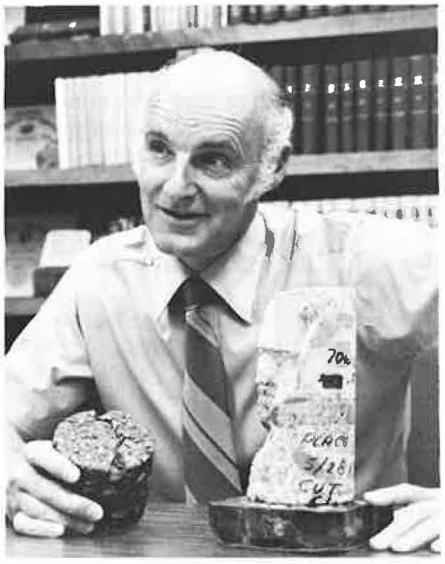
Cooperative Research Committees Save Money, Smooth Efforts of State Highway Commission

There is an old adage in the highway industry that standards and specifications have two distinct meanings, depending on whether one is writing them or reading them. Similarly, the two adversaries involved in specifications—the contractor and the state highway department—are traditionally regarded as being mutually suspicious. In actual fact, this state of affairs is rapidly dying out, and perhaps the most remarkable example of contractor-agency cooperation can be found in the State of Washington, where the Washington State Highway commission and the contractor associations discuss their respective problems and interests in committee sessions, resulting in improved relationships, simplified specifications, and savings of the taxpayers' dollar.

Although the Washington Concrete Paving Association and the Asphalt Paving Association of Washington, Inc., both conduct joint research committees with the State Highway Commission, the asphalt group initiated the practice in January of 1955. Faced with what they considered unworkable specifications, the Asphalt Paving Association of Washington sent representatives to what was essentially an air-clearing session with state highway commission representatives.

The joint committee, originally called the APAW-State Highway Commission Joint Standards and Specifications Committee, considered how standards and specifications were working in practice and where they could be realistically changed.



Roger V. LeClerc, Materials Engineer for the Washington State Highway Commission, holds an asphalt core from one of the early thick-lift sections and a portland cement core from one of the joint study sections. Plastic tape being evaluated for joint sealing can be seen at the top of the PCC core.

Answers to some questions were not readily available, and from this state of affairs there evolved the idea of a Joint Committee on Research on Asphalt Paving, the members of which would recommend certain projects that would justify further research. The cost of these research projects would be split between the highway commission and the asphalt association, and testing would be carefully controlled by the commission.

The first project to be selected by the joint committee was a study relating lift thicknesses and types of spreading equipment to compacted density and riding characteristics, and this was carried out on an asphalt base project near Shelton, Washington. The contractor, the Washington Asphalt Company, placed the asphalt base in three different lift thicknesses ranging from 0.1 ft to the full depth of 0.35 ft. The Class E base material was placed with a rock spreader in lieu of a conventional paving machine, and a rubber-tired roller was used to compact approximately half of

the three experimental sections while a conventional steel-wheel roller was used on the other half.

The results helped to make asphalt paving history; the carefully documented results showed that the number of lifts in which the base and leveling were placed and the type of compaction equipment used did not significantly affect the final riding qualities of the pavement. In addition, the density of the asphalt concrete was shown to be improved as the lift thickness increased and the tire pressures in the pneumatic roller were raised.

The successful use of thick lifts was swiftly reflected in a change in the state specifications, and Washington became one of the first states to allow the placement of hot-mix asphalt in thick layers, a practice that is now employed in nearly every state.

As a result of the tests, the compaction specifications were also changed from a predetermined, overall specification to a tailor-made compaction pattern based on air permeability tests taken on a test section at the beginning of each project. Last year the Training Subcommittee conducted a training program to familiarize personnel with the air permeability test procedures and is carrying out a similar course this summer in adjustment and calibration of paving equipment. The equipment, and in some cases the instructors, are supplied by the contractor members of the Asphalt Paving Association of Washington.

In the seven years since the Joint Committee was formed, studies have been made in such areas as benefits of pneumatic-tired rollers, variation in quality of asphalt concrete, the effect of drying operations on the cleanliness of aggregate as measured by the sand equivalent test, and further compaction testing based on the air permeability tests.

The Joint Research Program for the 1971 construction season includes a surface quality improvement study, designed to isolate the conditions or variables that affect the quality of the completed roadway.

Technicians compare interim test results on one of the thick-lift sections laid in 1965 as a result of the recommendations of the joint research committee.

Approximately 4 inches of hot-mix asphalt base was laid in one lift in the APAW-State Highway Commission experiment in 1965. A conventional paver is being used in this photograph, while a motor grader works in the background.

Research personnel are prepared to move into the field and conduct a major study of the cause of ripples in asphalt pavements, but, as Roger V. LeClerc, Materials Engineer for the Washington State Highway Commission, admits, "We haven't had a rippled section in the last three years, so we don't have anything to study."

How does the asphalt association feel about the joint project? Carl V. Kilgore, Executive Vice President of the Asphalt Paving Association of Washington, Inc., says, "Both the highway department and our contractor members are very enthusiastic about the continuation of our joint research program, and both organizations are aware of the value of research in improving our construction methods and the quality of our end product. Our contractors feel that a program of this type is an industry responsibility, and certainly in the best public interest."

In 1968 representatives of the Washington Concrete Paving Association met with highway commission representatives to form a similar joint committee. Subjects discussed at the original meeting ranged from surface tolerances, flagging, preparation of roadways, selection of pavement types, and comparable bases for bids between pavement types. Ultimately, a joint research committee was formed to investigate some of the problems that arose from these preliminary discussions.

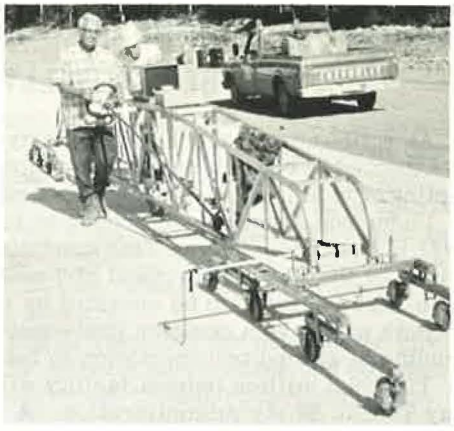
The most important joint study in the field of portland cement concrete to be undertaken till now is, appropriately enough, a joint study—a determination of the different effects of random spacing of joints in rigid pavements.

The joint research committee initiated this study because it felt that one of the primary factors in providing a rigid pavement with satisfactory riding characteristics and service life is the quality and smoothness of the contraction

This section of Washington state highway is the scene of the research project on random spacing of joints in portland cement concrete pavements.

joints built into the pavement. The study, which is still under way and is expected to take 5 years to complete, involves the use of certain joint-forming techniques into the normal construction of a concrete paving project.

All joints on the test section are being placed on a 1:2 skew to the centerline. Joint spacing configurations consist of two random patterns and one of uniform spacing. The random patterns are 9, 15, 16, 10 ft, repeating, and 10, 14, 15, 11 ft, repeating. The regularly spaced joints are at 15-ft intervals. Preliminary planning called for half the joints to be sawed and the remaining half to be constructed with plastic tape, which is considered to have a high potential in the prevention of transverse cracking control.



State Highway Commission technicians check the smoothness of a section of portland cement concrete pavement on Washington's Interstate 90 near Snoqualmie Pass.

Although full results of the research program will not be available until the end of the 5-year period, immediate comparisons of construction techniques and riding qualities of the selected joint designs are being evaluated continually.

The joint research committee is also investigating the factors related to the unit weight test for plastic portland cement concrete. The committee is assessing the benefits of rodding versus mechanical vibration during the filling of the test bucket, the use of a ½-cubic foot bucket rather than a 1-cubic foot bucket, and the relationship of the density of hardened portland cement concrete as determined from pavement cores to the unit weight of the fresh concrete as consolidated by rodding or vibration.

The committee believes that this study will provide a basis for streamlining testing procedures to the point where one test will replace the two now required, and a smaller, more manageable test bucket could be used without sacrificing accuracy.

"Our main area of investigation in portland cement concrete will continue to be the improvement of joint performance," says Roger LeClerc. "We have some minor problems in contract administration to clear up, too. As for asphalt, our problems are more or less licked, and we're just keeping our eye on things for the moment. Nuclear testing may be a subject for our investigation in the future.

"The joint committees have been of enormous help to the highway department," he adds. "The spontaneity of our program can be maintained, with no red tape, and the joint funding helps us to get results in the least possible time."