for local road agencies on pilot-scale implementation.
	Rationale	Bangladesh faces both plastic waste management challenges and infrastructure maintenance issues. Repurposing plastic into pavement materials addresses both problems, turning an environmental liability into a structural asset.
Subject (Leader)	Initiator(s)	RABBY, Md Abtahi
	Champion(s)	RABBY, Md Abtahi
	Major team member(s)	(To be expanded with collaborators or student assistants during implementation)

Environment	Nature/Society	Plastic waste accumulation threatens ecosystems. Using plastics in infrastructure mitigates environmental risks while serving community needs.
	Industry/Market	The construction sector is under pressure to reduce costs and adopt sustainable practices. Plastic pavements offer both economic and market appeal.
	Citizen/Government	Government and municipalities are increasingly emphasizing sustainable waste management and road durability, aligning with this project's outcomes.
Resources	Human resources	Led by a faculty member with student involvement in testing and analysis.
	Financial resources	Modest internal funding; potential external grants to scale testing and implementation.
	Technological resources	Laboratory access for ASTM/BS standard testing; equipment available for mechanical and durability assessments.
Mechanism	Strategy (Weight/Sequence)	• Laboratory testing of recycled plastic mixes (highest priority). • Mechanical and environmental durability assessments. • Development of guidelines for pilot road sections. • Dissemination through conferences and publications.
	Organization	Conducted under WUB Civil Engineering Department with academic oversight.
	Culture	The project reflects WUB's commitment to sustainability, applied innovation, and student engagement.
Doing		
Launch date		July 2025
Responsible organization		Department of Civil Engineering, World University of Bangladesh
Program content and process		The research investigates the use of recycled plastics in pavement base layers, focusing on a standardized mix of HDPE, PET, and PP. Laboratory tests include compressive strength, flexural strength, impact resistance, modulus of elasticity, abrasion, freeze-thaw resistance, water absorption, creep, thermal conductivity, permeability, rutting resistance, and chemical resistance. Environmental safety is verified through leachability tests. These results will guide design criteria for plastic-based pavements, enabling their application to light and eventually heavy-load roads. The program emphasizes both material performance and environmental impact, bridging the gap between waste management and sustainable construction. Outcomes will be shared via academic publications and policy briefs to promote scalability.
Key highlights of the content/process		• Innovative reuse of plastic waste in pavement base design. • Comprehensive ASTM/BS-based laboratory testing. • Scalable model adaptable for local and global contexts.
Differences from traditional approaches		Conventional pavements rely on natural aggregates, contributing to resource depletion and recurring maintenance. Plastic pavements lower costs, increase durability, and reduce waste simultaneously.
Progress as of today		Research design and material selection have been finalized. Testing phase is scheduled.
Problems in implementation		Securing consistent waste plastic supply and scaling results to highway-grade pavements.

Approaches to solve the problems	Collaboration with waste management firms and phased scaling from pilot projects to highways.
Completion date, if completed	Expected: December 2026.
Seeing	
Impacts on students	Hands-on research in sustainable materials and infrastructure innovation.
Impacts on professors	Enhanced research portfolio, collaborations, and publications.
Impacts on university administration	Showcases WUB's leadership in sustainability-focused applied engineering research.
Responses from industry/market	Positive interest expected from construction companies seeking cost-effective green technologies.
Responses from citizen/government	Strong alignment with national priorities on waste management and sustainable infrastructure.
Measurable output (revenues)	Potential commercialization of plastic pavement blocks and guidelines.
Measurable input (expenses)	Laboratory costs, plastic sourcing, and testing expenses.
Cost-benefit analysis for effectiveness	High benefit-to-cost ratio: reduces plastic waste, lowers pavement maintenance costs, and offers long-term durability.
Future Planning	
Where does the project go from here?	After laboratory validation, pilot road sections will be constructed in collaboration with government and private contractors. Expansion into heavy-load applications (highways, industrial roads) will follow. The long-term goal is to integrate plastic pavements into BNBC or national road construction guidelines.
Addendum	
Exhibits, pictures, diagrams, etc.	 *CP= Conference Paper, JP= Journal Paper Figure 1: Gantt chart
Reports, mimeos, monographs, books, etc.	Draft manuscripts (planned 2 conference papers, 3 journal papers).
Others which may help explain the program (including website links)	N/A