Program Profile		
Program	Program name	Study on Brick Fine Aggregate (BFA) as Partial Replacement of Natural Sand in Concrete Production
	Category	A8

Summary of Program	
Program Name	Study on Brick Fine Aggregate (BFA) as Partial Replacement of Natural Sand in Concrete Production
Category	A8
Abstract of Program	This program addresses the environmental and resource challenges of modern concrete production by exploring Brick Fine Aggregate (BFA) a by-product of brick crushing as a sustainable partial replacement for natural sand. Rapid urbanization and infrastructure growth have created a surge in demand for sand, leading to environmental degradation, river erosion, and ecological imbalance. Simultaneously, brick waste is accumulating in urban areas, contributing to environmental pollution. The project evaluates BFA's suitability for structural and non-structural concrete applications, with replacement levels up to 25%. Laboratory studies assess physical, fresh, and hardened properties of BFA-concrete mixes, with focus on workability, compressive strength, and tensile performance. The outcomes are expected to demonstrate the feasibility of eco-friendly, cost-effective concrete, reducing dependency on natural sand while promoting circular economy practices. Ultimately, the project aligns with sustainable development goals (SDGs), particularly responsible consumption and production, climate action, and resilient infrastructure development

Details of Program		
Planning		
Objectives	Long-term Goals	I. Reduce environmental impact of sand extraction and brick waste disposal. II. Encourage sustainable, circular practices in Bangladesh's construction industry.
	Short-term Targets	I. Evaluate physical and mechanical properties of BFA-concrete. II. Identify optimum replacement percentage ensuring acceptable workability and strength. III. Promote sustainable construction by reusing brick waste and reducing natural sand extraction.
	Rationale	Sand scarcity and brick waste accumulation are pressing environmental issues in Bangladesh. Reusing BFA addresses both problems, advancing sustainable development and innovation in construction practices.
Subject (Leader)	Initiator(s)	PARVIN, Rokhshana.
	Champion(s)	PARVIN, Rokhshana.
	Major team member(s)	PARVIN, Rokhshana.

Environment	Nature/Society	Sand scarcity, river erosion, and urban waste management drive the program.
	Industry/Market	Construction sector demands cost-effective, sustainable alternatives to sand.
	Citizen/Government	Citizens benefit from reduced environmental degradation; government policies encourage sustainable practices.
Resources	Human resources	Civil engineering faculty, lab staff, and students available.
	Financial resources	University research fund; potential government/NGO grants.
	Technological resources	Concrete lab facilities, testing equipment for fresh and hardened concrete.
Mechanism	Strategy (Weight/Sequence)	I. Material collection & lab preparation (High priority). II. Mix design trials & testing (Core activity). III. Data analysis & dissemination (Outcome). IV. Industry collaboration (Scaling).
	Organization	Aligned with Civil Engineering Dept. research framework.
	Culture	Strong institutional support for sustainability and applied research.
Doing		
Launch date		August 2025
Responsible organization		Department of Civil Engineering, World University of Bangladesh
Program content and process		The program will investigate the potential use of Brick Fine Aggregate (BFA) as a partial replacement for natural sand in concrete production. The process will begin with the collection of waste bricks from local sources, which will then be crushed and sieved to obtain particles smaller than 4.75 mm. These particles will serve as BFA, while Sylhet sand will be used as the control natural fine aggregate and stone chips will remain constant as the coarse aggregate. Six concrete mix designs will be developed, incorporating BFA at replacement levels of 0% (control), 5%, 10%, 15%, 20%, and 25% by weight of natural sand. A fixed water-to-cement ratio of 0.466 will be maintained across all mixes to ensure consistency in hydration. The program will evaluate three key stages of concrete performance. First, physical properties of aggregates such as specific gravity, moisture content, and water absorption will be tested. Second, fresh concrete properties will be assessed through the slump test to determine workability. Third, hardened properties will be examined by conducting compressive strength tests at curing ages of 7, 14, and 28 days, along with split tensile strength tests for tensile performance. Data collected from these experiments will be analyzed to determine the optimal percentage of BFA that provides satisfactory strength and workability. The program will also document variations in performance compared to conventional sand concrete.

	The entire process will follow a structured timeline, beginning with literature review and material preparation, followed by laboratory testing, data analysis, and report writing. The findings will provide scientific validation of BFA as a sustainable material, and recommendations will be prepared for its practical application in the construction industry.
Key highlights of the content/process	**Key highlights (Content):** I. Use of brick waste as fine aggregate. II. Sustainable and eco-friendly approach. III. Validation of mechanical properties. **Key highlights (Process):** I. Structured experimental methodology. II. Industry-oriented testing framework. III. Collaboration with local stakeholders.
Differences from traditional approaches	Traditionally, natural sand is the only fine aggregate. This project reduces sand usage, replaces waste material, and enhances sustainability.
Progress as of today	Initial literature review and sample preparation completed. Testing phase ongoing.
Problems in implementation	Limited funding, variable quality of brick waste.
Approaches to solve the problems	Standardizing waste collection, applying grant support.
Completion date, if completed	July 2026
Seeing	
Impacts on students	Hands-on sustainable research experience.
Impacts on professors	Research publications and industry linkages.
Impacts on university administration	Enhanced reputation for sustainability-driven innovation.
Responses from industry/market	Anticipated positive, given material cost savings.
Responses from citizen/government	Strong alignment with environmental policy goals.
Measurable output (revenues)	Potential reduction of sand import costs.
Measurable input (expenses)	Moderate lab research and material costs.
Cost-benefit analysis for effectiveness	Expected high benefit-to-cost ratio due to reduced raw material use.
Future Planning	
Where does the project go from here?	The project will move from laboratory research to pilot applications in real construction projects. Next, technical guidelines for using BFA in concrete will be developed in collaboration with industry and government bodies
Addendum	
Exhibits, pictures, diagrams, etc.	(Attach specific documents that validate the program at the end of this template, and list them here.)

Reports, mimeos, monographs, books, etc.	(Describe the specific documents that validate the program, and list them here.)
Others which may help explain the program (including website links)	(Include any materials that may help validate the program; links to the program's website will be especially useful.)