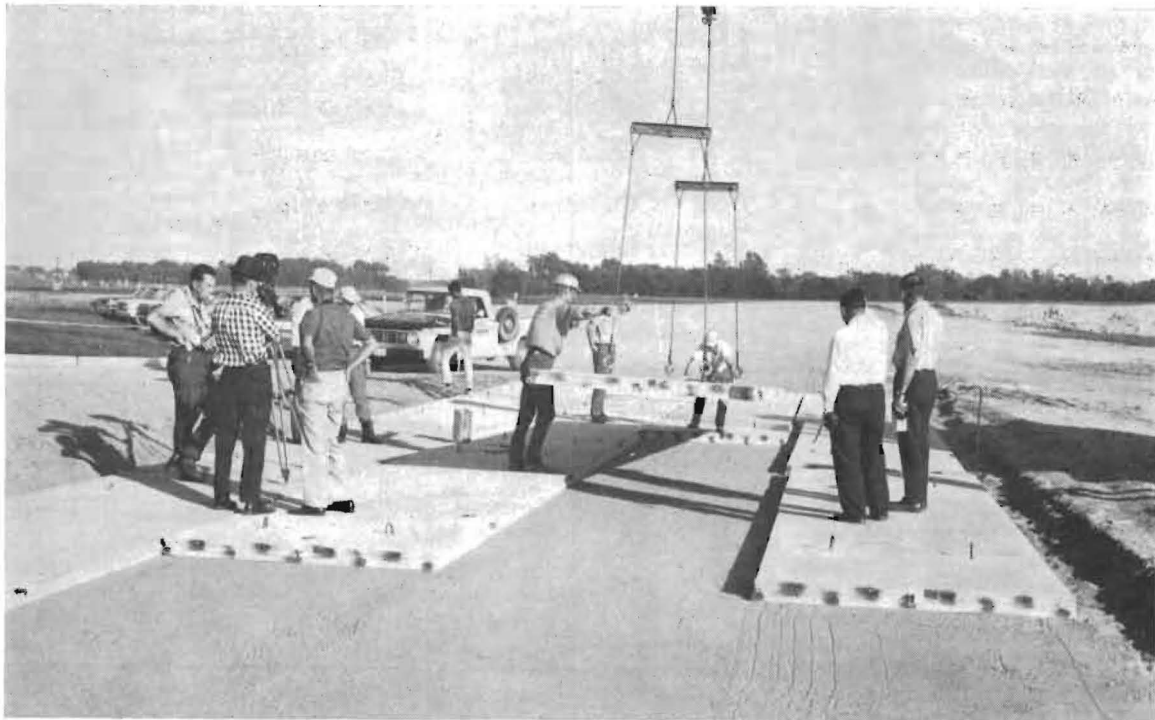


Prefabricated Highway is Investigated



■ PRECAST, prestressed concrete panels fit together readily to provide support for an asphalt surface course.

WORKING in cooperation with the South Dakota Department of Highways and the Bureau of Public Roads, South Dakota State University has developed what is said to be the first prefabricated highway section. Emil R. Hargett, associate professor of civil engineering at the university, was in charge of the research program which resulted in the development of a prestressed, precast portland cement concrete panel which can be set in place on the roadbed by a crane.

"The idea of prestressed concrete isn't new," says Prof. Hargett, "but precast and prestressed have never before been linked together and used in highway construction." The precast panels are 6 feet wide, 24 feet long and 4½ inches thick. Each panel weighs four tons and contains two cubic yards of concrete.

The panels are constructed at any convenient place off the right-of-way and are taken to the construction site by truck. Four loops are cast into each panel to facilitate handling; these are removed after the panels are in place.

"The need for a pre-fab highway of this kind," says Prof. Hargett, "developed from the increase in traffic, especially heavy truck load-

ings which have created a need for a stronger but more flexible pavement. The pavement must withstand heavy wheel loadings without creating maintenance problems generally common to many pavements subjected to such traffic.

Construction of rigid pavements, using prestressed concrete, has had recent application in airport runway design, but in the highway field usage has been very limited. Prestressed rigid pavement construction, however, has definite advantages through the elimination of most of the expansion joints normally required in concrete highways. Tension, applied through a high-strength cable embedded in the concrete, eliminates weather and stress cracks; and prestressed design makes a more efficient use of the material required. This combination of prestressed rigid pavement and a flexible pavement overlay could introduce a new type of highway construction.

Prof. Hargett and the South Dakota Department of Highways are planning to coordinate his research with practical application. He hopes to combine present-day highway construction with a type of off-site precasting to reduce overall

costs. He has planned a three-phase program: 1) More investigation; 2) installation of more slabs; and 3) a field study of performance and cost of a short length of composite pavement. Already installed sections consist of prestressed and precast concrete panels interconnected and covered with an asphalt mat 1½ inches thick.

The installation, off the South Dakota highway system, includes a 24 by 96-foot section. It is hoped to let for construction this winter a 900-foot section on the state highway system.

A. W. Potter, director of the Materials and Tests Division for the Department of Highways says "if this type of construction proves successful, it could eliminate some of the maintenance problems that will face us when the Interstate System is completed. Small segments of the pavement could be removed to correct subgrade or allied problems and then replaced."

The Bureau of Public Roads has expressed an interest in this research project by sharing a part of the cost of the small-scale field study and have indicated that some federal funds might be available for further study. □□□

SEWERAGE & REFUSE

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DIGEST

Surface Aerators

Surface aerators offer the engineer an economical method of mixing and furnishing oxygen to wastes in tanks and lagoons. The selection of aeration units, however, should not be based on oxygen transfer alone. One method utilizes a turbine type rotor consisting of a horizontal round plate with flat, vertical blades welded to its periphery. A motor and speed reducer, mounted on a supporting plate, drive the rotor through a vertical shaft. This type of aerator is essentially a low head, high volume pump. Like any other pump, horsepower requirements of a surface aerator increase with the volume of liquid moved and thus are directly proportional to the mixing of the basin contents. Another factor to be considered in the selection of a surface aerator is the geometry of the basin. Surface aerators may be used in circular, square, or rectangular tanks of new or existing construction. Surface aerators may be used in earthen lagoons as well as in metal or concrete tanks; however, criteria for aerated lagoons or earthen basins differ somewhat from those for tanks. In low-rate activated sludge treatment or in aerated lagoons, mixing will usually determine the size of the aerators. But oxygen requirements of the system are of equal importance and must be considered in design. The actual amount of oxygen transferred by a specific unit depends on the temperature, the DO already present in the liquid and the nature of the liquid. Once the total oxygen requirements of the system are known and the value converted to the standard conditions of the manufacturer, the number of aerators can be selected on the basis of mixing and oxygen transfers. Mixing should be checked by noting the oxygen transfer rate at various points in the basin. This mixing also provides an average oxygen trans-

fer rate, from which a reasonable value of total oxygen transferred can be computed.

"Surface Aerators Spin To a Comeback." By Arnold Smith, Partner, Nebolsine, Toth, McPhee Associates, Consulting Engineers, New York, N.Y. *Water & Wastes Engineering*, December, 1966.

Microbial Content of Air Near Treatment Plants

The specific objectives of this study were to compare the emissions of coliform organisms from

the activated sludge process in sewage treatment and the high-rate trickling filter process; to compare the emission of coliform organisms from the various individual units of the two processes; to establish the survival distance of coliform organisms as related to wind velocity and other weather conditions; to establish the size distribution of the particulate matter and relate this information to the efficiency of the human lung in order to determine the health hazard. This investigation included measurement of the

Mobile Lab for Water Pollution Tests

A MOBILE laboratory for on-the-site water analysis in pollution control programs has been placed in service by Brown & Root, Inc., of Houston. The laboratory is one of three units used by the engineering and contracting firm for water quality control evaluation in the field. Also included are a boat equipped with a recording fathometer, current meter, and sample collectors, and a four-wheel drive station wagon. The three units provide a capability to evaluate the design adequacy of actual waste water treatment facilities; to evaluate the adequacy of individual processes; to provide control for start-up operations; to troubleshoot existing malfunctioning or inadequate waste water treatment facilities; to establish baseline data for new construction process designs; and to conduct stream surveys including determination of physical, biological, and chemical characteristics.

Where possible, the stream surveying begins before treatment facilities are placed in operation, enabling proper evaluation of the treatment process and assisting in plant start-up and regulation for optimum operating conditions. This also provides the beginning of a valuable source of data on the "be-

fore" and "after" conditions of the receiving stream. As these data are expanded, accurate predictions on the effects of a pollution load on a stream can be made.

Brown & Root's Public Works Engineering Department has engineered water pollution control projects valued at approximately \$12 million in the past three years.

■ INTERIOR view of well equipped mobile laboratory used by Brown and Root for needed water pollution field tests.

