ABSTRACT

Utilization of industrial waste products in construction industry have been done in our country and all over the world for quite a long time. This study encompasses utilization of industrial waste in construction industry. This experimental and analytical research work is an effort to try to develop the awareness and importance of industrial waste - material management and its utilization in a productive manner among the construction professionals. In today’s environmentally-conscious world, a more responsible approach to the environment is to increase the use of by-products of one industry which is disposed off as waste which can be used as raw material for some other industry. Lack of awareness, Consumer preferences, competitive marketing strategies and a lot of misunderstanding among the users have impeded their utilization in our country. (116)

All useful waste products have prove the slogans true that are “ash to cash” or “refuse to resource” & “wastes to wealth”. In our country annually huge quantities of waste products are produced by the industries. Instead of disposing off these waste products if they are utilized, it will provide an eco-friendly solution, simultaneously solving the problem of pollution and reducing the use of scarcity available natural material and cement. Such waste can be blended with Cement, is the step towards economy and obviously towards the progress of the nation.

The present day world is witnessing the construction of very challenging and difficult civil engineering structures. Researchers all over the world are attempting to develop high performance concretes by using industrial waste like fly ash, hypo sludge, glass fibers and many more in concrete up to certain proportions.

India has an approximate road network of over 4 million kilometers (159). These roads are a mix of modern highways and narrow, unpaved roads, and are undergoing drastic improvement (in terms of widening and strengthening). Nowadays, India has changed with major efforts to modernize country’s road infrastructure particularly NHs and village road (PMGSY). Road Transport is vital to India’s economy. It enables the country’s transportation sector to contribute more than 4 percent of India’s gross domestic product, in comparison to railways that contributed nearly 1 percent.

Bitumen and cement are used as binder in road construction in the country. In general, roads in India are primarily bitumen-based macadamized roads. However, a few of the National Highways have been constructed using concrete. In some locations, such as in
Kanpur or in Gujarat, British-built concrete roads which have been rehabilitated by overlaying bitumen concrete. Concrete roads were less popular prior to 1990s because of low availability of cement. However, with large supplies of cement in the country and the virtues (durability and less maintenance) of concrete roads, they are once again gaining popularity. Concrete roads are weather-proof, more service life and require lower maintenance compared to bituminous roads. Cement concrete roads enjoy a clear advantage over bituminous roads and are extremely longer lasting, often going for 40 to 50 years. Ministry of Shipping, Road Transport and Highways, Government of India, and added that for sustainable development, the modern society cannot do without using high performance construction material, concrete in roads and highways by using industrial waste for green development.

Hence an experimental research study has been conducted for comparing and studying the effect of replacing ordinary portland cement with Fly Ash Class-F and Hypo Sludge with 10%, 20%, 30% and 40% by weight and Also 0.1% added glass fibers in M25 and M40 grade concrete. The comparison has been made on the basis of Compressive Strength Test, Flexural Strength Test, Modulus of Elasticity.

Cement concrete pavement is designed for a Rural Road in Gujarat State having a traffic volume of up to 500 vehicles per day consisting vehicles, like, agricultural tractors/trailers, light goods vehicles, heavy trucks, buses, animal drawn vehicles, motorized two-wheelers and cycles. The soil has a soaked California Bearing Ratio (CBR) value of 2%, 4% and 6% and design wheel load 30kN and 51kN. Based on computed thickness of pavement estimated cost per sq.m. worked out range from Rs.450 to Rs.600.00.

Cement concrete pavement is to be designed for a two-lane two-way National Highway in Gujarat State. The total two-way traffic assumed as 500, 600, 700, 800, 900, 1000, 1200, 1500, 2000, 3000 commercial vehicles per day (cvpd) at the end of the construction period. To improve effective modulus of subgrade reaction (k), layer of Dry Lean Concrete (DLC) 100mm and 150mm thick assumed on subgrade soil having CBR 2%, 4%, 6%. Based on computed thickness of pavement estimated cost per sq.m. worked out range from Rs.800 to Rs.1050.00.