

THE DEADLY PARALLEL

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Maintenance of Rigid Cement Slabs Under Highway Traffic "Is Annually a Mounting Expense" — Editorial Engineering News-Record April 26, 1923. Versus "Concrete Roads Will Last Over One Hundred Years" — Col. Boyden, Representing Portland Cement Association, Chicago, Salem Statesman, April 12, 1923.

The following news item appearing in the "Salem Statesman" for April 12, 1923, reads like fiction to those familiar with road maintenance:

"Concrete Roads Best, Declares Col. Boyden"
"Concrete (Portland cement) roads well built according to our specification will last 100 years and then be good to start in on the second century lap."

(Col. Boyden comes from Chicago, and is the field representative of the Portland Cement Association.)

Cold Facts
The annual maintenance of Portland cement concrete in several states based on public records, is as follows:

Michigan—\$655.00 per mile per year on 105 miles of road, average age 5 years; (Report State Highway Commission.)

Utah—\$425.00 per mile per year on 35 miles of road, average age 5 years; (Utah Road Commission Report.)

Oregon—\$299.00 per mile per year on 123 miles of road, average age 7 years; (Fifth Biennial Report of Oregon State Highway Commission, covering period to Dec. 1922.)

California—\$450.00 per mile per year on 4700 miles, laid between 1913 and 1920, 56% of which was laid since 1916, so that the average age of 56% of the total Portland cement concrete roads on which repairs are reported was less than 3 years (Industrial News Bureau, Jan., 1923).

New York—\$943.00 per mile per year, average age 7 years (1921 N. Y. State Report.)

After spending the above high costs for annual maintenance on comparatively new pavements, many states, including Utah, face an expense of upwards of \$25,000 per mile for reconstruction due to

the "broken down and rapid disintegration" (Salt Lake Tribune May 8, 1923) of the roadway.

How long will engineers be blinded to the fact that rigid bodies, such as Portland cement concrete slabs, will not stand, even for a limited number of years, the continual pounding of modern traffic, without becoming weakened by fatigue, and remedy this effect by construction at the outset an asphaltic surface to take the shock and blow of traffic?

The following analysis of Portland cement concrete road maintenance, giving a "deadly parallel," further confirms the fallacy of "concrete for permanence," in road construction being a review of actual cost of maintenance of Portland cement concrete roads taken from public records in several states, as follows: Wayne county, Mich., Utah, Oregon and California.

Wayne County, Michigan, Experience: Engineering papers generally have published a report by LeRoy C. Smith, Engineer Manager, County Road Commission, Wayne county, Michigan, read at the annual Michigan conference on Highway Engineering, Feb. 14, 1923, which clearly shows the extensive organization and equipment and close watch and frequent repairs required for maintenance of Portland cement concrete roads, as shown by the Wayne county, Michigan, experience on roads from one to eleven years old.

This is further accentuated by an article on "Concrete Road Maintenance Methods and Tools," by C. C. Dillman, Deputy Commissioner, Michigan State Highway Department, Lansing, Michigan, published in the Engineering News Record of April 26, 1923, from which the following concluding paragraph is taken:

"In a general way it may be said that for a 16- to 20-foot Portland cement concrete road well built, it will cost in the neighborhood of \$50 per mile annually for

filling cracks and joints and a total annual slab maintenance of from \$100 to \$400 per mile, depending on the amount of traffic."

Consequently the eleven years' experience of Wayne county, Michigan, is that Portland cement concrete roads of the most modern type if subjected to any considerable amount of traffic will cost up to \$450 per mile per annum for maintenance.

The Engineering News Record of April 26, 1923, in an editorial on the subject of "Concrete Road Maintenance" says:

"While the demonstration is clear that the cost of maintaining concrete roads is not extravagant in comparison with the cost of keeping up working structures of other sorts, it is quite as clear that the Portland cement concrete road is annually a mounting expense."

Utah Experience: The Salt Lake Tribune, under date of May 8, 1923, contains the following item under the heading, "Wider Ogden Road Planned:"
"The State road commission met at Farmington yesterday, with the Davis county commission. * * * The conference was on the problem raised by the rapid disintegration of the present sixteen-foot pavement (Portland cement concrete), laid in 1915 or 1916. The state commission some time ago decided on an effort to make the reconstruction of this pavement a part of the 1923 federal aid program."

"Yesterday, the state and federal officials made a recommendation to the Davis county commission, asking that they undertake a co-operative agreement for the widening and resurfacing of the broken down Portland cement concrete highway. It is estimated that the four miles would cost about \$100,000 of which Davis county would be asked to bear the state's portion of \$25,000, the federal government putting up the remainder of the cost.

Resurfacing Proposed.

"The widening would be accomplished by placing on each side of the present pavement a three-foot slab of Portland cement concrete, eight inches thick. With the present 16-foot roadway this would give a total width to the traveled surface of the road of twenty-two feet. On each side would be a four-foot shoulder, bringing the total width of the highway to thirty feet.

"The cement sides would be laid so as to extend two inches above the present surface of the paved portion of the roadway. The portion in between, it is proposed to surface with a two-inch layer of asphaltic concrete, using the present Portland cement concrete pavement as the base.

"The Portland cement concrete would extend the same depth into the ground as the present hard-surface pavement and the new pavement would be eight inches thick at the edges, with a maximum of eight inches of cement and two of bituminous concrete at the center."

The expense on the sections of Portland cement concrete road between Ogden and Salt Lake are as follows:

Several sections totaling about 35 miles were constructed 1914 to 1921. Portland cement concrete used. Eight inches thick at sides; six inches in center; width, sixteen and eighteen feet.

The maintenance on this road according to state records is as follows:
1919—\$1495.00 per mile per year on 12 miles, average age 3 years;
1920—\$480.00 per mile per year on 22.3 miles of which 10 miles is only one year old.

1916." The state officials, looking to the future, have decided to widen the highway at the same time that they repair the "rapidly deteriorating and broken down conditions" of the present Portland cement concrete roadway. (Salt Lake Tribune, 5-8-'23.)

The cost of the reconstruction of this four-mile stretch is estimated at \$100,000, or \$25,000 per mile.

Other sections than the four-mile section referred to in the clipping are in various stages of disintegration, as shown by the abnormal sums spent in annual maintenance given above. Only seven years have elapsed since this Portland cement concrete pavement was built by the State of Utah, under supervision of the State Highway Engineer, who was thoroughly conversant with concrete construction, and under the co-operation and advice of the Portland cement manufacturers, and yet the roadway now requires \$25,000 per mile to reconstruct it with asphaltic type of construction which will take the "impact" and prevent further disintegration by traffic.

The above would prove to an unbiased mind—if it were not already convinced by the failure in other states, such as California, where \$65,000,000 is reported to be required for similar reconstruction purposes—that traffic in its pounding effect on rigid slabs of Portland cement concrete is rapidly weakening the pavements to a point of fatigue and the inevitable result with such a rigid slab subjected to traffic, is to become weaker as it ages, until it becomes absolutely necessary to resurface with a shock-absorbing asphaltic surface as now recommended by the State Road Commission, to be done with the Ogden-Salt Lake highway. (See news item Salt Lake Tribune 5-8-'23, quoted above.)

Oregon Experience: From the Biennial Report of the State Highway Commission of the State of Oregon, 1921-1922, covering the period to Dec. 1922, the following is quoted:

Maintenance.
"Last year this work involved the maintenance of 485 miles of bituminous pavement, 105 miles of concrete pavement, which mileages are entirely exclusive of any mileage of new work constructed during 1922.

"The maintenance of the mileages stated above, inclusive of the maintenance of bridges cost during the one-year period distributed as follows:

Maintenance of bituminous pavement (Warren type) \$46,669.31
Maintenance of Portland cement pavements.....\$25,186.90

Note: This statement when reduced to cost per mile shows the following:
Bituminous (Warren) — Miles maintained, 485; total cost, \$46,669.31; cost per mile \$96.20; average age, 3.25 years.

Portland Cement—Miles maintained, 105; total cost \$25,186.90; cost per mile, \$239.80; average age, 2.10 years.

Bituminous maintenance includes maintaining all Bitulthic pavements, to-wit:
228 miles of 2 in. surface on crushed rock base
257 miles of 2 in. surface on 3 in. mixed base

Total 485 miles bituminous.

The satisfaction given by the bituminous pavement (Warren type) in Oregon is further referred to in the report of the Oregon State Highway Commission, covering period to Dec. 1922.

"The Columbia River Highway is considered to be one of the finest and most scenic highways in existence, and its construction represents an achievement in road building which is not equaled anywhere."

Note: The Columbia River Highway is Warren pavement laid in 1915.

California Experience: That the original investment in highways

is being dissipated is illustrated by the following quotation from "Building and Engineering News," September 17, 1919, published at San Francisco, Calif.:

"Highway Maintenance"
(In Portland Cement Concrete)
Contracts let 1912-1913 316 miles
Maintenance cost 1914 \$265 per mile
Contracts let 1912-1914 718 miles
Maintenance cost 1915 \$833 per mile
Contracts let 1912-1915 966 miles
Maintenance cost 1916 \$1231 per mile

"* * * The average annual maintenance cost per mile is about 10% of the first cost, or in ten years at that rate we shall have paid out as much for maintenance as the original cost, and we have still only started to pay off on the bonds."

From the San Francisco Chronicle, July 3, 1921, we quote the following: "State Roads wearing fast as autoists. Misleading data supplied to public."

"The stretch of State Highway in Contra Costa county near Eckley, built only three years ago, is a typical example of how the State Highway Commission is preserving its original investment.

The original investment was seen in broken pieces of Portland cement concrete blocks lining the road. A statement issued by the Chairman of the Highway Commission in April, 1921, shows 290 miles of original investment which was then in such a broken up and cracked condition as to need immediate reconstruction, and thirty-nine miles of this total is less than three years old.

"To describe the work of adding an additional inch to this badly shattered and broken Portland cement concrete pavement as conserving the original investment is entirely misleading and the people of this state are entitled to a

more frank and truthful exposition of this wasteful and extravagant attempt to cover up engineering mistakes.

"Let the commission show its straightforward facts and figures just what remains of the 'original investment' in the 10.7 miles of road south of Willows, the 20 odd miles of road in Los Angeles and Ventura counties, through Calabasas and over the Canejo grade, the eight and three-fourths miles of lateral h'ghway near Colusa, the ten miles of highway east of San Diego, the three miles in Alameda county north of San Jose, the six mile section in Sonoma county south of Healdsburg and on all of the sections making up the 200 miles of Portland cement concrete pavement now so badly disintegrated that more than \$7,000,000 are needed at once, according to the commission to continue the preservation of the original investment."

Conclusion: The failure of rigid Portland cement concrete slabs to withstand, successfully without injury, the impact of traffic after several years use, is a phenomenon that is receiving the general attention of road experts, and statements like that made by the representative of the Portland Cement Association, namely:

"Concrete roads well built according to our specifications will last 100 years and then be good to start on the second century lap," is tantamount to fraud. Were the statement modified to read:

"Portland cement concrete roads will last for three years and then be good to start on the second three-year lap," the statement would still be at variance with the facts; and even such a short term of service as three years for rigid slabs cannot be proved by past performances, taking the average condition of Portland cement concrete roads in any section as a criterion.

How the Radio Proves that Flowers Actually Feel Pain When Plucked

Flowers actually feel pain when plucked or torn, according to Dr. Albert Abrams of San Francisco, who announces this discovery as a result of a series of experiments with a super radio set.

The radio used by Dr. Abrams is attached to what he calls a reflexophone, which catches from the air the vibrations and records them by means of delicate tuning methods.

The boxes of the reflexophone are placed on a table with their dials covers. Wires connect the reflexophone to tiny instruments arranged on a board whereon three lighted bulbs glow warmly and from which rises an amplifying horn. The radio is equipped with an antenna, a delicate looking rod attached to the set by a black cord.

This delicate machine, Dr.

Abrams believes, will some day be perfected to the point where it will stand on street corners and in stores so that those who care to may drop a coin in the slot and ascertain what ails them.

The first test Dr. Abrams made was to record the vibrations of cancer. The moment the antenna rod approached a bottle containing a cancer in alcohol, the horn gurgled audibly. When the bottle was removed and the rod adjusted, the horn sounded again, but after a magnet had been passed over the spot the radio failed to respond.

The radio recorded the message broadcast by the cancer, Dr. Abrams explained. "The cancer communicated a portion of its energy to the spot where the bottle had stood, hence the same reaction. The magnet 'sterilized' the spot, hence the reaction."

The horn responded to the leaf of a nasturtium. Dr. Abrams then cut the leaf and there was no reaction. Another leaf held over the mouth of a chloroform bottle was similarly torn and cut but without the radio recording the reaction.

"Plants broadcast waves of radio activity," Dr. Abrams explained. "Tearing hurts the leaf, cutting is painless. When the plant is influenced by chloroform it has no pain."—Portland Journal.

(Dr. Abrams, referred to above, is Dr. Albert Abrams, discoverer of the methods of diagnosis and treatment of diseases now being employed throughout the world by thousands of graduate physicians, and known as the E. R. A., or the Electronic Reactions of Abrams.)

MENACE SEEN IN COLLEGE CONTROL

Danger Is Detected by Prof. Harry W. Tyler of Massachusetts Tech

CAMBRIDGE, Mass., July 21.—Cooperation between national societies representing college teachers on the one hand and college administrative officers on the other as a means of arriving at a better understanding and better methods in American colleges and universities is suggested by Professor Harry W. Tyler, Professor Tyler is head of the mathematics Institute of Technology and secretary of the American Association of University Professors.

Referring to the recent enforced resignation of President Alexander McKeljohn of Amherst College and the resignation of several Clark University professors accompanied by statements protesting against the methods of President Wallace W. Atwood, he says:

"These events cannot be regarded as merely local in their significance. Quite regardless of the faults or merits of individuals there is not reason to infer that the events are merely symptoms of some more fundamental defect in the organization of our highest institutions?"

of American Colleges, the Association of State Colleges, etc., on the other, representing administrative officers and to some extent trustees. Through the co-operation of these bodies it should, for the first time in our educational history, be possible to deal with a national problem in a national way, establishing standards which may count on progressive acceptance by the colleges."

Remark that the college president is expected to make more or less successful appeal to all these groups, Professor Tyler says:
"There are probably such suppersmen (if not in presidential captivity) but the chance of discovering one for a given place is well nigh negligible. The difficulties which arise are mainly due to the fact that the business management and the educational conduct of an institution continually overlap. In numberless matters of great importance best results require co-operation of trustees and faculty or both with alumni.

"Under present conditions in this country each institution is a law unto itself. Interesting and valuable experiments are easily tried here and there but with no certainty of permanence or imitation.

"The way out to a better understanding and better method necessarily lies ultimately with the individual college but much will depend on organized and concerted action. The possibility of this now rests in such national societies as the American Association of University Professors on the one hand, representing the college teachers, and the Association

THINGS THAT NEVER HAPPEN



Prices on this 1923 line remain practically the same, in spite of the added equipment, such as in some cases, an auto truck, sun visor windshield wiper and other features that add beauty, convenience and comfort.

MOSLEMS FLOCK TO HOLY MECCA

Pilgrims Engage in Observance at the Birthplace of Mohammed

CAIRO, July 19.—Pilgrims are now converging on Mecca, their sacred city and the birthplace of Mohammed. Thousands are traveling from all parts of the Moslem world to be present on the day of sacrifice, July 24. Egyptian Mohammedans have dispatched the sacred carpet to Mecca, with elaborate ceremonial and prayer.

FIGHT IS MADE ON ILLITERACY

Summer School Idea in Modified Form Being Used in South Carolina

COLUMBIA, S. C., July 19.—The summer school idea, in a modified form, is being used by South Carolina in this state's fight to wipe out illiteracy.

Vacation boarding schools for men and women who have lacked educational opportunities have been arranged for the summer by the state department of education in cooperation with the authorities of Lander college for women, at Greenwood, and Erskine college for men at Due West. A full month's course in elementary subjects is offered at each institution at a cost of \$12.50 to the student, which includes all expenses except transportation and laundry.

Pupils whose education has equalled that of an average sixth grade pupil are not accepted for enrollment, nor are boys and girls under 14 years old.

The pupils live in the college dormitories and eat in the college dining halls, and in fact, according to Miss Will Lou Gray, state supervisor of adult school work, lead the same lives that are led by the college students during the regular terms.

Eighty-nine girls and women attended the first "opportunity" summer school, which was conducted at Lander college last summer. The course offered this summer at Erskine is the first made available to men and boys. The ages of the Lander students ranged from 14 to 54 last year, the average age being 18 years.

Many of the women came from the cotton mill villages, and not a few of these had their expenses paid by the management of the mills in which they worked for the remainder of the year.

"I wanted to be able to help my little 7-year old son with his lessons," one of the older women students said last year, when explaining what had prompted her to leave her family, and enroll in the summer course.

Winchell Is Transferred to Position at Silverton
SILVERTON, Or., July 20.—(Special to The Statesman.)—George Winchell, who has been with the Portland Railway, Light & Power company for 14 years, has been transferred from Salem to Silverton to take charge of the Silverton division. Mr. Winchell will make his home at Silverton as soon as his daughter, who is ill, is improved enough to be moved.

Agricultural Item—The horse radish is a native of England and the turnip they put in it originally came from Rome.

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