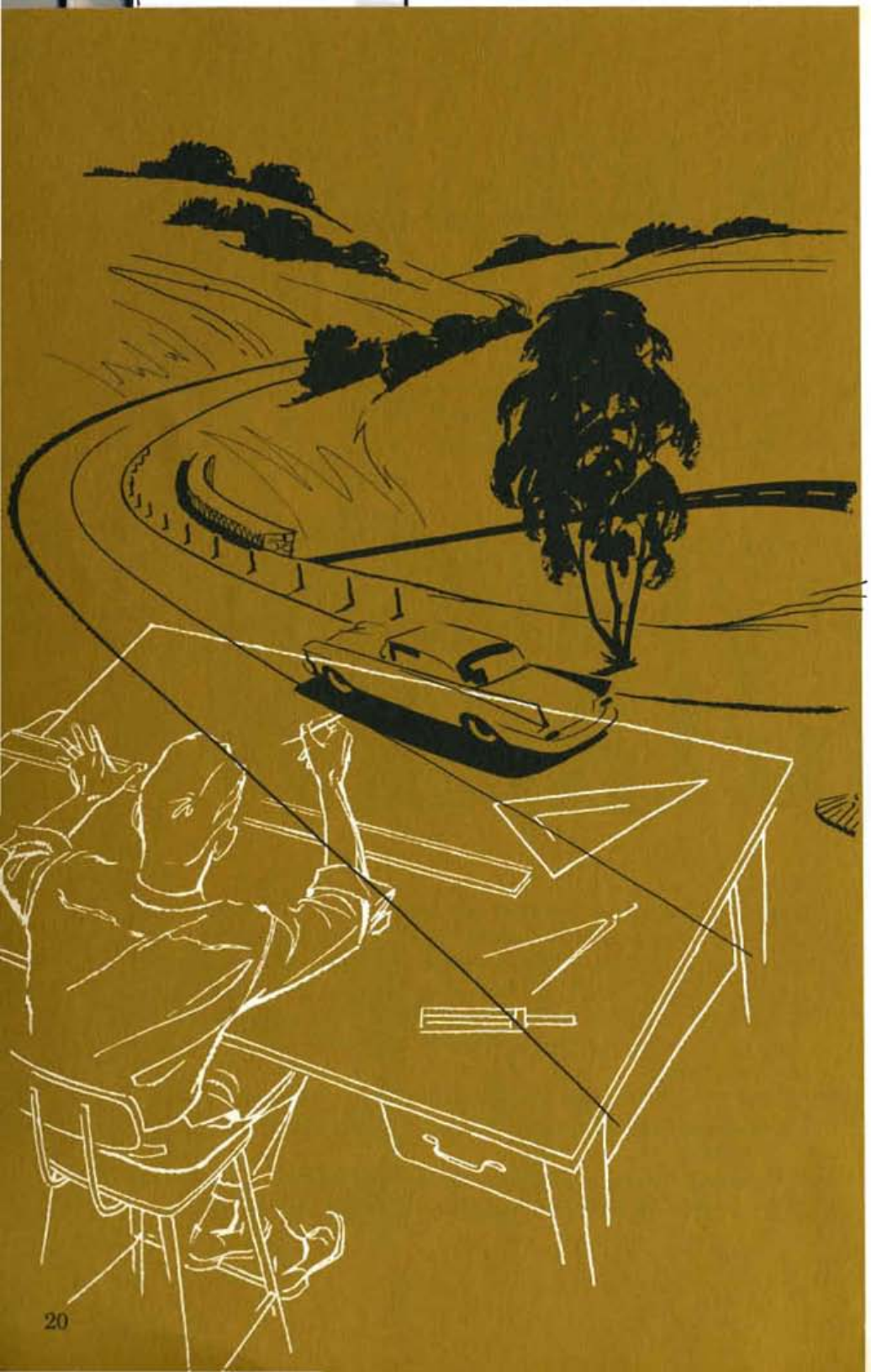


RESEARCH • TESTING • PLANS & DESIGN • REVIEW

"A better highway is

That's a familiar sign in Delaware these days. You see it by the roadside wherever a new highway project is planned. But before the sign is put there, long before the bulldozers and graders swarm on the job, the highway already is built—on paper.

Last year the highway department and its consultants drafted plans and awarded contracts for 65 road projects, covering about 244 miles. Many other projects still were under design at the year's end. For this and related work the department produced 150,000 separate blueprints during the year. Supporting these paper roads were solid foundations, also on paper, in the form of field studies, fact-finding reports, statistical surveys.

STATISTICAL STUDIES HELP SURVEYS

This submerged mountain of paper work provides the best of all building materials for Delaware Highways: Sound engineering, incorporating the latest scientific advances in road building techniques and materials. This insures a smooth, economical ride for Delaware's motorists on roads that will meet traffic needs for years to come.

FUTURE IN THE MAKING

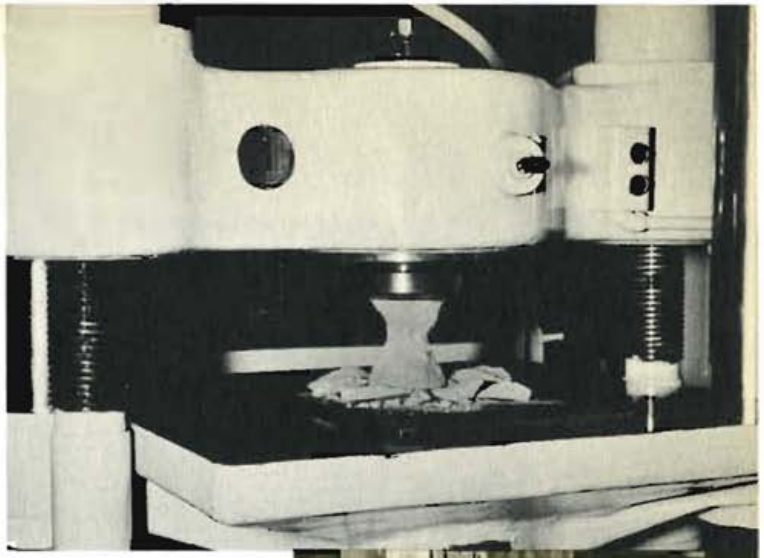
The plans for Delaware's highways originate through the interlocking efforts of four department divisions: Research, Plans and Design, Tests, and Review.

CHAUNCEY O. SIMPSON
Research Engineer

STANLEY S. SCARBOROUGH
Testing Engineer

EDWARD B. PALENSKI
Plans & Design Engineer

ROBERT WETHERALL
Review Engineer



Compaction tests are made on various combinations of soil to determine their value for a roadbed.

coming here."

As its name suggests, the Research Division, organized in 1955 and now composed of two engineers and a secretary, digs for new ideas. The staff digs in two directions: (1) Through special research projects; (2) By keeping abreast of new developments in other highway departments, allied agencies and the construction industry.

The research projects are conducted both within the Highway Department and by the University of Delaware's civil engineering department and its laboratories. Last year the highway department sponsored four major research projects there and is continuing one this year, along with two new studies.

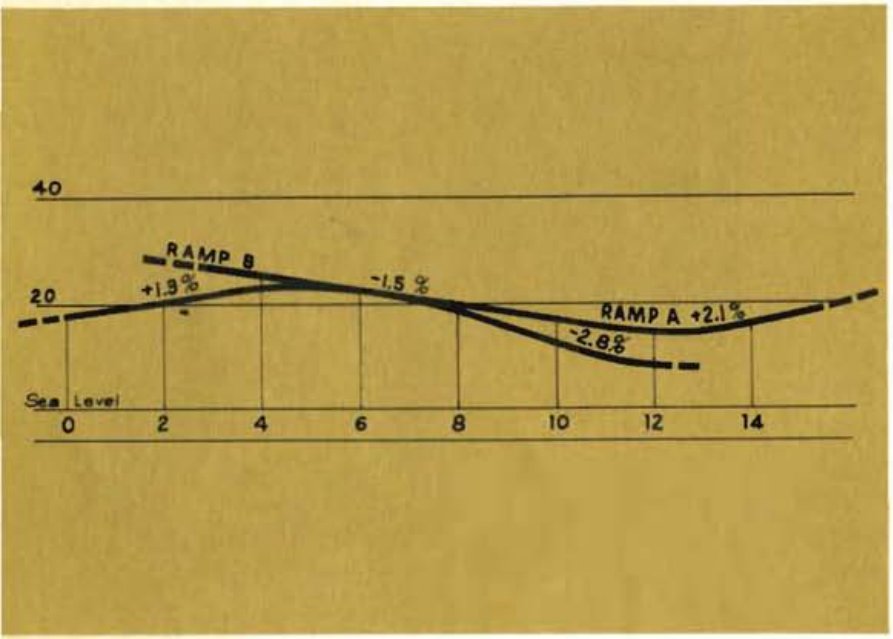
DIGGING FOR IDEAS

The university projects are aimed chiefly at finding economical ways to make highways last longer. Roads seldom if ever wear out. They tend to disintegrate due to many factors: freeze and thaw, wet and dry spells, erosion of sub-layers, infiltration of drainage water. One department research project is experimenting with new type "pre-stressed concrete slabs," a study which can result in more durable roads under all varieties of weathering.

25 other research projects seek: Improved surfacing mixtures; Ways to reduce damaging expansion and contraction of concrete; Facts on engineering soil properties. Planned for the coming fiscal year is a rainfall-runoff study, the first of its kind in the state. One of its aims is to find practical methods for designing storm drainage systems.

Plans must be drawn . . .

. . . And carefully checked.



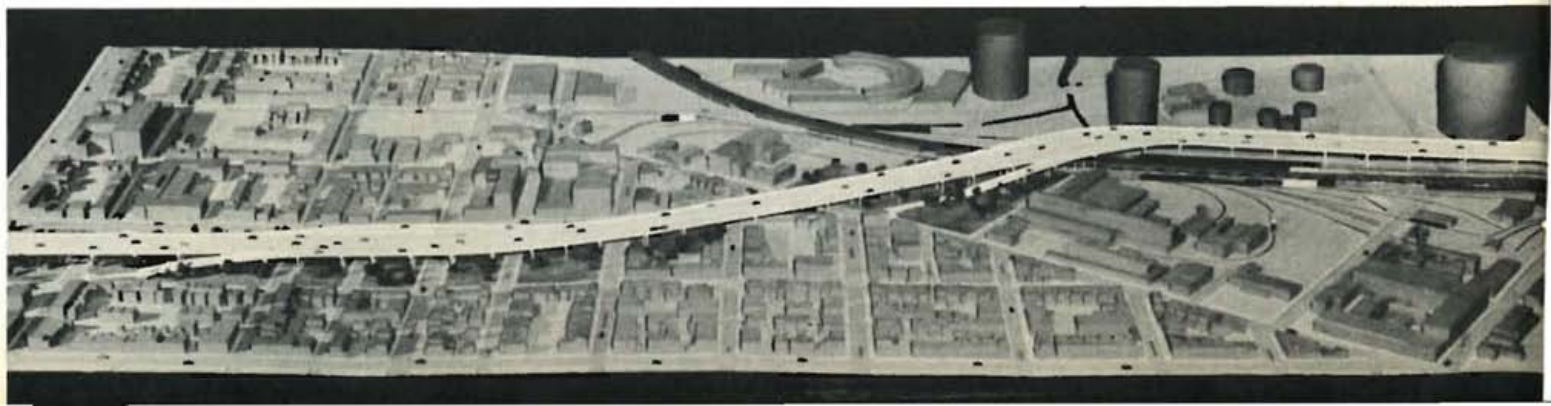
Profile drawing of one section of the Interstate System. Plans such as these represented are vital to construction.

GETTING TOP WORKMANSHIP

Another and quite unrelated responsibility of the Research Division is "prequalification of bidders." Delaware roads are built by private contractors to the department's plans and specifications. When a road contractor bids on a highway project for the first time the company must undergo an investigation to determine whether it has the know-how, skilled manpower and equipment to do the job properly. This investigation, carried out by Research, is done before the contractor is awarded a contract, thus insuring that the department will get top workmanship.

Other functions of Research are: Highway landscaping aimed not only at beautifying the roadway but also at improving safe-driving conditions through, for example, the placement of trees and shrubs to prevent headlight glare; A current study of the feasibility of using electronic "brains" to speed the handling of engineering problems; A continuous policy of gathering and exchanging helpful information, especially new ideas, among the other divisions.

Finally, Research is continuing its very active participation in the Delaware River Valley survey now being conducted by the U. S. Army Corps of Engineers. The survey is concerned with water requirements as far ahead as the year 2060.



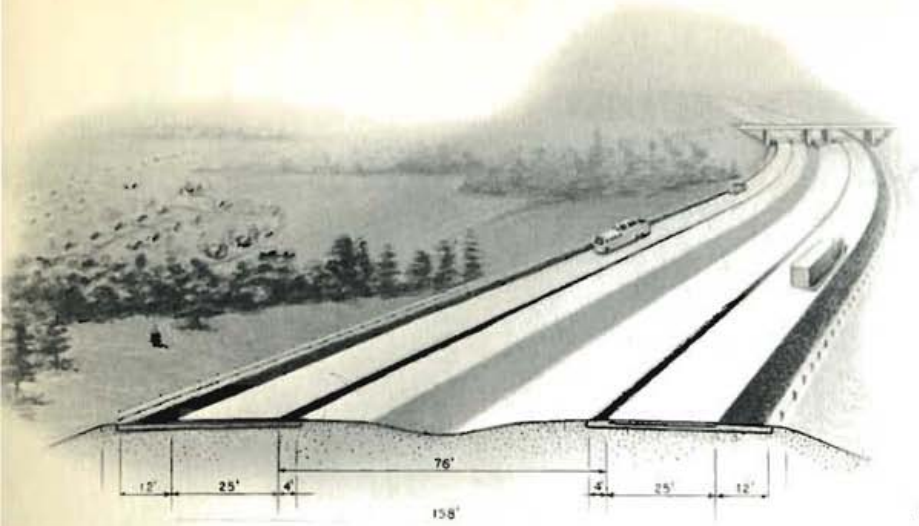
Sometimes roads are built in model form first. This is part of FAI-2.

To bring this road up to date, thousands of hours of paper work, testing, and thought must be done.

PLANS AND DESIGN

The graceful sweep of a modern highway is more than just pleasing to the motorist's eye. Every foot of it—gentle hill, arching curve, soaring straightaway—is carefully calculated to solve a host of problems at once—problems of topography, subsoil conditions, natural obstructions, to name a few—all in such a way as to serve traffic needs far into the future.

Making sure Delaware's highways meet these exacting demands is the job of the Plans and Design Division. Fortified with new ideas from Research, with studies on field conditions, with factual reports on future traffic needs, Plans and Design last year drafted plans for 44 highways and related contracts covering about 207 miles. All were awarded for construction. Among these were 15 major contracts calling for new construction or reconstruction or widening and resurfacing of 38 miles of highway. Another 12 contracts involved sidewalk and shoulder work, crossover construction or drainage projects. The remaining 17 projects were for grading and paving about 155 miles of "dirt roads." Now in its third year, this 10-year program for surfacing all Delaware "dirt roads" is ahead of schedule.



Typical section of Delaware's new Interstate Highway System.

OUTSIDE HELP

In addition to the 44 projects designed by the division during the fiscal year, the department's outside consulting engineers designed another 14 state contracts and 7 interstate contracts for a total of about 37 miles. All were awarded for construction. By the year's end the consultants also had another 26 state and 16 interstate projects either designed or under design, covering about 96 miles.

The practice of using consulting engineers has grown in recent years because it is an economical and efficient way to expand the department's staff at peak period and contract it during off seasons. On its permanent staff, Plans and Design usually retains three engineers.

Plans and Design also has other duties. Last year it conducted special drainage studies. It was responsible for all blueprint reproduction, miscellaneous drawings and and plottings. The division, as in previous years, also gave expert assistance to other state and municipal agencies, providing special surveys, sketches or blueprints, engineering advice and supervision.

DOUBLE CHECKING

In the costly business of road building, errors must be avoided. Consequently, after a project is designed, every detail and calculation must be verified. This is the function of the Review Division, which runs a critical eye over the work of the outside consultants and, to some extent, that of Plans and Design. This double-checking is conducted at every stage: the preliminary, semi-final and final planning. An error turned up at any stage can save sizeable sums later. The Review Division's experts even accompany the planning engineers on preliminary and final field reviews.

Organized primarily to process the work of consultants, the Review Division also serves as liaison among the consulting engineers, other department divisions and the Federal Bureau of Public Roads.

MATERIALS TESTING

Another little-known but important step in road building is the pre-testing of all materials to be used in Delaware highways. The purpose is to make certain materials are up to standard. This is the work of the Division of Tests. Here, too, the discovery of an error or a substandard material can result in substantial savings.

Last year the division conducted 10,750 routine tests of vast quantities of all types of materials. For instance, 983 tests were performed in approving some 12,253,516 gallons of asphalt. Another 1,716 tests were needed to okay 527,158 tons of coarse materials.

Besides routine testing, the Division last year searched for "borrow" pits, drilled deep marsh and rocky areas to get road building data; drew up specifications and provisions for special projects, worked with other state, federal and foreign agencies, carried out research on soil stabilization, and conducted tests in its laboratories on the physical properties and road performance of soil bituminous and soil cement mixtures.

Research,
Plans and Design,
Review,
Testing,
—their work
stands behind the sign,
"A Better Highway
Coming Here . . ."

and it will be
better in every way,
another link
in one of the nation's
most modern
state highway
systems