PROCEEDINGS

Sixty-Third Annual Convention
OF THE
American Railway
Bridge & Building Association
1958
Proceedings of the

Sixty-Third Annual Convention

of the

American Railway
Bridge & Building
Association

Held at

CHICAGO, ILLINOIS

September 15-17, 1958

Published by the Association
Ruth Weggeberg, Secretary
431 So. Dearborn St., Chicago 5
OFFICERS FOR 1958

W. H. Huffman ................................................. President
Chicago & North Western, Chicago

M. H. Dick ...................................................... First Vice-President
Railway Track & Structures, Chicago

B. M. Stephens ................................................. Second Vice-President
Texas & New Orleans, Houston, Tex.

H. D. Curie ...................................................... Third Vice-President
Baltimore & Ohio, Garrett, Ind.

Elise LaChance ................................................. Secretary
431 S. Dearborn Street, Chicago

L. C. Winkelhaus ................................................. Treasurer
Chicago & North Western, Chicago

DIRECTORS

Terms Expire 1958

G. W. Benson, Central of Georgia ........................................ Macon, Ga.
J. M. Lowry, St. Louis Southwestern ..................................... Tyler, Tex.
H. A. Matthews, St. Louis-San Francisco ................................ Amory, Miss.
T. M. von Sprecken, Southern ............................................. Washington, D. C.

Terms Expire 1960

W. H. Bunge, Missouri Pacific ........................................ St. Louis, Mo.

Past President

R. R. Gunderson, Western Maryland ................................... Baltimore, Md.
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Railway Track & Structures, Chicago

B. M. Stephens ................................................ First Vice-President
Texas & New Orleans, Houston, Tex.

H. D. Curie .................................................. Second Vice-President
Baltimore & Ohio, Garrett, Ind.

G. W. Benson ................................................ Third Vice-President
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Ruth Weggeberg .............................................. Secretary
431 S. Dearborn St., Chicago

L. C. Winkelhaus ............................................ Treasurer
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Terms Expire 1960

W. H. Bunge, Missouri Pacific ................................. St. Louis, Mo.

Terms Expire 1961

H. A. Matthews, St. Louis-San Francisco ...................... Amory, Miss.
M. J. Hubbard, Chesapeake & Ohio ............................ Huntington, W. Va.

Past President

W. H. Huffman, Chicago & North Western ...................... Chicago, Ill.
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The Bridge & Building Association again held their 1958 convention concurrently with, although separately from, the Roadmasters and Maintenance of Way Association. Attendance figures for the non-exhibit year were as follows: Guests 490; supply men 171; railroad men 541. This made a grand total of 1202.

On the following pages, for the benefit of our members, we have presented, in addition to pertinent information, the six committee reports which were presented at last September’s meeting and also excerpts from several major addresses that were also delivered before the group.

Joint Sessions
The first joint session of the Bridge & Building and Roadmasters Associations took place on Monday morning, September 15. It featured addresses by Clark Hungerford, president of the Frisco Railway and R. G. May, vice president, Operations and Maintenance Department of the Association of American Railroads.

The second joint session took place on Tuesday afternoon, September 16. This was highlighted by an address from C. J. Fitzpatrick, president of the Chicago & North Western, and a motion picture showing construction of embankment across the Great Salt Lake, entitled “Operation Fill,” which was accompanied by commentary from H. M. Williamson, engineer maintenance of way and structures of the Southern Pacific.

B & B Separate Sessions
At the separate sessions, W. H. Huffman, president of the B&B presided, during which time the following committee reports were presented:
- Attracting and Training B&B People
- Bridge and Building Forces and the Federal Highway Program
- Dieselization and the Water Service Man
- Extended Service Life for Masonry Structures
- Housing Problems of Bridge and Building Forces
- Trends in Trestle Design and Construction

Also heard at these meetings was an address, illustrated with slides, by L. P. Nicholson, railway representative, Structural and Railway Bureau, Portland Cement Association.

A panel discussion on “New Trends in B&B Mechanization” also took place, at which R. L. Fox, process engineer structures, Southern, served as moderator, and W. E. Chapman, chief engineer—maintenance, Central of Georgia and J. V. Inabinet, general bridge inspector, Seaboard Air Line served as panelists.

An inspection trip to American-Marietta Company was also on the agenda for the B&B members.

Remarks by President Huffman
Presiding over the B&B meetings, Mr. Huffman had the following remarks to say at the opening session:

“IT is customary at this time that a brief summary of the past year be given you. Speaking for myself, I would like to say it has been a very interesting, educational and rewarding experience. Starting as a director, as all of our officers do, and coming up through the various chairs, is entirely different than being President. Even though you have many and varied assignments, you have been directed to do them by the incumbent President. You realize more than ever before the necessity of having a group of hard-hitting, hard-working members on the Executive Committee and that the position of President would be untenable without their loyal and capable assistance. I thank them all sincerely and acknowledge that this successful year is the result of their efforts.

“Let’s face the facts—years ago before mechanization, brawn was a prime requisite for either track or B&B men and the man hours required to do a specific job was staggering compared to today’s output. Air tools, electric tools, hoists, derricks, light weight portable scaffolding, paint spray machines to name a few, have made, in many instances, a skilled mechanic out of a skilled carpenter. I would be the last man in the
world to belittle a skilled carpenter as I know how valuable one is and how hard it is to find one when the occasion arises, but there isn't time any more to saw or drill with hand tools in this speeded up era in which we now live. Our actions as well as our thinking must be streamlined to meet today's conditions. Every machine or tool must be recommended to your superior officer that will make your gangs more efficient. You might say—yes, we have recommended them but get turned down. I say this—if your ideas are sound and you can prove their effectiveness, you will eventually be rewarded. As the wage spiral continues, more and more men will have to be dispensable, and machines will be required to do their work.

The new subjects selected, on which the committee reports will be based and presented at the 1959 convention are as follows:

- Contracting Work in the Bridge & Building Department
- Use of Highway-Railway Equipment by B&B Forces
- Recent Developments in Fire Protection Methods
- Effect of Preventive Maintenance on Work Equipment

New Materials for Buildings
Materials and Methods for Extending the Life of Existing Structures

In the election of officers, M. H. Dick, editor, Railway Track & Structures, Chicago, was advanced from first vice-president to president; B. M. Stephens, assistant to executive vice-president, T&NO, Houston, Tex., was promoted from second vice-president to first vice-president; H. D. Curie, master carpenter, B&O, Garrett, Ind., was promoted from third vice-president to second vice-president; and G. W. Benson, division engineer, CofGa., Macon, Ga., was elected third vice-president. L. C. Winkelhaus, architectural engineer (ret.) C&NW, Chicago, was re-elected treasurer.

New directors elected were J. M. Lowry, chief engineer, SLSW, Tyler, Tex., and R. C. Baker, engineer of structures, C&EI, Danville, Ill., (elected for one year). H. A. Matthews, general foreman, bridges & buildings and water service, FRISCO, Amory, MS., and M. J. Hubbard, assistant chief engineer, system, C&O, Huntington, W. Va. (elected for three years).

REPORT OF NECROLOGY COMMITTEE
TO THE PRESIDENT AND MEMBERS OF THE AMERICAN RAILWAY BRIDGE & BUILDING ASSOCIATION:

We regret to advise that we have learned of the loss of nine (9) members through death during the year. It is possible that other members have passed away during the year of which we have no information. If you know of any, we would like to have their names to include in the list to be printed in the next Annual Proceedings. The following have been reported:

<table>
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<tr>
<th>NAME</th>
<th>TITLE-RAILROAD</th>
<th>DATE JOINED</th>
<th>DATE DIED</th>
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<tr>
<td>Active Members</td>
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<td>Ralph J. Lorber</td>
<td>Supervisor B.&amp;B. Peoria &amp; Pekin Union Peoria, Ill.</td>
<td>1948</td>
<td>November 17, 1957</td>
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<td>B. C. Phillips</td>
<td>Master Carpenter Chicago, Burlington &amp; Quincy Alliance, Neb.</td>
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REPORT OF RESOLUTIONS COMMITTEE

As we near the close of the Convention marking the 63rd year of the American Railway Bridge & Building Association, it is fitting that we recognize the special contributions of those whose time and efforts have made this Convention such an outstanding success, even though handicapped by this being a year without an equipment show and a generally critical year for the railroad industry. To acknowledge these special efforts, we propose the following resolutions:

Be it resolved by the American Railway Bridge & Building Association in Convention assembled that the thanks of the Association be extended, first, to Dr. Hildebrand, Pastor of the Central Church in Chicago, who invoked the blessing and guidance of Almighty God on the activities of this Association and its members and guests;

Be it further resolved, that the thanks of the Association be extended to the Executive Officers who honored us with their presence and inspired us with their advice and counsel, and especially to Mr. Clark Hungerford, President of the St. Louis-San Francisco Ry., to Mr. C. J. Fitzpatrick, President of the Chicago & North Western Ry., and to Mr. R. G. May, Vice-President, Operation and Maintenance Department, AAR;

Be it further resolved, that the thanks of the Association and of its Members and Guests be extended to the Bridge and Building Supply Association and to the Track Supply Association for their valuable support and for the banquet and entertainment which they so graciously provided;

Be it further resolved, that the sincere thanks of the Association be extended to, The Simmons-Boardman Publishing Corporation and to its representatives for their invaluable aid and interest, and to the American-Marietta Company, and/or the Portland Cement Association for providing an interesting and instructive inspection trip.

Be it further resolved, that the thanks and appreciation of the Association be extended to President B. R. Meyers of the AREA, President A. J. Reading of the Track Supply Association, and President R. E. Mann of the Bridge and Building Supply Association, who honored us with their presence and extended the Greetings of their respective Associations;

Be it further resolved that the thanks of the Association be extended to the Management and Staff of the Conrad-Hilton Hotel for their attentive co-operation and warm hospitality which contributed so largely to the success of the Convention;

Be it further resolved, that the thanks of the Association be extended to the Chairmen, Vice-Chairmen and Members of the Com-
mittees for their work in preparing the valuable, interesting and instructive reports, and to Messrs. L. P. Nicholson, R. L. Fox, W. E. Chapman, J. V. Inabinet and H. M. Williamson for their informative discussions, all of which were so ably presented.

It is recommended that these resolutions be made a part of the Minutes of this Convention so they will be a part of our Annual Proceedings and that the parties concerned be advised of this action.

T. M. von Sprecken, Chairman
Lee Mayfield
Resolutions Committee

TREASURER’S REPORT
SEPTEMBER 1, 1957 TO AUGUST 31, 1958

Cash Balance—September 1, 1957 ................................................................. $3,311.46

RECEIPTS:

Dues ................................................................. $3,090.50
Advertising
1956 Proceedings .................................................. 130.00
1957 Proceedings ................................................. 1,030.00
Refund from Roadmasters and Maintenance of Way Assoc. for 1957 Convention Expenses ............................................ 574.31
Sale of Proceedings .............................................. 3.00 4,827.81

Total Receipts ......................................................... $8,139.27

DISBURSEMENTS:

Salaries (Secretary and Asst.) ................................. $1,380.96
Social Security and Withholding Tax .......................... 300.08
Stationery and Printing ........................................... 593.40
Postage ............................................................... 159.37
Office Rent, Telephone, Electricity .............................. 242.94
Proceedings (1957 edition) ........................................ 2,425.51
1957 Convention Expense .......................................... 1,031.51
Office Supplies ...................................................... 37.64
Addressograph Plates ............................................... 19.66
Embossing Membership Certificates ............................. 41.60
Miscellaneous ....................................................... 23.39
Refund of Dues ...................................................... 10.00 6,266.06

Cash on Hand (August 31, 1958) ..................................... $1,873.21

BALANCE:

First National Bank of Chicago, August 31, 1958 .................. $1,883.21
Less—Outstanding Check ............................................ 10.00

$1,873.21

L. C. Winkelhaus,
Treasurer

September 8, 1958

APPROVED:
J. A. Jorlett, Chairman
R. E. Dove
R. P. Luck
Auditing Committee
SECRETARY’S REPORT
ANNUAL REPORT OF MEMBERSHIP FOR PERIOD SEPTEMBER 20, 1957 TO SEPTEMBER 15, 1958

ACTIVE MEMBERSHIP:
- Total Active Members, September 20, 1957: 586
- Reinstated—Paid back dues: 4
- New Active Members since September, 1957: 88
- Transferred from Associate Membership: 1

LESS—Members reported deceased: 4
- Resigned account retirement: 11
- Transferred to Life Membership: 9
- Dropped a/c did not pay dues (1956): 13

TOTAL ACTIVE MEMBERS, SEPTEMBER 15, 1958: 679

ASSOCIATE MEMBERS:
- Total Associate Members, September 20, 1957: 98
- New Associate Members since September, 1957: 11

LESS—Reported deceased: 4
- Resigned: 1
- Transferred to Active: 1
- Transferred to Life: 1
- Dropped a/c did not pay dues: 5

TOTAL ASSOCIATE MEMBERS, SEPTEMBER 15, 1958: 109

LIFE MEMBERS:
- Total Life Members, September 20, 1957: 76
- Transferred from Active Membership: 9
- Transferred from Associate Membership: 1

LESS—Reported deceased: 4

TOTAL LIFE MEMBERS, SEPTEMBER 15, 1958: 82

HONORARY MEMBERS:
- Total Honorary Members: 7

TOTAL MEMBERSHIP—ALL CLASSES—SEPTEMBER 15, 1958: 828

REPORT OF AUDITING COMMITTEE
TO MEMBERS OF THE
AMERICAN RAILWAY BRIDGE & BUILDING ASSOCIATION:

Gentlemen:
The undersigned have examined the books of the Secretary and report of the Treasurer for the period from September 1, 1957, to August 31, 1958, inclusive, and have found them to be correct as of the latter date.

Respectfully submitted,
J. A. Jorlett, Chairman
R. P. Luck
R. E. Dove, Auditing Committee

September 8, 1958
Presented Below Is the Address Delivered by Mr. Nicholson During a Separate Session of the Bridge & Building Association

On Monday afternoon, September 15, L. P. Nicholson, railway representative Structural & Railway Bureau of the Portland Cement Association, had the following remarks to say about the "Use of Prestressed Concrete in Railway Bridges and Buildings."

Under present economic conditions, engineers are challenged to find new methods of construction which will not only improve conventional design and construction but will also result in greater economy. Prestressed concrete provides builders with a material of superb strength, adaptability and economy.

First Patent

Although the application is new, the principle of prestressing is old. The first patent for prestressed concrete was issued in 1886 to a San Francisco engineer named Jackson who realized that if he could place all the concrete in a beam into compression, he could carry greater loads with the same size beam.

Unfortunately his system did not work, because in time the concrete shrank to the point where his bar, made of ordinary steel, lost its tension and no longer compressed the concrete. Today, however, we have high-tensile steel which can be stretched enough to keep most of its tension even after the shrinkage of the concrete has taken place.

What Is Prestressed Concrete?

For the benefit of those who are not too familiar with prestressing, it might be well to give a brief description of what it is and what it does.

To understand the principles of prestressed concrete, we will have to reach back in the simple theory of structures.

As you will remember, a beam placed across two supports will deflect downward under a load. The concrete along the top of the beam is "squeezed" by compressive forces, and the concrete along the bottom is "stretched" by tensile forces.

It must be kept in mind that while the compressive strength of concrete is quite high, its tensile strength is low, in a ratio of about 10 to 1.

In a conventional reinforced concrete beam, the reinforcement is placed in the bottom of the member to resist the concentration of tensile forces located in this area.

The concrete must crack before the tensile steel is stressed appreciably. As a matter of fact, about one-third of the concrete in a rectangular beam with conventional reinforcement is assumed to carry stress. It is assumed that approximately the bottom two-thirds will crack under load, and therefore will not contribute to the beam's structural strength.

In prestressed concrete we "pre"-compress the concrete before the superimposed loads are applied and then when loads are imposed the concrete in the entire beam remains in compression. This means that all the concrete is helping to support the working load.

Prestressed concrete then is merely concrete that has been compressed prior to the application of the working load.

Methods of Prestressing

There are two basic types of prestressing, "pre-tensioning" and "post-tensioning." In pre-tensioning, high tensile steel is stretched between fixed points before the concrete is placed. Concrete is then placed and cured and after sufficient strength is attained, the stretched steel is released and the force is transferred to the concrete.

In post-tensioning the concrete is cast around but not in contact with the unstretched high tensile steel. After the concrete has cured and attained sufficient strength, the steel is stretched and the force is transferred to the concrete by attaching plates to the end of the steel.

Some of the advantages of prestressed concrete are that it—

Makes possible economical use of high strength concrete.

Makes crackless concrete possible, which is conducive to greater durability under severe conditions of exposure.

Makes it possible to use thin-web concrete members of I- and T-sections, thus realizing considerable savings in concrete and steel.

Allows a reduction in depth of beams and girders and thickness of slabs, thus affording greater underclearance.

Results in very stiff members at working load and there is good recovery of deflections caused by overloads.
Reduces the effects of shear and diagonal tension.

Makes entire cross-section of the concrete available for resisting moment prior to cracking.

Automatically proof-tests a member because under maximum conditions of loading the stress in the steel and concrete will seldom exceed that produced by the initial prestress.

Makes it possible to greatly increase economical span lengths and can be designed to fit greater variety of job requirements.

Discussion

J. M. Lowry (SLSW) questioned Mr. Nicholson's statement that there was less damage to prestressed concrete piles and asked how cutoffs were made in these piles. Mr. Nicholson stated that many are cutoff by using dynamite. Cutoffs also have been made he said, by using air hammers to knock off the top. Mr. Lowry then asked if a pile is post-tensioned how the strands of reinforcement were held. Mr. Nicholson replied that these were grouted in place.

To a question made by T. M. von Sprecken (Sou.) as to what kind of a cap is used with prestressed piles and slabs, Mr. Nicholson stated that the caps were cast in place.

To a question raised by R. W. Routenberg (B&O) about keeping the grouting material from the reinforcing, Mr. Nicholson stated that the wires went through the conduits so that they could be moved when stretched. After being stretched, the cable was then grouted in the conduit (he drew a picture of the situation on a blackboard). It is not possible to grout wires that are covered with paper or grease, he added, because the cable gets narrower, that is smaller in section, so that you could not grout it in later on as the area would be too small to squeeze in the grout.

To a question raised by a Pennsylvania member about what protection is given to the post-tension anchorage in salt brine territory, Mr. Nicholson stated that a notch or groove is placed at the end of each beam and then the anchorage is covered with concrete cap. The Pennsylvania member then asked about fatigue stress in the reinforcement, and Mr. Nicholson stated that the fatigue is only in the wire. The stresses in these strands, he stated, do not pass through the zero reading so that there is not the stressing and non-stressing set up which would produce the fatigue stress. Pretensioning, he added, is cheaper for production line methods. Post-tensioning costs are higher but do not require as large a plant.

Abstracts of Addresses by Messrs. Hungerford, May and Fitzpatrick as Delivered Before the Two Joint Sessions Are Presented Below

During the morning joint session on Monday, September 15, Clark Hungerford, president of the St. Louis-San Francisco spoke on "Railroads—Past, Present and Future." He had the following comments to make:

I feel certain that all of us share the conviction that these are challenging times for our industry. Yet it is a good idea to view the present in its relationship to the past and the future. It is certainly true that the present economic recession has given us added reason to concentrate on the immediate problem of reducing our costs to conform to the lower volume of traffic that is presently available. It is also true, however, that there is nothing unique about the present situation. Like many of you, I have spent the greater part of my life in the railroad business and it would be difficult to recall a time when track and bridge people haven't had to use every bit of ingenuity at their command to provide a safe, dependable roadway within budgetary limitations. In fact, the entire engineering history of railroading down to the present day has been almost wholly a search for methods and means of attaining higher productivity and higher standards.

The challenge we face today . . . and the one we shall face tomorrow . . . is to find ways to bring about further improvement. In this respect, there isn't anything different about the past, the present or the future. Always, the effort to provide for a better tomorrow has been in the forefront of man's efforts.

Competition and rising costs have brought about some remarkable developments. Year after year they have caused us to strive to find more lasting and durable material; they've brought into being machines which to the railroad men of yesterday would have seemed incredible . . . machines that enable
us to carry out essential maintenance not only in less time and with less cost . . . but also with greater precision.

The key to the future is still more progress. In this connection, it would be unrealistic to overlook the fact that despite temporary setbacks, the long term trend of the American economy is upward . . . and so is the need for transportation. Americans are an especially mobile people. They like to get up and go places; they like to separate their places of residence from their places of employment, and more and more they have spread out into the suburbs around large cities. Every year in this country about 1,200,000 people pick up and move. And like individual families, business is beginning to appreciate the advantages of location . . . with the result that there has been a very sizable movement out of long-established urban areas and high-cost industrial locations. It is a matter of record that the transportation requirements of the American people have increased to a much greater degree than the population growth.

In less than 30 years time, the population of this country increased some 40%. Total freight traffic moving via all forms of transportation went up more than 133% . . . or more than three times the increase in the population. I mention this to indicate that over the long pull, total transportation requirements can be expected to rise. The proportion which goes to each form of transportation will be influenced by a number of factors . . . but chief among them will be the type of regulation which applies.

In recent months we have been granted a measure of legislative relief. The transportation tax on freight has been repealed, thus eliminating one of the stronger incentives to ship in privately owned vehicles. There has also been a change in the agricultural commodities exemption, and we’ve also been granted greater rate-making freedom. I doubt that many of us can remember a period when railroads have come in for as much public and governmental attention as they have in the recent past.

While we can be encouraged by these developments, there is much that we have to do to aid ourselves. First and foremost, we are continually reminded we are operating in a society that is becoming more highly competitive all the time. The cost and quality of our service is constantly being compared with the cost and quality of other transportation services available to the traveling and shipping public. To meet the challenge of ever-increasing competition, we have channeled an enormous amount of time, effort and money into physical improvements. In the last ten years the railroad industry has spent nearly twelve billion dollars for modern locomotives and freight cars, for heavier tracks and bridges, for better signals, yards and terminals and for many other improvements. To be productive of results, all of these improvements must be used to better our service and to keep our charges to the public competitive.

Beyond that, we have to think in terms of even more technological advancement to meet still stronger competition from other modes of transportation. Motor vehicles, ships and airplanes are all being built with greater power and speed potential. The share of the transportation market that railroads are able to capture will be related to their ability to keep pace in cost, in safety, in dependability, in comfort and in service.

In the competitive race, much strength will come from the investment we have made in research. The perfection of sensitive instruments to test, gauge and analyze, has brought into being expansive laboratory facilities. Staffed by technically-trained specialists, these facilities are gradually assuming a greater share of the job of searching for improved rail service through the use of better products and equipment. The result has been a greatly improved process for appraising the products the railroad industry uses. Beyond our own research that of allied industries has been most helpful. As users of some 80 odd thousand different items, there is not a new discovery by any industry that may not offer possibilities for improvement in railway economy, service or—most important—safety.

Any major item of maintenance of way expense offers opportunity for research benefits. Last year, for example, the total amount spent by Class I railroads on maintenance of way and structures exceeded $1,400,000,000. Expenditures of that size offer infinite possibilities. We might for a moment just consider one item—cross ties. When we add to the service life of a cross tie, the effect is not immediate but in the long run we realize some substantial savings. If some ten to twelve years ago we had inserted untreated ties, they would be due for renewal this year. But because the ties we put in were treated, their service life has been more than doubled.
What is true of ties is also true of just about every other item we use. If we can extend its serviceable life, make it more durable, we can make a substantial contribution to the kind of increased efficiency which competition demands.

Railway maintenance forces already have made possible enormous strides in efficiency. In relation to our revenues we spent more on maintenance of way and structures in 1957 than we did in 1938. In 1938 we spent 420-million. In 1957 this had risen more than three-fold to $1,400,000,000. Yet in that intervening span of years, prices not only went up but the wage of the lowest paid track worker increased more than four-fold. Off-setting these factors was a reduction in man-hours of 33%, from 441-million in 1938 to 330-million in 1957. In those figures we find evidence of the ingenuity of our maintenance personnel who year in and year out have moved methodically on to ever higher standards and better ways of doing a job.

There is little doubt that the years ahead will see a continuation of these efforts; nor can there be any doubt that the entire railroad plant of the future will reflect a higher state of development than the one we know today.

While I have none of the gifts of the prophet and I would find it difficult to draw a specific outline of what the railroad of the future will be like, there is not a doubt that the roadway of the future is going to be a tougher, more efficient instrument of precision... and you gentlemen will have made it all possible.

Following Mr. Hungerford that morning R. G. May, vice president, Operations and Maintenance Department, Association of American Railroads, spoke on "Railroading—Men, Methods and Materials." He had the following remarks to make:

Starting with the end of the war just 13 years ago, the railroads undertook to rebuild a thoroughly worn-down plant and to reshape their personnel structure. In the years since, they have been plagued with three mild business recessions—one in 1949, another in 1954, and the one from which we are now emerging. In spite of the retrenchment these declines necessitated, railroads have spent an average of more than a billion dollars a year to improve their plant facilities and equipment.

Railroads could never have remained solvent during this period of inflated costs without such spending and the deepgoing changes in operating methods which it brought about.

One marked result of this technological progress has been a reduction in rail employment since 1945 of nearly half a million men. Now, no one likes to see jobs abolished, but in an industry where wages are continually increasing and where labor costs eat up 54 cents of each dollar of revenue, attempts to save in this area were inevitable. The average railroad employee receives $3,400 a year in wages. Just for a moment try to imagine where the industry would be today if we were still paying an extra half a million men that kind of a wage each year. Despite the drop in employment, however, individual wage rates have risen so steeply that the railroads' total wage bill last year was $5,358,000,000, or 28 percent more than in 1946.

The number of locomotives in service has also dropped sharply even though roughly the same traffic volume is being handled. The postwar installation of more than 24,000 diesel locomotive units also made possible wholesale reduction of coaling plants, water stations and steam servicing facilities—resulting in vast savings in this area.

The increasing mechanization of maintenance of way work, which with yourselves have been so close to, has been another important factor in enabling railroads to keep afloat financially. Maintenance methods have advanced from the era of the section gang covering a few miles of track and extra gangs for laying rail and resurfacing track to specialized gangs with ingenious new machinery covering vast territories.

Research by the railroad industry, including the manufacturers and suppliers, has produced greatly improved equipment and materials of all sorts. In your own field perhaps the outstanding development has been in rail metallurgy. The controlled cooling process has practically overcome rail failure due to internal transverse fissures and has added years of useful life to rails. The treatment of crossties and bridge materials has advanced to the point where ties can be installed with practically a guarantee of 40 years of life.

Other examples of the great changes we have seen can be cited—such as data processing machines, electronically controlled classification yards and centralized traffic control. I cite these as clear evidence that the railroad industry has been quick to adopt every tech-
nological development that would increase operating efficiency and help make ends meet.

To cite a few indicators of gains in efficiency thus brought about, in just the postwar years freight train speeds have increased about 20 percent and passenger train speeds, 16 percent. The number of miles a locomotive travels a day has increased 50 percent in passenger service and 23½ percent in freight service. Net tons per freight train have increased 27½ percent. And looking at perhaps the most important efficiency indicator of all, we find that the average freight train in each hour is turning out 53 percent more transportation service than in 1945.

It seems to me self-evident that the troubles plaguing the railroads today are therefore due to other factors—factors beyond the control of operating management. The declines in traffic which started last fall brought into sharp focus the public policy problems facing an industry laboring under legislative and regulatory restrictions too great to bear. Fortunately, the worsening railroad situation also focused public attention on these conditions and brought demands for a change. Congress followed through with some long-overdue action. We need to recognize, however, that despite the substantive assistance it will give the industry in some respects, and despite the repeal of the onerous 3 percent freight tax, such action does not by any means bring to an end the glaring inequalities in public policies toward the various forms of transportation.

Remaining to be solved are the great problems of public subsidies to our water, air and highway competitors; questions of how much regulation is needed in the public interest and how it should be applied; whether one form of transportation should not be allowed to operate other forms; what to do about heavily-losing passenger service, and other matters. That Congress itself recognizes it has only scratched the surface in these areas is implicit in the adoption this summer of Senate Resolution 303 which directs the Senate Committee on Interstate and Foreign Commerce to undertake a comprehensive staff study of transportation problems, with a view toward recommendations for further legislation during the next Congress.

In a very large way, government transportation policies and practices are short-changing the public. The outgoing Congress, for example, authorized in just this one year more than $4 billion of the people's money for highway, waterway and airport and airway development. This outpouring of taxpayers' money poses an intolerable competitive handicap for the entirely self-supporting railroads.

That the railroads are among the general taxpayers putting up this money for competitive transportation completes the irony. It is pertinent that taxes paid by Class I railroads to federal, state and local governments since the end of World War II amount to $12,300,000,000, or almost equal to the amount we have spent on capital improvements during these years.

In the field of regulation, there is one little-noted area that I would also touch on briefly since I think it is of the utmost importance. In each Congress, railroad labor organizations have pushed a wide range of bills that would tighten government regulation—in fact, give the Interstate Commerce Commission virtual control—over many aspects of railroad operations and maintenance. I refer to bills that would affect the length of trains and their operation, to bills dealing with track and bridge inspection and signals and communications. Such legislation is generally pushed in the name of improving railroad safety; yet our safety record shows continuous improvement and is outstanding among all of American industry. We might justly wonder if the basic objective is not mainly to protect existing jobs and to make new ones.

Regulation was originally conceived and developed to protect the public interest, and railroadmen have long supported this concept. But carried too far, regulation becomes destructive and ceases to work for the public good.

The growing public awareness of this situation is the truly optimistic note of 1958. It indicates that essential public policy changes may yet be made in time to stop the decades-old drift of transportation into government ownership.

Even the casual observer must admit the railroads are doing an outstanding job under the most trying conditions. With the changes voted in this past session of Congress, they will do a better job. But the best job of all will be done when the railroads are finally put on the same competitive basis as all other forms of transportation.

On Tuesday afternoon, September 16, C. J. Fitzpatrick, president of the North Western,
spoke on "Productivity—A Key to Prosperity." After going over some of the legislative problems the railroad industry has faced in the past and, although somewhat relieved, is still facing today, Mr. Fitzpatrick had the following comments to make.

Under our free enterprise system it is productivity, sometimes called efficiency or the output per man-hour, which determines what place a business enterprise shall hold in the sun. And that definitely includes railroads. Because, no matter what other descriptive cloak you may give them, such as public utilities or what have you, they are still a business. The mere fact that they are railroads does not permit them to operate indefinitely on an unproductive, wasteful basis. They can not go on indefinitely without being competitive, without changes and improvements in their physical plant and services, without constantly increasing their efficiency through greater productivity. All these factors, in the final analysis, are reflected in the quality and cost of the transportation service we sell.

It is a generally accepted fact that the railroads are by nature the most efficient form of mass transportation yet known. But that fact, in itself, doesn't get us anywhere. What really counts is the degree to which we convert this inherent efficiency into actuality.

Reduced to its simplest terms, our objective, in my opinion, should be to unleash our great potential through greater productivity of our railroad personnel. This can be met only through constant improvement in supervision, full utilization of mechanization and the elimination of services, facilities and operations which are no longer necessary, notwithstanding that they may have had a purpose at one time. We must change with the times. The result can only be a sound industry that will be streamlined to set the pace for transportation progress with more enduring benefits for the public, for railroad personnel and for those who invest in railroads.

The fact that railroads are the most efficient form of mass transportation has lost much of its force in a period during which railroads have been constantly increasing the rates which they charge their customers. We feel the railroads should make, not merely meet, competition by reducing their rates. But to do this the railroads must rid themselves of wasteful practices wherever they may be, practices that long ago became economically obsolete and no longer serve a public need. On the positive side, they must jeopardize all down the line: in track and building maintenance, in offices, yards, shops and train operations.

They should realize that as railroad service is produced more economically and more efficiently, it will inevitably attract more customers. With increasing volume the industry would grow, increasing rather than decreasing its employment, as the growth would be based on sound economic lines.

In the field in which you are primarily interested, maintenance of ways and structures, the North Western, like other railroads, has been carrying out a program of modernization. Unless carried on with modern mechanized equipment, the cost of track maintenance to meet today's standards is virtually prohibitive. The pick and shovel era in track maintenance today is as obsolete as the steam locomotive.

The suppliers and manufacturers of machinery used in railroad maintenance deserve great credit for their unremitting efforts to produce more productive equipment. I also commend them for their wholehearted cooperation in working hand in hand with railroad personnel in the development of new machines or in the improvement of their old machines. I strongly urge you to work more closely with them today than ever before. To my mind the surface has only been scratched in this most important field. The potential for greater productivity in railroad maintenance alone is tremendous. Far more so than can be found in any other form of transportation, if for no other reason than that we have more to maintain.

Last year the Class I railroads spent over $13½ cents out of every dollar they took in on maintenance of way and structures or almost a billion and a half dollars. And this, mind you, was merely for maintenance of the existing plant and does not include the cost of improvements.

Down through the years I have on occasion been told by maintenance men that they work under somewhat of a psychological disadvantage because, due to the very nature of their activities, they are spenders of railroad funds, rather than revenue producers.

We on the North Western don't accept this view. It is no more accurate than to say the revenue producers can take sole credit for a railroad's net income. It takes both sides of the ledger to develop net income.
large that will be is determined not merely by the amount of total revenues but also how efficiently and how wisely the spending departments meet their necessary commitments.

The Railway Age sets forth in a few well chosen words my belief and our policy on the C&NW, and I quote:

"Not all maintenance officers exhibit the same degree of aggressiveness in promoting cost-saving policies. Progress in this direction has been most pronounced on those railroads where management has lifted the maintenance forces out of the stepchild category and regards them as a useful, and profit-producing, member of the railroad family."

In maintenance activities any increase in productivity for each dollar spent is the best indicator of effective supervision and administration.

Of course, progress has been made in greater mechanization of our maintenance of way. However, I am sure all of you will agree that we are only on the threshold of such mechanization and that twenty-five years hence railroad men and maintenance equipment designers will look with amusement at some of the machinery which we pride ourselves with having today.

While the mechanization of roadway equipment is still comparatively new and in its infancy, those who assume responsibility for its future development and we should not let themselves be trapped into mossback thinking. They should not develop a resistance to change simply because they have a good product. All too often in the past the railroad industry has been accused of just such resistance particularly in car design and construction. It is understandable that equipment and supply manufacturers, and railroad personnel who work with them, can become loyal to one product, but that loyalty and attachment is false and a detriment to the development of the railroad industry if it amounts to closing your eyes to greater improvement and efficiency.

Just as the public will always flock to the man who builds a better mousetrap, so will the railroads be attracted to roadway machines that show real improvements over their predecessors. In other words, the developers of roadway machines will establish reputations not so much on what they already have placed on the market but on the better machines that will inevitably come as a result of your open-mindedness and ingenuity.

If we are unique among transportation agencies in that we alone have our own right-of-way to maintain, then it behooves us to be unique in our methods of reducing that maintenance cost and doing so on our own initiative. The stakes are high if we attach any meaning to the inherent advantages of railroads over their competitors as the most efficient means of mass transport in existence. There can be only one objective: to translate that inherent advantage into actuality by producing transportation in increasing volume at an ever increasing cost.

The shipping public will inevitably buy our product if the price is right. Railroad costs determine how attractive the price will be. That is why I believe that the cost of maintenance—that billion and a half dollars as of last year—is one of the important keys to railroad prosperity.

This is an era of great technological development and we in the railroad industry dare not overlook the opportunities to share in its benefits.

Our railroads constitute a great natural resource as producers of cheap volume transportation. But like all natural resources, this one, too, must be developed. In that development many doors must be opened. Some were opened by recent congressional actions. We are hopeful it will open others. But the main job remains with us in all our railroad operations, procedures—and thinking.

You, too, have your doors to open, to better, more productive and more efficient ways of maintenance.

The beneficiaries, however, will not be limited to customers. They will include everyone directly or indirectly affected by transportation—railroad labor, agriculture and industry, taxpayers and consumers—in other words, the American public as a whole.
Housing Problems of Bridge and Building Forces
Report of Committee


As the railway bridge and building programs today are being curtailed due to the financial plight of the railroads, more and more thought is being given to the mechanization and standardization of the B&B gangs. This necessitates better and more adequate housing facilities to insure that the railroads retain and attract skilled mechanics in the B&B departments.

Camp Cars

Camp cars for B&B forces and other road forces are still the main means of housing these forces. However, in the last few years, the railroads, in order to obtain a better class of men and to hold these men after they become skilled mechanics, have provided better cars with modern equipment. Most railroads today have already started comprehensive programs for camp car renewals. The reconstructed camp cars in most cases are steel cars which are well insulated, have either gas or oil for automatic heating of cars and water, as well as fuel for cook stoves.

The usual cars in a boarding or camp car outfit include sleeping, kitchen, diner, recreation, tool and material cars. However, in some instances where the B&B force numbers only ten or twelve men, one steel coach will provide kitchen facilities, dining and recreation space, sleeping quarters for eight or ten men, a separate room for the foreman and necessary showers, and washing and toilet facilities. This arrangement makes it possible to have a small train of only three or four cars, which will fit on a short siding. When larger forces are involved, it is considered good practice to have separate sleeping cars, wash and shower cars, recreation cars, dining cars and kitchen cars, furnished in accordance with the requirements of the force.

The cooks and camp-car attendants should, when it is possible, have separate sleeping quarters equipped with bunks, writing desk, chairs, etc., to prevent disturbing the men whose sleeping hours are at different times.

Sanitation

Sanitation measures must meet all state and federal laws that apply. In sleeping cars, the number of bunks should be based on allowing adequate space for each man. Floors and walls should be of such design as to permit easy cleaning, and light colors for walls and ceilings are recommended for light and decorative purposes.

Gas or oil-fired automatic hot water heaters are recommended to provide an ample supply of hot water at all times.

Also gas or oil-fired stoves, thermostatically controlled, should be provided so men returning from week-end trips home can come back to a warm car and also to prevent freezing of water pipes and tanks. Windows should be located to provide adequate ventilation, and all doors and windows should be screened. It is desirable to wire living and dining cars for electric lights, the power to be furnished from either stationary or portable sources. Bathing and washing facilities should be provided with adequate water storage tanks, to be filled by a hand or engine-operated pump. Lockers of satisfactory size should be provided.

Kitchen and dining car design should, in general, conform to the design of bunk cars with respect to floors, walls, ceilings, screening and lighting. Ventilation over stoves should consist of metal hoods and exhaust fans. Tables and shelves should have smooth, water-resistant surfaces, easily cleaned. Storage facilities for packaged and non-perishable foods should provide protection from insects, dust and other contaminating influences. Refrigerators of adequate size and design to store perishable foods should be provided. Sinks for dish-
washing, constructed of non-rusting materials, and water-heating equipment are necessary.

Sanitation Rules
Sanitation rules for camp cars must provide for responsibility as to enforcement, and should be uniform for all types of forces. The organization should provide adequate personnel to operate and maintain properly the sanitary equipment furnished. Requirements for cleaning, heating, cooking, waste disposal, insect control, drinking water, toilets, etc., should be definite and clear and supervising officers should see that they are followed.

The foregoing recommendations governing sanitation conform in general to tentative recommendations of the American Railway Engineering Association.

Handling of Meals
The cooks usually work the same hours as the men in the force, plus additional time necessary before meals to prepare the food, and after meals to clean up the kitchen and dishes, to be ready for the next meal. On some roads, cooks are paid one or two hours additional time at pro-rata or time and one-half for the extra time worked.

In large forces very few cooks pay board. In small forces they usually pay the same board as those in the force are required to pay. In some gangs, the cooks pay for one meal a day. This matter is usually optional with the force personnel and no set rules govern.

Board arrangements are made according to the method adopted by the force for paying for their meals. On most roads, the meals are prorated to each man on the basis of total meals in the cars between pay days. Other roads have a so-called "jackpot;" each man puts a certain amount of his pay in the jackpot each pay day. Shopping for groceries is then carried out according to the amount of money available.

Some roads have considerable difficulty in obtaining and keeping good cooks for their road forces. The lack of a good cook can do much to lower the morale and efficiency of a force. Some better system for training and holding cooks is very desirable and improved collaboration between B&B and personnel departments might improve this weak point, which is so vital to the maintenance of good road organizations.

On some roads, some gangs prefer to buy the food and prepare their own meals rather than pay a stipulated amount or put up with a poor cook. If the forces prefer this, adequate cooking and refrigerated storage facilities should be provided.

Protection of Camp Cars
There are several different ways of protecting camp cars, set off along the line, against train accidents. One method is to provide so-called bunk-car discs which are attached to the leading switch on the siding where the cars are stored. In addition to the discs on the switch, the first car should be protected with amber lights, placed on the end of the car in the same position as on a caboose or end of train.

When occupied cars are set on a siding, the switches at each end should be spiked to prevent any possibility of a train striking the cars. Another method consists of using special derails, equipped with disc and light, and locked to the outside rail. This type derail cannot be removed except by permission of the foreman in charge of the cars. When the size of the job to be done warrants, and it is feasible to do so, camp cars should be set on temporary dead track disconnected from the operating track.

Fire Protection
Every bunk, lobby and dining car should be equipped with standard fire extinguishers placed inside the entrance door. Kitchen and tool cars should also be equipped with carbon tetrachloride, soda-and-acid or other approved types of fire extinguishers. Rules for fire prevention should be posted in all camp cars and supervision exercised to enforce them.

When camp cars are wired for electricity, and it is practical, gangs are provided with electric lights. Some camp-car outfits are equipped with portable generators for lighting. When electricity is not available, oil lamps of approved design are used.

On some roads the maintenance of the interiors of cars is taken care of by the bridge and building forces; and body and running-gear repairs are made by the local car department. On other roads, when the cars get to a point of heavy repairs, they are sent to the car shops for general repairs to the body and running gear. The maintenance of good paint standards in camp cars is very essential for good housekeeping and good morale among the forces.
Bunk houses, both permanent and portable, are being used less and less each year and except where large construction jobs are being done by B&B forces, away from any sizable town, they do not fit into the present picture for housing bridge and building forces. However, any one interested in this method of housing should read the committee report "Housing bridge and building employees" presented in 1948.

Transportation of Gangs

The bridge and building forces today are almost all equipped with trucks. This has come about due to the many man-hours that were lost waiting for clear track when motor cars were the main method of transportation. In some cases where the work site cannot be reached by truck, a combination of truck and motor cars can be used to reduce travel time over that of motor cars alone. Materials can also be transported more economically in trucks and with less chance of interfering with train operation.

Housing of Tools and Materials

Considerable time and material can be saved by giving more study to the housing of the tools and materials that are used by the average B&B employee. A plan should be worked out whereby tools and materials should be placed in bins, piles or racks in such a manner that an excessive amount of work will not be required to remove any tool or piece of material. It will be advantageous to set up a running inventory record of all tools and materials in a camp so that the foreman or supervisor does not have to rely on memory to know if he has the necessary tools and materials to do the work at hand. It will take close supervision by the supervisor to see that his foremen keep their records up-to-date and also that the foreman maintains good housekeeping habits in his camp cars.

Trailers

Trailers are a relatively new means of housing B&B forces. Most trailers now in use on the various roads are used mainly for housing small gangs of two to five men. Some roads, however, are adopting the idea of providing separate trailers for sleeping, cooking, dining and washing facilities. These outfits are a great saving on roads where sidings for camp cars are a long distance apart. The trailers can be moved every few days as the work progresses, inasmuch as they have portable lighting generators and water tanks mounted on wheels.

Several companies are now offering for sale trailers to meet the needs of housing railroad employees. Almost all of these trailers are insulated, have either gas or oil-fired heat and most of the other conveniences found in the modern house trailers of today.

There is, as yet, not enough trailers in railroad service to get a cost comparison between camp cars and trailers.

The committee feels however, that there is a place on the railroads for trailers for housing B&B forces and notes that on some railroads camp cars are being replaced by trailers.

One thing that should receive more consideration by the railroads is the need for establishing more and smaller gangs for routine maintenance work at central locations so that all parts of their territory are within easy traveling distance from their assigned headquarters, either by truck or motor car and truck. This will permit the men to be home with their families every night except in cases of emergency. By equipping the small gangs with trucks, they will be able to reach any point on their territory in case of an emergency faster than would be possible by work train or regular trains under ordinary conditions.

Conclusion

In housing bridge and building department employees, the important thing to consider is to provide as much of the comforts of home as it is possible to provide and properly maintain. This is desirable from a morale standpoint in order to keep the off-hour needs of the men as well satisfied as possible while they are away from their homes. Railroad men today, especially in the mechanics' class in B&B work, will not be content in their jobs unless this is done, and a heavy turnover in skilled labor will follow, with resultant loss of efficiency in the operation of the gangs.

All this means that comfortable quarters with good heating and lighting facilities, shower baths, plenty of room for recreation and reading, and, most of all, good meals, are necessary to obtain the best results from B&B road forces. A good safe workman must be a satisfied workman. Most railroads recognize this, and have generally improved, or are now improving, the housing facilities of their road forces, including
B&B forces. Dividends from the investment in such improvements will be paid in greater efficiency and productivity of their forces.

**Discussion**

President Huffman began the discussion by saying that the electric refrigerator is most acceptable but ordinarily no electricity is available in most places. He stated that he had tried the propane gas refrigerator but that it is touchy and does not work well. H. F. Lucas (CMStP&P) stated that his road has used propane gas refrigerators for seven years. Although they bought many second hand refrigerators at $75 each at that time, he said they do work well and that the men will not trade them for the electric refrigerators. He stated that the propane gas refrigerators were very reliable but they must be level. He reiterated that his employees do not want the electric, but prefer the gas type, and this was made very plain to him when they bought new refrigerators to replace the former second hand. He stated that the secret of the propane gas refrigerator is that it must be anchored to prevent movement. President Huffman agreed that the trouble on his road has been with the gas refrigerators getting out of level. But, he added, the leveling of a refrigerator should be a simple task for a B&B gang. Mr. Lucas stated that his men do not try to keep the refrigerator level by leveling the machine, but they find it easier to level the car to keep the machine level.

J. M. Lowry (SLSW) asked how the trailers were kept supplied with water. G. W. Benson (CofGA) stated that his road takes the trailers once a week to get filled up with water.

When J. W. Rowland (LI) asked if the disposal of toilet wastes was not a problem with trailers, Chairman Wilson stated that he noted that some of the southern railroads dig holes and fill them in. In cities, however, incinerators are used to burn the effluence but chemical toilets also can be used.

Mr. Lucas said that it was a strange thing that he had not been able to get delivery on gas-burning incinerators which were ordered two years ago because the suppliers state that these are not in stock.

When Mr. Lowry asked how the trailers were moved, R. Wall (Sou) stated that his road used trucks to move them. These were the ones that were generally nearest the camp, and were taken from the nearest B&B gang.

J. W. N. Mays (PRR) stated that he had seen trailers and two cars moved on one southern railroad with a truck by the B&B supervisor over the weekend. He stated that he was sure he could not get his supervisors to do this on the weekend. Mr. Wall replied that advance preparations could be made to avoid a weekend movement.

R. D. Bisbee (Santa Fe) asked what affect trailers had on the morale of the men. Mr. Phillips (D&H) stated that he did not think that they decreased the morale of the men at least his men did not object to them. Concerning the movement of trailers, he mentioned that his road arranges for a truck to take the trailers from point to point and they always are able to find some job for the men to do near the weekend. His supervisors are too busy during the weekends getting caught up with their paper work to be driving trucks hauling trailers.

Mr. Lowry stated that there is always some resistance among the men to new ideas. He cited the case where a foreman objected to the trailer and wanted his camp car back. However, the foreman's men telephoned the supervisor to let him know that they were very happy with the trailer. As a result the trailer was retained.

A member from the B&O asked if there were any disadvantages in the maintenance of trailers as compared to camp cars. On his road, the car department does the outside work on the car while the B&B crew fixes up the interiors. President Huffman stated that the trailers are new and in good condition, whereas it is hard to get the car department to furnish good coaches.

Mr. Lowry stated that camp cars must be set out on tracks which are farther and farther apart because of the removal of so many side tracks. Also, he added, many subdivisions have no daily train service to get the cars moved.

F. D. Day (PRR) stated that his road had fixed up some of the large trailers used up in the road's pickup and delivery service for use of the men. The truck tractors are then called upon to move them. President Huffman stated that the B&B forces on his road can not fix up the interiors of such trailers. If they did, the road would be time slipped by the car department forces.
Extended Service Life for Masonry Structures

Report of Committee


O. E. Fort
Chairman

To more clearly define our subject it should be divided into two separate topics or classes. One is concerned with the "restoration of existing deteriorated masonry structures" and the other with "proper construction methods for new masonry structures for extending their life beyond that found for such structures through past experience." In view of the need for maintenance economies, facing the railroads today, we feel that the restoration of existing deteriorated structures has reached the utmost in importance, and the committee will devote most of its report to that subject.

Masonry in the form of sun-dried bricks made with mud and straw, and stones either laid dried or with natural cement mortar, represent the oldest of the engineering materials known to man; being used by the ancient Egyptians down through the Roman Empire, and great works of their craft are to be found standing today. The ancient pyramids and the partial ruins of the Roman Coliseum stand as a challenge to present engineers for durability.

Today's masonry structures on railroads had their origin before the Civil War in eastern United States and there were a great many stone piers and abutments built just following the Civil War and on into the early part of the Twentieth Century on all the railroads then being built. Concrete did not attain prominence as a construction material until after the turn of the century. A number of these early structures were of strictly gravity design and were laid up dry with the stones being carefully selected and cut to be placed in position. A far greater number were laid up using natural mortars and some of the later ones with portland cement mortar joints.

It can be said that all of these masonry structures were most usually laid up of stone common to the locality in which they were built, including soft porous sandstone, limestone of various characteristics, and some of good non-porous, durable granite. Often they were built of stone exterior and solid stone cap rocks, with the center core of the pier or abutment shaft being filled with spalls and broken stones. Except where convenient and possible they were seldom carried to a solid rock or firm deep foundation, but rather were founded on gravel, water-bearing clay, timber grillages, and sometimes on timber foundation piles.

These structures were then subjected to continually increasing loads of rolling stock. Since in many instances they were built of materials of high absorptive properties, with poor mortared joints and often on poor foundations, it is indeed remarkable that they have withstood the ravages of the years
as well as they have. The bridge seats were not well drained and as mortared joints broke loose and stones moved, freezing and thawing action of the seeping and absorbed water has acted on these structures with sometimes disastrous results.

In the early 1900's concrete began to be used for masonry structures and no doubt it was believed that this was a foolproof superior material that would last many years. Little was known of the water-cement ratio and little effort made to select proper aggregates. Good drainage of slabs and bridge seats and proper waterproofing were not considered. Now we find many of the structures spalling, checking and cracking. It is remarkable, however, that other structures have not developed these conditions.

Today's railroad structure supervisor often finds, therefore, that he must either replace or repair the deteriorated existing structure, with sorely depleted financial resources available. Then it becomes of great importance that he find ways to further extend the life of existing structures and that for those demanding complete replacement he use the best construction techniques to obtain longer life than has been the past experience in many cases.

External supports for holding together stone piers and abutments, where the stones are merely loose or working, have been used with some success by a number of the railroads. It is felt, however, by the majority that they are mostly temporary until more permanent repairs can be made. One of these methods is by installation of tie rods through the masonry, the rods being threaded on both ends with steel plates, and nuts being tightened against the masonry to prevent displacement or overturning of the stones.

Another similar method is the placing of timber walsers or collars around a stone pier, the timbers being tied at the ends with steel tie rods, nuts and plates. This requires that the individual stones be blocked or shimmed against the timbers if they are not in direct bearing. Also vertical steel dowels have been used by some railroads where separation has occurred at poor joints both in old stone and concrete abutments. To be effective the hole should be drilled through the defective parts, somewhat larger than the dowel and the dowels grouted in place. Concrete buttresses have been used with success to support failing wingwalls of abutments, arches, and culverts.

Where the mortar between the stones has disintegrated and the stones have not loosened, the pointing of the joints with masonry cement mortar is effective. For best success the old disintegrated mortar should be completely removed and preferably to a depth of at least one inch. The old stone joint should be thoroughly wetted and washed and all foreign matter or vegetation removed. A good mortar mix is one part cement to three parts of sand, and not over five gallons of water per sack of cement used. It is well to use a small amount of lime in the mix to prevent too quick setting up of the mortar and reducing shrinkage after placing in the joint. The mortar should be well worked and/or tamped into the joint. One road advises that it has used open nozzle pressure grouting with success on large jobs of this nature injecting grout into the cracks or joints as deep as two feet in some instances.

In many cases, piers or abutments with sound shafts and good footing, but with deteriorated cap rocks and bridge seats have had their life extended indefinitely by replacing the defective cap rock course and often two or more underlying courses with new concrete. When only one or two courses are replaced the new concrete slab should be designed as reinforced concrete to distribute live loads over the entire top surface of the old adjoining masonry. Also the new bridge seat should be designed for good drainage to prevent standing water and its detrimental effects. All the old defective stone must then be removed down to sound masonry, and the top surface of the remaining sound masonry entirely cleaned of foreign materials and loose stones. Then dowel holes should be drilled in the remaining masonry surface, their number and depth depending on the depth of the new concrete. The steel dowels should be grouted in place and left undisturbed for at least 24 hours.

It is of particular importance on this type of repair work that the new concrete be properly cured, especially in either hot or cold weather. In hot weather one of the commercial sealing compounds is beneficial in preventing drying of the outer surface, preventing checking, and sealing in the moisture necessary for the proper hydration of the cement in the mix. If the application of the sealing compound is not done, then
at least the slab should be kept wet for several days. In cold weather, proper temperature and moisture control should be rigidly adhered to. This type repair, of course, will require falsework to carry traffic while the work is being done and until the new concrete is sufficiently cured and aged to accept its proper loading.

Concrete encasement of old masonry that has shown loosening of stones, weathering, or to increase its stability, has long been used for extending masonry life. In many cases concrete encasement has been placed around old piers and abutments without properly solidifying the old masonry interior, resulting in a fine appearing job on the outside, which, however, is merely a shell. The same principles of doweling, cleaning surfaces, and curing of exposed concrete should be observed in this type repair work as in constructing the pier or abutment top.

Where reinforced concrete structures are showing signs of spalling and weathering, and the depth of the defective concrete is shallow, that is, not over 3 or 4 in, they may be repaired by the application of a shotcrete. If the reinforcing steel is exposed it should be thoroughly cleaned of all corrosion and the steel treated or sealed to prevent any further corrosion. The defective concrete materials should then be removed down to sound concrete and thoroughly wetted and soaked before the shotcrete application is made. Often in more massive restoration of surfaces, a wire mesh is used and the shotcrete grout then applied. It is the consensus that after shotcrete is applied one or two applications of a curing compound should be made as soon as possible, to prevent dehydration and almost certain checking.

Internal pressure grouting has been used by many of the railroads the past few years with remarkable success. It has been used to consolidate stone piers and abutments, stone culverts and retaining walls. It is of paramount importance that the grout used on this work hold the materials in suspension and without separation, so that there is no gain in water until the grout has set, and so that the ultimate set produces a minimum of shrinkage. This feature has been best met by incorporating in the grout commercial additives which retard the setting of the grout, eliminating shrinkage, and improve the flowability of the grout.

A typical consolidation repair job involving a defective stone masonry pier on a yielding foundation should proceed in the following manner:

One-and-one-half-inch diameter holes are drilled in the exposed faces and ends of the pier, preferably at the joints, on approximately 4-foot centers in rows, with each row staggered with the other. Where the pier extends below the ground, the bottom rows of holes are drilled on a slope to go through the bottom. Holes for grouting above ground are drilled horizontally. If the pier is resting on an exposed solid rock or gravel base with no earth overburden, it will probably be necessary to use a sand-bag wall around the perimeter of the pier base to confine the grout. Next clear water should be injected with a pressure pump, to wash out dirt and foreign matter from the interior of the pier as much as possible. This step seems a moot question, some claiming the water will carry the fine material to the bottom and prevent the entrance of the grout. But it is the consensus that these fines will be washed out through bottom holes and, if not, more holes can be drilled after the initial grouting.

The sand-cement grout is then injected, starting with the bottom holes and continuing until there is a flow of grout from the open holes on the next higher level. The pressure of the grouting pump varies up to 200 pounds per square inch. It is often necessary to plug some of the defective cracks in the stones to prevent excessive loss of grout. When the pier rests on a gravel foundation the drilling of bottom holes is carried into the foundation and every effort is made to inject grout into it. If the gravel is of coarse nature this is done with a good degree of success. The grouting is then worked progressively up the sides of the pier through each row of holes until the cap stones are reached. Consolidation of the cap stones is achieved by grouting through holes drilled both vertically and horizontally. If the cap rocks are broken, dowels are inserted in the vertical holes to extend into the shaft and the dowel grouted in place.

The repair and restoration of large patches too extensive for consolidation by sand-cement grouting are most successfully accomplished by the pre-pack method and internal pressure grouting of the pre-packed dry materials. This method has been used
to replace large defective portions of stone piers and abutments, pedestal blocks, and cantilever concrete sidewalks, to underpin piers, encase the bottoms of piers under water and to build an entire pier.

This method consists of the formation of a good grade of structural concrete by first filling the formed volume with a graded coarse aggregate from which all the fines smaller than ⅜ inch have been removed. Then the dry materials are intruded with sand-cement grout with additives for shrinkage prevention and flowability as heretofore described, until all the voids are filled. This method works very well under water as the additives prevent the grout from taking on more water. It is very good for filling the voids as shrinkage in setting up is prevented. The materials, of course, must be confined by forms, or the sides of the old cavity to be filled.

In forming small volumes of this type of concrete, the experienced man can tell from practice when the voids are filled. In large volumes, such as underpinning piers, under-water incasement of piers, etc., slotted pipes are inserted in the coarse aggregate to indicate the height of the grout. Injection pipes are placed at about 4-foot centers and carried down to near the bottom of the void. They are raised as the grout level rises and removed when all voids are completely filled.

One railroad proposes to use this method in constructing two new piers in the southwest located in unstable quick-sand in a large river. At this location, solid rock is 60 feet below ground surface or 78 feet below base of rail. There are 30 feet of fine sand which is often water bearing. It is planned to drive steel sheet pile cofferdams to just below the sand strata and then remove the sand in the cofferdam. Then they will drive steel bearing piles to rock and fill the cofferdam with graded coarse aggregate, which will be under water. Then the aggregate will be injected with grout to form concrete. Since there will be no shrinkage in the concrete, it is felt they will get a much better bond between the concrete and bearing piles than could be obtained with regular concrete placed with the tremie method. It is also stated that this intruded pre-pack method is financially cheaper than the tremie method and that dewatering of the cofferdam would be expensive because of the gravel strata overlying solid rock.

At this time it would appear that the use of plastics for masonry repairs should prove to be successful, particularly for shallow repair sections and on prestressed concrete sections for emergency repairs. This plastic material is not necessarily a pure plastic, as cement is generally used as a base. It is the committee’s understanding that the chemical composition of these materials has not been generally made known to the public. The use of these materials has not progressed in common use and this is merely presented as information to the members to watch for future development in the repair field.

To extend the life of new concrete structures being built today beyond the life experienced in a great many cases in those built in the past thirty years, is a task well worth the effort. With the development of the water-cement ratio theory, it was believed that, if this theory were followed closely with sound well-graded aggregates to obtain a maximum strength of the yielded concrete, we had produced a structure of indeterminate life. We have now been rudely awakened these past few years to the fact that such is not the case. Strength without durability is truly a poor job. Concrete of sufficient strength that will not withstand the rigors of weathering, freezing and thawing is not the ultimate in a desired product.

To obtain concrete of the best durability and sufficient strength is certainly a complex question to the man in the field and can only be completely accomplished through rigid laboratory control. We will not attempt to cover the many facets of this technique but merely try to point out some of the principal controls the field man can use to give greater durability to his concrete. First the life of concrete can certainly be prolonged by seeing that the surfaces are well drained and waterproofed against seepage water. Then the concrete should be made from a durable, inactive, non-laminated, non-absorbent coarse aggregate. Trap rock, granite, and the hard limestones could be considered as some of the better aggregates. Chert, shale, and unsound laminated materials are to be avoided in general.

The most unstable of the ingredients in concrete is cement. It generates heat causing expansion and contraction, changes its volume with moisture and, if it contains an excess of free lime or alkali, it can work with injurious effect on many kinds of ag-
aggregate. Therefore, it is better to keep the amount of cement used to a minimum. This is particularly desirable in massive pours where the heat generated deep within the mass is injudiciously high.

It is poor practice to use a little more cement to play safe and get a higher early strength. One of the greater assets for durability in concrete today is probably the use of air-entrainment in concrete. You can now obtain air-entrained cement from nearly all of the cement producers at very little added cost. Some believe it is better to add air-entraining agents at the mixer but most believe that proper air-entrainment specified in the cement is a better control. While it somewhat reduces the strength of richer mixes it does not affect the strength of lean mixes. In all localities subject to freezing and thawing action, it is most desirable for greater durability.

Mixing water should be clear, fresh, and free from alkali or acids. Drinking water is good mixing water, generally. Aggregates should be proportioned by weight. Batching machines are now available for this purpose for both small and large jobs.

In a well-graded aggregate concrete, only enough sand should be used to render the concrete workable, and it is the modern opinion that honeycomb to some extent is more desirable than deep sand faces where weathering elements gain a foothold. Vibrated concrete is superior to hand-placed concrete. When properly controlled it produces a more dense product and less honeycomb than with hand methods. However, over vibration produces over segregation and often sand faces. Much dryer mixes can also be placed. Proper curing has heretofore been discussed in this report but cannot be over-emphasized.

There are no doubt other practical methods of extending the service life of masonry structures. We believe we have described most of these in general use. We have not elaborated on the production of durable concrete, as much has been well said in former reports, but merely restated some of the common principles of attainment.

Discussion

H. D. Curie (B&O) stated that he has quite a few abutments that are very old, some of which were showing signs of deterioration. To restore them, he said, he cleaned out the masonry joints from 1/2 to 2 in. deep, then he injected grout through injection pipes, placed mostly through the joint courses, then pointed up the joints. Today there is no sign of deterioration or spalling of the soft sandstone stones.

D. E. Hellickson (GN) asked what additives are used to avoid shrinkage in the grout and mortar. Mr. Curie replied that he uses those having an iron compound. O. E. Fort (SL-SF) stated that he uses commercial type additives in his mortars and grout. When C. C. Green, (B&O) asked the chairman what proportion of additives he uses, Mr. Curie stated that he uses 5 lb of additives to each 100 lb of cement.

E. A. Johnson (IC) said he did not understand the statement in the report where it mentioned that reinforcing steel, where exposed should be very thoroughly cleaned of all corrosion and the steel treated or sealed to prevent further corrosion. Mr. Fort stated that the steel is cleaned and then coated with a plastic coating.

A member from the Long Island Railroad stated that he did some grouting work on a bridge over salt water and he had trouble in doing the work properly. R. Patterson (consultant) stated that he recalled that job on the Long Island. The work was done in water that contained sewage and lime which, when the grout was injected, caused the additives to jell. A further difficulty, he added, was a cement strike which held up the work and caused difficulty in injecting the grout by plugging up the holes so that the grout did not entirely fill the holes.

J. N. Burkle (MP) stated that the concrete crews generally leave a job too soon to effect proper curing. He wondered about the effectiveness of curing compounds. Chairman Fort stated that ceiling compounds were found to be effective. Very often, he added, the ready-mix contractor will furnish the proper compound which can be sprayed on the completed work.
Trends in Trestle Design and Construction
Report of Committee


J. A. Goforth
Chairman

This report will consider a trestle as that type of railroad bridge consisting of relatively short spans of simple horizontal members or beams supported by transverse bents. On the railroads of the United States and Canada, there are approximately 210,000 bridges with a total length exceeding 4,000 miles. Approximately 50 per cent of this length, or at least 2,000 miles, consists of trestles. Thus, the interest of this subject to railway engineering and maintenance personnel can be readily appreciated.

Timber Trestles
Whenever the word trestle appears, timber is usually the material implied. This is no doubt due to the fact that timber trestles have had extensive use since the early days of railroad construction and today they are quite extensively used as permanent structures on the high-speed, heavy-traffic, main lines and are certainly the predominant type of bridge structure on branch lines. The pile-bent, treated-timber, open-deck trestle, still remains the most economical type of structure to span an opening from the standpoint of initial cost.

The design and construction of timber trestles has for the most part been standardized for a number of years. As the details are well known, it is not necessary to go into them. More recent developments in timber trestles are the use of improved items of hardware and fastenings; the introduction and progressive improvement of preservatives and treatment methods; efforts to reduce the fire hazard; and simplification of details to permit a more economical use of treated timber.

Developments in hardware consist of the use of metal timber connectors, improved stringer fasteners, clamping plates, and bolts with integral head and washer designed to provide a tight seal between the head and the wood. A 4-inch metal connector with a 3/4-inch bolt will carry three times the load of the bolt alone, and, used with clamping plates and improved stringer fastenings, will add considerably to the capacity and rigidity of the structure.

As a trestle of treated timber has three to four times the life expectancy of one of untreated timber, it is needless to present further proof of the economies of treated timber. During the past 20 to 25 years there has been an increasing practice of using treated timber in renewing timber trestles with the result that very few untreated trestles are now in service. To prevent decay from setting in around exposed areas resulting from field cutting and boring, as was experienced in many of the earlier treated timber struc-
tures, some railroads are now preframing trestle materials. Plans are carefully prepared with each piece being detailed. All cutting and boring is performed in advance of treating, and if the plans have been properly prepared, and the preframing correctly done, no difficulty should be experienced in the assembly of the completed structure.

The latest developments to reduce the ever present fire hazard in timber trestles are: The use of fire retardant chemicals introduced with the treatment; covering the exposed surfaces of the deck with sheet metal, or with stone screenings held by a mastic binder; and the construction of fire stops at intervals to confine a fire to a fixed section and prevent it from spreading and consuming the entire structure.

Investigations are currently under way for the design of structural glued, laminated, timber trestles. Some railroads are simplifying their standards for timber trestles, and modernizing details for more economical construction and service.

Effects of Reduced Maintenance Budgets

In more recent years the general conditions on the railroads of declining revenues and greatly increased operating and maintenance costs have resulted in reduced budgets for construction and maintenance. This situation has resulted in definite trends in trestle design and construction. The initial cost of a structure can no longer be the sole consideration in the type of structure selected, but the future maintenance costs, life expectancy and other factors should also be considered in the selection. Management is now becoming favorable to higher first costs for types of construction which will eliminate or reduce future maintenance. Consequently, construction which was considered uneconomical twenty years ago can now be justified.

When it becomes necessary to renew an existing structure, an economic study should be made to develop a comparison of the various types of structures to determine which will be the most advantageous. Whenever a structure can be renewed with one of a more permanent type for the same or with little more cost than replacement in kind, there can be no doubt of the economy of the selection. In cases where such economy is not so obvious, a careful study and analysis should be made including all factors of cost. This study should include the elements of first cost, expense of maintaining traffic during construction, annual maintenance and operation, depreciation and interest on the investment. The same approach can also be used in determining the most economical type of structure to use in the construction of a new line.

Earth Fill and Culvert Construction

In determining the economical type of structure for renewal, consideration should also be given to eliminating the structure entirely by replacing it with an earth fill. In the construction of early railroads, grading was a slow, expensive operation performed by hand or horse-drawn equipment. Timber was plentiful and trestle construction was relatively cheap. Many roads had an established policy to construct trestles when fills exceeded twenty feet in depth, finding it cheaper to do so. This accounts for so many timber trestles on older lines.

Modern off-track grading equipment has reduced to a simple operation the work of excavating, hauling and building roadbed sections at locations away from the cuts or borrow pits. Some roads report that they can justify an investment up to 150 per cent of replacement in kind to eliminate a timber trestle with an earth fill.

The waterway under such fills can be provided by culverts or pipes of masonry or metal. Considerable progress has been made in the design and construction of culvert pipe and it is now available in large diameters. The placement of multiple units of these large diameter pipes in parallel lines will pass a fairly large stream of water.

Concrete pipe manufactured under AREA specifications can be obtained in standard strength or extra strength, both reinforced, in diameters up to 84 inches. Concrete pipe culverts have proved very satisfactory in some situations, particularly in cases of low headroom and heavy concentrated loads. However, considerable care and attention are required in the installation. A uniformly and well-compacted foundation, sometimes requiring concrete cradles, must be prepared before installation, as any settlement after completion will result in slipped joints and costly repairs. The larger sizes are extremely heavy and require locomotive cranes or similar equipment to handle. Concrete pipe culverts properly installed have an estimated service life of 60 years or better.
Corrugated metal culvert pipes are available in various sizes and gages in both pipe and multi-plate types up to diameters of 15 feet. It is now available with an asphalt bonded coating over both inside and outside surfaces and with the invert paved with the same material. The estimated service life of this type pipe is 50 to 60 years. Beveled ends eliminate the need for dead walls.

In the case of high fills, some installations were made with the culvert pipe somewhat larger than required for drainage. This was done to facilitate future replacement years later by permitting a new pipe to be slipped through the old pipe at a nominal cost, and without tunneling or opening the fill.

Hundreds of miles of trestles have been replaced with earth fills and pipe culverts in the past twenty years.

Concrete Trestles

The concrete trestle offers the ultimate in a permanent, low-maintenance, fire-proof structure. The typical structure of this type consists of bents composed of three precast octagonal piles, 20 inches to 24 inches in diameter; poured in place pile caps and precast concrete slabs. The span lengths vary from 15 to 24 feet. Anchor bents consisting of double rows of piles with a single pile cap are placed every fifth or sixth bent to resist the longitudinal forces from braking and traction. The deck slabs are usually cast in two parts to permit easier handling.

The precast piles and deck slabs are usually made at a central casting plant. In some instances, on an unusually large project, a casting plant can be set up on the job site. The pile caps are poured in place. After the driving is completed, the piles are cut off at the proper height, the cap form is set and the exposed reinforcing steel from the pile cut-off is tied into the cap reinforcement. The concrete for the pile caps and deck slabs should have a 28-day strength of 3,000 to 3,500 psi. Concrete for the piles will need to have a 28-day strength of 4,500 psi or better, to withstand the driving.

Trestles of this type are particularly adaptable for broad, relatively shallow openings, swampy conditions and shallow inlets or bays. Precast concrete piles can be used for end bearing support or where the support is from skin friction only. The replacement of an existing structure with a concrete trestle of the above-described type can be made under traffic with minimum delay.

Concrete trestles of the precast-pile and deck-slab type are relatively high in initial cost, require a longer period of time to construct than some other types of structures and locomotive cranes or similar heavy equipment are required to handle their erection.

For small projects, or for small railroads that do not have adequate personnel or equipment, precast piles and deck slabs are available from a manufacturer of railroad concrete products, arriving on the job site properly aged and ready for installation. The driving of the piles, pouring of the caps, and setting of the slabs can be contracted in some instances.

A ballast deck is predominately used with this type trestle. Except for renewal of ballast, maintenance is practically zero.

Steel Trestles

The steel trestle, composed of driven, steel-pipe piles, and rolled-beam caps and stringers, has come into extensive use in the past ten years.

The piles used in this type of structure are welded steel pipe either round or fluted, and are driven in the conventional manner. The leading end can be open or equipped with flat plates, conical points or rock bits depending upon local conditions. The flat plate is most commonly used as it is cheaper than the other points and permits easier, straighter driving. Welded pipe piles are available in single lengths up to 90 feet, and diameters up to 36 inches. The size commonly used for driven-bent steel trestles is 12 inches. Field joints can be made by welding sections together. Odd lengths from pile cut-offs can be welded together to form full-length piles, resulting in considerable savings and little or no waste.

When proper driving resistance has been reached the piles are filled with concrete. When conditions require, a cage of reinforcing steel is placed in the pipe shell prior to filling with concrete. The pipe shell provides a perfect form for the concrete, which, being poured after the driving, is not subjected to possible damage from driving.

Standard rolled-beam sections are used for pile caps. Span lengths are usually 20-feet with WF flange beams used as stringers. Standard angles or channels are used for struts and cross braces. The piles are encased in concrete collars at the ground line.

Either an open or ballast deck can be used. The structure can be painted or given a pro-
tective coating according to the railroad’s standard practice.

A steel trestle of this type can be constructed under traffic in the replacement of an existing structure. The pile driving and handling of materials can be done with the same type and weight equipment used in the construction of timber trestles.

AREA Bulletin No. 516, 1954, gives results of actual tests of the behavior of steel pipe piles under various loading conditions.

**Other Types**

There are some trestles in use which combine various design features of the foregoing types. Generally, these are:

1. Poured concrete substructure with rolled-beam stringers and either concrete or timber deck.
2. Double-row bents of steel pipe piles, or rolled H-section piles, with concrete caps and precast concrete deck slabs, or rolled-beam stringers with open or ballast deck.
3. Double-row timber bents, with rolled beam stringers, with ballast or open deck.

Trestles of these types are usually the result of some particular site conditions which prevent the use of the conventional trestle, or a compromise structure due to other reasons. Type 1 structure above is used where a rock condition close to the surface prevents the driving of piles. Types 2 and 3 are used where longer spans are required than is possible to get with the conventional single bent structure. Here again, the most advantageous structure can be determined by an economic study.

**Possibilities of Prestressed Concrete**

Prestressed concrete for bridge and trestle construction has been under development by European railroads for a number of years. In more recent years it is coming into use on the railroads of the United States and Canada.

The advantages of durability, low maintenance, less steel required and lighter weight than conventional reinforced, precast slabs, are offset to some extent by the higher initial costs. Costs competitive with other steel and concrete construction may be attained in some cases where it is possible to use a number of times the casting beds, forms and other special equipment for prestressing. Where a standard length structure can be utilized for general construction, the prestressed beams or slabs can be cast much as other precast members are today at a central plant and transported to the construction site. Such a practice may prove economical in an extended program.

Committee 8 of the AREA reports in Bulletin 530, 1956, the results of a study of the economics of prestressed concrete bridge and trestle spans in comparison with the conventional types using prices current at that time. The study included a comparison of the conventional 22-ft precast trestle slab with a prestressed slab of the same length, and found that there was no economy in the use of the prestressed slab. There was very little difference in the required amounts of concrete and steel.

The committee also made a comparative study to consider spans 36 feet 6 inches long, the approximate length required to span two lanes of traffic with sidewalks, for possible use as superstructure spans for highway underpasses. Ten different designs were considered, including cast-in-place concrete slab; precast concrete slab; concrete on rolled beams, including composite beam design; wrought iron deck on rolled beams and several types of prestressed spans, both posttensioned and posttensioned.

The prices were compiled from information supplied by contractors experienced with this type of construction. The costs for the prestressed slabs were based on supplying a minimum of ten spans, as the cost of a single span would be prohibitive for purposes of comparison. All factors of costs such as labor, materials, supervision, erection equipment, overhead and profit, were included. To get an equal comparison, only the superstructure was considered, with the abutments, piers, ballast and track structure excluded.

The study revealed that the conventional precast slab was the cheapest; the wrought iron deck plate on rolled-beam stringers was the most expensive; with some types of prestressed slabs comparing favorably with the conventional precast slab. The committee pointed out that local conditions will influence the costs of each type and should be considered in the final selection.

Committee 8 is currently preparing specifications for prestressed concrete structures. Further research and development along with lower first cost can result in extensive use of prestressed concrete in trestle construction in the future. In fact, the competitive conditions in the industry have changed radically.
in the last few years with the construction of many prestressing plants and it is thought by Committee 8 that economic comparisons today would be more in favor of prestressed concrete than they were in 1956.

Open Deck vs. Ballast Deck

This has always been an interesting as well as controversial subject. It cannot be said that either type has a distinct advantage over the other. Each has its particular advantages and disadvantages. The location and service will sometimes favor one type over the other.

The advantages claimed for the open-deck type are:

1. Lower first cost.
2. Less dead weight.
3. Less depth required; thus, more underclearance.
4. Ease of inspection and repair.

The advantages claimed for the ballast deck are:

1. Better riding conditions.
2. Flexibility for line and surface of track.
3. Less fire hazard.
4. Track can be maintained by regular section or maintenance of way forces.
5. Less impact on the structure.

The ballast deck is particularly advantageous for bridges on curves or spirals to curves. It also offers more protection against corrosion to trestles with steel stringers on lines carrying refrigerator cars. The line and surface can be maintained by track forces who have occasion to be at the site more often than bridge-maintenance forces. Thus, responsibility for maintaining good support for the track at the ends of the bridge is not divided between track forces and bridge forces. A ballast-deck structure can be retied and surfaced with a mechanized force, which is a factor to be considered in the rapidly expanding practice of doing all track maintenance with mechanized forces. Very few fires resulting from train operation occur on ballast-deck structures, and there is certainly less damage from derailed wheels or dragging equipment.

The open deck has lower initial cost, and costs less for repairs or renewals. Many railroads prefer these lower costs and to use the difference on other kinds of work.

Conclusions

During the past twenty years, material costs for railroad maintenance work have increased some four times while labor costs have increased approximately six times. As bridge maintenance work is predominately a labor item, the economies of construction which reduce or eliminate future maintenance are quite obvious.

The time has come when matters of habit or established past practice can no longer be followed. When trestles come due for extensive repairs or renewals, or in the case of trestles for a new line, it is time and money well spent to make a thorough study or analysis as to the most advantageous expenditure before a definite selection is made. All possible types should be reviewed for their adaptability to the particular location, noting the advantages and disadvantages of each, with the final selection giving due consideration to the features of permanence and low maintenance.

Discussion

T. M. von Sprecken (Sou.) began the discussion by saying that in the old days trestle designs were for wood. Since then the designs of trestles have changed, and now include mostly ballast deck timber trestles, and these are now being replaced with precast concrete structures. E. Johnson (IC) questioned the statement that timber trestles were being replaced with concrete structures because, on his road, the matter was still a question of economy. All cost factors, he said, are given consideration and it turns out that the standard open-deck timber trestle to be the most economical. Mr. von Sprecken agreed that the old style open-deck timber deck trestles are still used on light traffic lines. But, he said, on heavy traffic lines other types may be more advantageous.

H. M. Wilson (PRR) asked the chairman if he had made cost comparisons. Chairman Goforth stated that he had mentioned them in the first draft of his report, but that the Executive Committee of the Association had requested him to eliminate them from his report.

Chairman Goforth stated that the cost will vary according to local conditions. But, assuming that a single track open-deck timber trestle of average height is given an index of 1, the creosoted timber ballast deck structure would be 1.25, with steel piles it would be 2.10, a concrete trestle would vary between 3.35 and
3.50 for precast piling and deck, and that a poured-in-place concrete trestle would have an index of 4.60.

E. H. Barnhart (B&O) asked if there had been any change in trestle design because of diesel power. R. W. Gilmore (B&O) stated that diesel locomotives, even though they are lighter than many of the old steam locomotives, do not affect the design of trestles so much because of the wheel loads on cars.

When W. T. Towle (NYC&StL) asked what the life expectancy was of a concrete pile and a steel pile, Chairman Goforth stated that the steel pile and concrete piles have not been serviced long enough to arrive at a life expectancy figure.

Mr. Gilmore (B&O) stated that he had a few precast concrete pile trestles installed in 1930 and has not had to spend a nickel for maintenance on them.

E. T. Franzen (CRI&P) stated that there will be corrosion on steel piling and brine territory. However, an inspection of steel caissons installed in 1940 has revealed no signs of deterioration. He expects that these will be good for 100 years of service life. It is his opinion, he said, that unless some specific condition, such as salt or acids in the water, should get an equal life of steel piling as in creosoted timber. He suggested that it might be a good idea to test the water first in which the piling will be placed.

C. M. Burpee (AWPI) stated that that is one good point for pressure-treated timber piles. They are not affected by acid bearing or alkali bearing waters.

M. J. Hubbard (C&O) stated that, even disregarding the maintenance economy, it was much cheaper to construct earth fills today with modern equipment than it was to build a trestle.

Mr. Franzen stated that he has been having trouble with pre-boring the timbers because, when he gets out in the field, the holes do not line up properly, particularly in stringers. H. M. Harlow (C&O) stated that his road has been preboring timbers for over 30 years. The boring of the three stringers is done as they lay on the ground in the same positions that they would assume when installed. That way the holes do line up.

Mr. Franzen pointed out that many of the old trestles were built with odd span lengths so that it is hard to cut timber to fit them in advance. Yet, he does not like to do it on sight. Mr. von Sprecken stated that his road takes measurements of each piece on the ground before the timber is preframed. W. A. Sweet (ATSF) stated that troubles of lining up the holes is avoided on his railroad because they pre-bore the outside stringers only and bore the others in the field.

Mr. Johnson asked when the measurements are taken of the panel lengths, before or after the bents are driven. Not much trouble is experienced with the high bents he stated, but the short ones cannot be moved to fit. Also, he stated, it is hard to drive bents exactly to panel length because of the presence of many of the old bents. Mr. Harlow stated that the measurements are taken on his road after driving the piling. President Huffman questioned the efficacy of this method unless, he said, the driving was done out of face on one bridge after another. Otherwise, the crew would have to come back.

Mr. Johnson made reference to the figures stated in the committee report where the estimated service life of concrete pipe is stated as being 60 years and that of corrugated metal steel pipe as between 50 and 60 years. He asked where those figures were obtained. Chairman Goforth stated that the concrete pipe was a matter of record whereas the corrugated metal steel pipe figure was obtained from the Armco Company. Tom Cross (Armco) stated that the company had made a survey of 30,000 pipes to obtain life expectancy figures. For the most part, he said, these pipes were treated, coated and paved. It is a matter of record that thousands of the thinner metal pipes are in service after 50 years of service. Others 40, and still others 30 years. This was taken as the basis for the figures submitted to Chairman Goforth.
Attracting and Training B & B People
Report of Committee


R. D. Bisbee
Chairman

The purpose of this assignment is to call your attention to the importance of hiring B&B personnel capable of filling the job needs, with the potential for advancement, and to the importance of proper training to insure sufficient qualified men to promote to supervisory positions. This is not a new problem, as it has always been an important part of our responsibility. We hope the suggestions given will arouse your interest and offer some ideas to help you.

The problem of attracting B&B labor would be helped were it possible to promise a new employee promotion by showing merit and ability ahead of other employees. It is not possible to make any promises or commitments to a new employee as he will usually begin as a helper and await his turn to advance according to the seniority he holds among the employees. Promotions are usually slow and uncertain.

Extreme care must be used in the selection of all applicants. Best results are usually obtained by use of trained personnel to interview applicants, and such an office is maintained by many railroads. The interview should be given in private, to learn of the applicant's background, previous employment, health record, alertness, ability, and, most important of all, his honesty. It is apparent an honest man will be a loyal employee, and, once you have a nucleus of this type of men, the other men in the gang will be better satisfied and on the lookout for men of this type as a co-worker.

Safety of the employee is highly stressed on railroads as proven by the safety records and the continuous interest being shown on all railroads.

A full and complete understanding of the work should be had with the applicant. Describe the work in as much detail as possible, the earnings he can expect, his probationary period, pass privileges, pension, sickness benefits, holiday allowances, working conditions, and living accommodations. If all conditions are explained carefully, it will avoid disappointment later for both the employee and supervisor. The applicant should be made to feel he has become one of the team.

Employment and job security is relatively steady and assured as the past records of railroads have proven. With most railroads it is necessary that applicants first be secured from the Railroad Retirement Board when men are available. Many also may be secured from employees cut off in other departments, through the recommendation by other em-
ployees of acquaintances, through newspaper advertisements and from trade and high schools. Generally better men are obtained from rural areas or small communities, as these men are more self reliant and show more initiative from early training in the use of tools, materials and machines.

Supervision is generally improving in its approach and attitude toward dealing with the problems of B&B men.

Transportation and housing away from home are continually being improved, such as camp cars with recreation rooms, and electricity for lighting, television, radio, freezers and power-operated tools. The decided trend toward the use of trucks to transport the men, material, and tools from the camp site to the work, makes for greater comfort and safety compared with motor cars.

In most areas of the country the pay compares favorably with other trades involving the same degree of skill. B&B men have regular hours of work and steady employment.

In dealing with the problem of attracting good employees for B&B work let's not overlook the fact that considerable attention should also be given to keeping the good employee after he has been working.

When a man is first employed you are usually permitted to work him a period of sixty days before he will establish seniority. It is during this period of time the new man should be watched with the keenest of interest, because this is when he should measure up to your requirements. Before the probation period is ended the man should be talked with honestly as to how he likes the work, the organization, his intention of staying and to make certain again of his honesty and loyalty. At this time he should be frankly informed of his position in the organization and his apparent shortcomings as well as his good points. Only then should the new employee be permitted to gain seniority.

Develop the men as broadly as possible. Team the new men up with the older employees who will teach them the varied skills and methods of doing the work. The new man learns principally by observation and assisting the experienced men. Skill and aptitude are of increasing value as more power tools and equipment are becoming available for their use, which in turn will require less physical effort from the men.

As the new man shows improvement he should be given an opportunity to increase his responsibility by having him first do a job by himself, then as lead-workman with one or two men and next by relieving his regular foreman when sick or on vacation. The supervisor should have frequent talks with him to apprise him of management's interest in his progress and to assist him in any way possible.

The foreman must put safety first in all his work and sell safety to each of his men in such a thorough manner that safety comes first with the men at all times.

A prescribed training program will probably not be workable as it is not possible to give the new man advancement as his training progresses. Many railroads have a company-sponsored training program and pay a portion or all of the cost of a correspondence course upon satisfactory completion of the course. Management should be encouraged to provide subscriptions to magazines and carpentry manuals for part-time study by the men in camp cars.

The foreman should be ever ready to assist and guide the new men in education pertaining to the work at hand. The incentive to better himself, together with the ability to properly handle the job and loyalty to management, should be a basic factor in the development of a supervisor. He should have good intelligence along with sufficient education to enable him to understand mensuration, read and understand plans for construction and repair of structures, rules and agreements, keep accurate time reports, account for materials and prepare the other numerous reports which are increasing all the time. A foreman that does not have at least one man trained to the point where he can recommend him for advancement is not doing his job in a complete manner.

Discussion

D. J. Bertel (MP) began the discussion by saying that his road now takes X-rays of the backs of all new employees. This was instrumental in disqualifying 40 or more per cent of the applicants because of back deformities.

President Huffman made the observation that he understood that doctors could tell, by examining children under 10 years old, whether or not they would develop back difficulties in the future. Their prognosis was based mostly by noting whether or not the vertebrae were in proper alignment. If not,
it was inevitable that nerves in the spinal cord would be affected.

L. H. White (IC) stated that it was all very well to talk about training personnel, but, for the most part, the men now holding jobs have seniority and it is difficult to get them to change their habits as they have been around too long a time. Many of the older employees, he said, were good men but must be told what to do. Others are just old and feeble and are just marking time until the time they can retire. Since the doctors clear them for work, they must be employed. This creates a problem for the supervisor because the production is not what it should be.

A. H. Pearson (CB&Q) agreed that this was a problem on all railroads. He states that he works with the claim department as their doctors are the ones to decide whether a man is qualified to continue work. To this a member (GN) stated that the examining surgeon is always notified in advance when such men go in for their periodic examination. The surgeon is instructed to make a search to see if the man is suitable for further work.

J. M. Lowry (SLSW) stated that very often the chief surgeon will continue to qualify an old and feeble man for work, which means that some of the younger men must be laid off. He thought possibly that some agreement could be worked out with the labor organizations to retire men at the age of 65.

J. W. Rowland (LI) related that he had one man on his payroll who was very old and getting into his dotage. He asked the man to retire and when he declined, referred him to the company doctor. The result was that the doctor said that the man is okay for continued employment even though he was old. It developed that the supervisor then visited the old man and convinced him of the advantages of retiring. This was of no avail until it was brought out the fact that the man’s wife would also get some stipend. With this assurance, the man finally decided to retire from service.

L. H. White (IC) stated that he had a man in his employ who was about 73 or 74 years old. Even though the state of Alabama has a law that gives a man over the age 65 a retirement pension, the man would not retire. This made it difficult to find work for the man to do because he could not send him out alone on a job. What made it more difficult to get this man to retire, he said, was that the man’s wife was also working, and together they made over $800 a month. If the man retired, this income would be cut to $160 a month. It was therefore impossible to talk to this man about the advantages of retirement, when they had a larger income by working.

Mr. Bertel stated that he was forced to place such men at a work bench which was about the only thing they were capable of doing. However, he added, these men get the same pay as those who produce more. He felt that the supervisor should insist to the older person that he is not doing a good job and should quit. Eventually, the man would see the light and retire.

M. J. Hubbard (C&O) stated that he has found that some men are not willing to be foremen at the pay offered for the responsibility they would have to assume. He asked if other roads were having the same trouble. President Huffman stated that his road was having the same trouble which he thought was brought about by the fact that the pay raises are on the cents per hour basis which decreases the spread of pay between the carpenter and a foreman.

E. R. Schlaf (IC) stated that it is true that the wages between a supervisor and a mechanic is being consistently narrowed. Since the foreman has to take a lot of responsibility with the job, this makes carpenters or mechanics reluctant to accept the job of foreman. He suggested that he thought that the railroads could make the supervisors position more attractive by allowing him to participate in some things that the carpenter or mechanic could not. This would be in the form of allowing the supervisor to attend more of the Bridge & Building Association meetings, giving the supervisor a more important status. If such a program were instituted, he believed, that more mechanics and carpenters might want to become foremen or supervisors.
Dieselization and the Water Service Man
Report of Committee


J. H. STINEBAUGH
Chairman

The purpose of this report is to develop the effect of dieselization upon water and fuel service practices and procedures from the standpoint of changed requirements, differences in maintenance problems, refinements in service, and related matters.

Since the appearance of the diesel locomotive on the American railroad scene we have witnessed many radical changes in railroad practices. Unquestionably there are many more to come.

When a district, division, or entire system becomes completely dieselized, many engineering department maintenance problems are solved; however, others appear to take their place. One of the most annoying of these problems, in connection with the operation of steam locomotives, was that of water treatment. The steam locomotive required large quantities of water which had to be treated to control pitting, scale, corrosion and foaming. The diesel locomotive requires small quantities of water, as compared to the steam locomotive; however this water must be treated just as carefully, if not more so, than the steam locomotive water.

Water for cooling purposes must be non-corrosive and scale-free. The presence of dissolved minerals in the steam generator water will lead to scale and sludge deposits in the coils. Many railroads have found that zeolite treated water or deionized water is best for automatic steam generators. Automatic zeolite or deionizing plants require skilled mechanics to keep them in top operating condition. As automation of boiler plants and water softening plants increases, closer supervision and more frequent inspections become necessary.

Efficient and quick refueling of diesel locomotives is dependent upon several factors. The first requisite is pumping equipment of sufficient capacity to deliver the amount of oil needed. Usually about 125 gpm through each of three 21/2-inch outlets will be sufficient. The use of steel pipe lines, coated with corrosion-resistant materials, and with welded joints, is considered good practice. However, while welded joints are generally used, the repair of welded-joint oil pipe line presents a problem. Welding, cutting, or any hot repairs to oil lines require a thorough knowledge of the procedure necessary to insure safe working conditions and to avoid fires and explosions around fueling facilities. It is common practice to blow out all piping and tanks with air, fill and flush with water, then introduce either carbon dioxide or nitrogen gas to provide the inert atmosphere necessary.

In most cases it is desirable to make repairs to welded oil lines by the use of gasket-type couplings.

Thus we see that the water service repairman, who has been trained to install and maintain water pumps, pipelines, storage tanks and water columns, has learned to install and maintain automatic zeolite softeners, deionizing plants, oil pipelines, filters,
Summary of information furnished in replies to questionnaire

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recording meters and pumps. He has also acquired a working knowledge of the correct type of packing, gaskets, pipe-thread compounds and protective coatings for the pipe lines, all of which were new to the railroad industry. This craft possesses a rather high degree of mechanical skill and they have adapted themselves to their new assignment very quickly. On most railroads the water service repairmen install and maintain, in addition to diesel water, fuel and sanding facilities, all heating facilities, plumbing, fire protection, air conditioning, sanitary and storm sewers, water, air, and steam lines.

With the reduction in water stations resulting from dieselization of locomotives, water service supervisors on operating divisions of railroads having the divisional organization are finding time to take on other responsibilities. It would appear to be a good move to place the maintenance of power-operated maintenance-of-way work equipment under the jurisdiction of the supervisor of water service. The only way to protect machinery investment is a planned program of preventive maintenance. Taking cognizance of this fact, it would seem that a travelling division officer, with mechanical training, such as a that given water service supervisors, should have supervision over the specialists who do the work in the field and in the maintenance-of-way equipment repair shop.

Questionnaires seeking information relative to supervision of water service, diesel fueling facilities and roadway machinery on division and system levels were returned by twenty roads in the United States and Canada. A summary of the information received is given in the table.

Since Class I railroads of the United States spend from $16 million to $21 million annually in acquiring new work equipment, the investment is so great that the need for direct supervision of the organization is very evident. We believe that such supervision should be combined with supervision of the water department.

The combined forces of roadway machinery mechanics, and water service forces, trained in maintaining diesel fueling and water facilities, will provide the management with a source of potential supervisory personnel.

The water service men, although reduced in number, still have an important job in the industry, and it is to the interest of the rail-
roads to see that the best men available are trained and assigned to these maintenance jobs and that they are properly supervised.

Discussion

E. R. Schlaf (IC) stated that his road uses the water department supervisors to take care of roadway work equipment. He wondered if other roads followed this plan. W. W. Caines (C&O) stated that the mechanical department handled the fuel on his road and the water service supervisor handled only the water facilities. The work equipment was under the jurisdiction of the supervisor of work equipment and was maintained by his forces. When H. D. Curie (B&O) asked Mr. Schlaf if his water service men serviced machinery, Mr. Schlaf stated that there were two different crafts who serviced this machinery. One, being the water department men and the other being the roadway machinery mechanics.

Bridge and Building Forces and the Federal Highway Program

Report of Committee


M. J. Hubbard
Chairman

Highway construction has continually expanded over the past twenty-five years and now consumes several billion dollars of the nation's annual tax accruals. There are few railroads that are not affected by this broad program, and, probably, very few bridge and building supervisors who do not become involved in some phases of this problem. Therefore, it seems appropriate to briefly discuss the subject at this time.

During the early days of railroad construction, there were relatively few highways in existence. Except in built-up communities, situations requiring overhead or underground separations of the two modes of transportation were infrequent.

It should be kept in mind that railroads were originally built into and through relatively undeveloped areas. In every sense of the word, railroads were the principle media leading to development of large sections of the country. Railroads were initially essential, and today remain essential, for economic movement of large tonnages of commodities. Railroad horses pulled the country's carts to place the nation in its dominant world position.

One could easily get the impression today that railroad transportation no longer satisfies the needs of the economy and that it is essential to pour billions of tax dollars into
other facilities which provide means for movement of the privately owned automobile and other automotive vehicles and which are necessary for the national defense in event of an attack upon the country (although many vehicles for the purpose of defense would not clear existing bridge structures or would load them beyond their designed capacity).

There can be no quarrel, however, with the position that such other facilities are essential to the ever-broadening utilization by competitive methods of transportation. Not only are they competitive with the railroads but they require the use of highways that must pass over or under railroad tracks.

Railroads are located upon properties owned by them and upon which they pay annual taxes that run into huge figures. The bulk of the nation's industry is located alongside or adjacent to railroad properties and facilities. The railroads provide transportation for industry, handling both raw materials into and finished products out of plants. This is done over short and long distances by establishing fast, sure, and dependable schedules.

Railroads have invested many billions of their own dollars into developing and modernizing their properties and their services. There is a very strong conviction that they should not be required to contribute many more millions of dollars of their own money for the preponderant benefit of competitive transportation; but railroads, as corporate organizations, have no votes and convictions are superseded by laws of the land.

Federal aid in the development of the nation's highway system is an established policy. A portion of the federal tax dollar is appropriated to the states, cities, municipalities, and urban governmental bodies in accordance with prescribed scales. Federal agencies administer these policies and establish standards of construction that are generally applicable. These federal agencies have also prescribed conditions that determine benefits to be derived from construction undertaken with federal aid.

However, states and other governmental bodies also obtain tax dollars and they may initiate construction without the assistance of federal funds. In this event, there is wide variance in allocation of costs and standards of construction. It is encouraging to note, however, that there is an overall awareness of the interest of the railroad industry and negotiations are generally conducted with consideration of these interests.

You may well ask what has all this to do with you as a bridge and building supervisor and what effect does it have upon your forces.

The answer is this—you, as a bridge and building supervisor, will inevitably become involved in any project that is located within your territory.

Highway construction programs are established by governmental agencies. Many of these programs are well defined and the railroads know in advance what changes are contemplated. In such cases, it is possible to set forth the railroads' positions and interests during the broad overall planning stage and in some cases obtain favorable consideration. Advance commitments for necessary properties cause many projects to reach the stage beyond which the railroads can effectively voice objections. Initial knowledge of a project often is in the form of preliminary plans, showing type of construction proposed and clearances to be provided. Some such plans are prepared from aerial surveys or topographic maps and there is not even the advance warning that would be obtained by observing a field survey crew at work.

Preliminary plans are usually sent to division offices of railroads for review. You, as supervisors, undoubtedly are asked for your comments. Do not believe that your comments are ignored. They are, in point of fact, passed back up the line. You may be asked to look the situation over on the ground, and your knowledge of certain conditions that should be observed and provided for in any proposed work may be helpful. You will undoubtedly be asked later to prepare estimates of cost for some work that will involve the railroad.

Division office comments are gathered along with comments from signal and communication officers, operating department officers, real estate officers, and traffic department and development department officers. All of these comments are correlated in initial replies to the submitting highway agencies and are used in negotiations with these agencies in formulating necessary agreements to cover the project.

It is not necessarily of interest at this time to trace the many items of discussion and negotiations that are handled above the supervisory level. It is possible to briefly discuss your problems if we assume the project moves to a conclusion.

Your division office will receive copies of final plans for the project along with copies of the covering agreement and, if pertinent
to the work, copies of the force account estimate. You will soon become aware of how much you are involved when you digest the bulk of information that is turned over to you.

You will be informed as to who has been awarded the contract to build the project, the starting date for the work, and the contract time for its completion. You will soon become acquainted with the general contractor, his subcontractors, and their superintendents. It is a good idea to assure them of your cooperation and your intent to observe the responsibilities delegated to you.

Your problems are usually more involved if the grade separation project results in the new highway passing beneath the railroad. Structures of this type usually have temporary arrangements for maintaining railroad traffic during the construction period. It is sometimes possible to construct temporary run-around tracks. In many instances, however, it is necessary that the track structure be carried on temporary falsework construction. This is when you and your forces often become closely involved in the project.

If construction of a temporary falsework structure is to be done with company forces and with company equipment, it is necessary to obtain all needed materials and equipment and then pursue the work to completion. It is also necessary to coordinate the work with that being done by the general contractor.

Continual attention is required to see that the contractor's work is performed in such manner that the safety of railroad operation is not impaired. This is a major responsibility since you usually have authority to stop his work or require that he take precautions that you may deem advisable under situations that may develop.

During all phases of the work, it is necessary to keep accurate records of all materials used or removed, all time spent by men of the several classifications, and all equipment used in connection with company force account work. It is usually necessary to have the government inspector on the job verify all records daily and indicate his signed approval.

Some temporary falsework construction may be performed by contractors. Your problems are considerably simplified if this is the case since your primary concern is that the work be done under proper protection and that safe railroad operating conditions be maintained. These remain your responsibilities and they cannot be delegated entirely to the contractor, even though the written contract may so provide. You also have much less control over his work methods and as a result you entrust the daily supervisions to your most trustworthy and experienced assistants whenever you cannot be present.

Railroad company forces are rarely used to construct overhead grade separation structures. Projects of this type generally require the services of railway company forces to provide flag protection for safety of rail traffic whenever the contractor is performing work adjacent to or over the tracks. It may also be necessary to have company personnel on the job to assure that excavations are properly shored and that proper clearances are maintained.

The volume of grade separation construction underway or proposed on some railroads is so large that separate engineering, accounting, and construction forces are organized to handle work to be performed by the company. In this event, you are relieved of some responsibility for the work being done on your territory. However, the load is merely transferred to others in your company and the problem in logistics is compounded.

Company forces cannot be built up to handle a surge of work and then laid off when one phase is completed and the next demand will occur a few days, weeks, or months later. Reimbursement to the company for these forces can be made only for time actually spent on work related to the project. Therefore, most force account work is performed by regular company forces and time that they devote to special work is at the expense of sorely needed items elsewhere on your territory. There is little consolation in the fact that work thus performed does not usually come out of your regular maintenance appropriations. There is also little consolation to be derived from thinking about how much of this work is ahead of us for the next decade or more.

The railroad industry exists for the purpose of furnishing transportation service, by whatever means it may be permitted to employ. This is done under the rules of private enterprise, without subsidization, and for the purpose of making a fair profit for the owners. Problems of the railroads are compounding as they labor under the burden of obsolete restrictions and are loaded down with demands for more and more of their cash to help provide facilities for their competition.

Super-highways and uninterrupted traffic flow are wonderful for highway transporta-
tion. They are rough on railroads. They often use properties that have been retained or acquired for potential industrial development. They often render some properties worthless for their intended use by construction of limited access roads that bar entry to the properties.

They take initially adequate grade separation structures and greatly expand them or rebuild them to meet design needs of superhighways. They take an unrealistic amount from railroad earnings.

They often take services of your workmen that are sorely needed to perform other work on your territory. They take an increasing amount of your time and energy in the fulfillment of your responsibilities to your employer.

Such are some of the problems brought about by the Federal Highway Program.

Discussion

J. H. Brown (Frisco) stated that due to the vastness of the Federal Highway program around large cities the railroad has little or no control over the location of bridges on the new highways and that sometimes they are located over high-speed crossovers. He asked if anyone present had any knowledge of a railroad obtaining any protection or release from liability in event of an accident occurring due to this location. President Huffman (C&NW) answered that he knew of no instance where liability protection was provided. He stated that under the circumstances the best protection would be to include in the design of overhead structures massive retaining walls in front of the abutments to take the impact of a derailment.

W. B. Throckmorton (CRI&P) also stated that no liability protection was available. In his opinion the best protection is to place collision walls in front of abutments. However, railroads should try to get the highway people to locate abutments away from a danger area. He stated that the Rock Island has been successful in getting them to move abutments back to allow for the movement of maintenance of way equipment. In reply to a question as to the distance they should be moved back, President Huffman answered that there was no specific distance established. He stated that in the state of Illinois the North Western has been successful in getting one side clear to allow the movement of maintenance of way equipment. Chairman Hubbard announced that they have made some progress in having abutments moved back far enough so as not to interfere with industrial spur tracks.

B. M. Stephens (T&NO) mentioned that a committee of railroad and highway people representing the AREA and the AASHO are conferring on these and other mutual problems. He also stated that the highway people have no conception of the problems confronting the railroads in connection with the highway program.

A representative of the Missouri Pacific stated that his road does quite a bit of work on these projects themselves. A daily work sheet is kept showing all men working in the crew and all equipment working on the job. A daily diary is also kept showing the work done and what each piece of equipment did that day. These records are referred to in case a controversy arises. W. E. Chapman (C of Ga.) stated that on his road a statement of work was made out daily and that an assistant supervisor was assigned to check the daily work sheet.

Mr. Stephens pointed out that the Federal Government’s Policy and Procedure Memorandum must be followed for a railroad to be reimbursed for the work they do on a project.

A representative of the Pennsylvania asked whether the driving of temporary pile trestles should be done with railroad forces or by a contractor. President Huffman replied that the North Western has not used its maintenance of way forces on any of the jobs in $50-million of federal work. Run around tracks or trestles have all been built by a contractor thus saving its manpower for railroad requirements. He advised railroads to try getting the state to do as much of the work as possible in order to eliminate tying up railroad forces on this type of work. Mr. Stephens cautioned that it is best for railroad forces to do any work around high speed tracks or turnouts. C. C. Patterson (C&B&Q) stated that the governing factor of doing work around track is safety. He also stated that with proper handling it is sometimes possible in the interest of safety, to let the state to obtain the required material for the railroad to do the actual work with its forces. A representative of the Pennsylvania cautioned that on some roads labor contracts outside of railroad forces require the approval of the general chairman concerned. He advised that if outside forces are used a competent supervisor should be assigned to watch over the construction operations.
**Past Officers**

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**Past Officers**

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**Notes:**
- To November 1, 1942
- To February 1, 1943
CONSTITUTION

ARTICLE I.

NAME
Section 1. This association shall be known as the American Railway Bridge & Building Association.

ARTICLE II.

OBJECT
Section 1.** The object of this association shall be the advancement of knowledge pertaining to the design, construction and maintenance of railway bridges, buildings, water service facilities, and other structures, by investigation, reports and discussions.

Section 2. The association shall neither indorse nor recommend any particular devices, trade marks or materials, nor will it be responsible for any opinions expressed in papers, reports or discussions unless the same have received the endorsement of the association in regular session.

ARTICLE III.

MEMBERSHIP
Section 1. The membership of this association shall be divided into five classes, viz: Members, life members, associate, honorary and junior members.*

Section 2.** A member shall be a person in a position above rank of gang foreman in connection with roadway bridge, building and water service work, or in the employ of a public regulatory body, a professor of engineering in a college, an engineering editor, or a government or private timber expert. Any person desirous of becoming a member shall make application upon the form prescribed by the executive committee, setting forth his name, age, residence and practical experience. He shall furnish at least three references to whom he is personally known. Applicants may be voted into membership at any regular executive meeting or by letter ballot of the executive committee, a majority vote being necessary in either instance.

Section 3.** To be eligible for a life membership a member must have belonged to the association for at least 15†† years and in general must have retired from active railway service due to age or physical disability. He shall have all the privileges of active membership, except the holding of office, and shall not be required to pay annual dues. The transfer from membership to life membership shall be made in the same manner as the election of members, as prescribed in Section 2, of this Article.

Section 4. Associates shall be responsible persons who are not eligible as members, whose pursuits or attainments qualify them to co-operate with members in the study and development of improved practices in the construction and maintenance of bridges, buildings and water facilities. They shall have all the rights of members except of voting and holding office. They shall be elected in the manner prescribed for members, in Section 2, of this Article.

Section 5. Honorary members shall be chosen from persons who have attained acknowledged eminence in some branch of engineering or railway service. Their number shall be limited to ten. Honorary members shall be proposed by not less than six active members and shall be elected by the unanimous vote of the members.

*Amended October 16, 1941.
**Amended September 20, 1948.
††Amended March 10, 1958.
present at a regular meeting. They shall have all the rights of active members except that of holding office and shall be exempt from the payment of dues.

Section 6. A junior member shall be a person who is a graduate of a recognized engineering school, or who has been employed for at least two years in the design, maintenance or construction of railway bridges, buildings or structures. Applicants shall be at least 21 years of age and they shall be elected in the manner prescribed for members, in Section 2 of this article. Juniors shall have all the rights of members except that of holding office. When the attainments of a Junior are such as to qualify him as a member, he may apply for promotion and the Executive Committee shall authorize such promotion when qualifications warrant the action. Unless a Junior is promoted, his membership shall cease automatically when he becomes 28 years of age.*

Section 7. Any member guilty of conduct unbecoming to a railroad officer and a member of this association, or who shall refuse to comply with the rules of this association, shall forfeit his membership on a two-thirds vote of the executive committee.

Section 8. Membership shall continue until written resignation is received by the secretary, unless member has been previously expelled, or dropped for non-payment of dues in accordance with Section 1 of Article VII.

Section 9.** Only active members shall hold office in this association, and only active and life members shall be entitled to vote in the election of officers.

ARTICLE IV. OFFICERS

Section 1†. The officers of this association shall be a president, three vice-presidents, a secretary, a treasurer, and six directors who with the most recent past president shall constitute the executive committee.

Section 2. The past presidents of this association, previous to the most recent past president, who continue to be members, shall be privileged to attend all meetings of the executive committee, of which meetings they shall receive due notice, and be permitted to discuss all questions and to aid said committee by their advice and counsel; but said past presidents shall not have a right to vote, unless called upon to fill a quorum.

Section 3. Vacancies in any office shall be filled for the unexpired term by the executive committee without delay.

ARTICLE V. EXECUTIVE COMMITTEE

Section 1.** The executive committee shall manage the affairs of the association and shall have full power to control and regulate all matters not otherwise provided for in the constitution and by-laws and shall exercise general supervision over the financial interests of the association, and make all necessary purchases and contracts required to conduct the general business of the association, but shall not have the power to render the association liable for any debt beyond the amount then in the treasury plus accounts receivable and not subject to other prior liabilities. All appropriations for special purposes must be acted upon at a regular meeting of the association.

Section 2. Meetings of the executive committee may be called by a majority of the members of the committee, providing 10 days' notice is given members by mail.

Section 3. Five members of the executive committee shall constitute a quorum for the transaction of business.

ARTICLE VI. ELECTION OF OFFICERS AND TENURE OF OFFICE

Section 1. Except as otherwise provided, the officers shall be elected at the regular annual meeting of the association and the election shall not be postponed except by unanimous consent of the members present at said annual meeting. The

*Amended October 16, 1941.
**Amended September 20, 1948.
†Amended September 21, 1957.
election shall be by ballot, a majority of the votes cast being required for election. Any active member of the association not in arrears for dues shall be eligible for office, but the president shall not be eligible for reelection.

Section 2. The president, three vice-presidents, secretary and treasurer shall hold office for one year and the directors for three years, two directors being elected each year. All officers retain their office until their successors are elected and installed. A director elected for a three-year term shall not be eligible to serve two consecutive terms.

Section 3. The term of office of the secretary and the treasurer may be terminated at any time by a two-thirds vote of the executive committee. Their compensation shall be fixed by a majority vote of the executive committee.

The secretary shall also serve as secretary of the executive committee.

Section 4. The secretary and the treasurer shall be required to give bond in an amount to be fixed by the executive committee.

ARTICLE VII.
MEMBERSHIP FEE AND DUES

Section 1. Every member upon joining this association shall pay to the secretary an entrance fee and dues as prescribed by the executive committee. No member in arrears for annual dues shall be entitled to vote at any election and any member more than one year in arrears may be stricken from the list of members at the discretion of the executive committee.

Section 2. A person stricken from the list of members because of non-payment of dues, upon written application may be reinstated as a member in his former class without loss of privileges, either upon payment of all back dues (which must accompany application) or at the discretion of the Executive Committee voting in the manner prescribed in Section 2, Article III.

ARTICLE VIII.*
LOCAL SECTIONS

Section 1. Upon the application of ten or more members of the association residing in the same geographical district, or having offices therein, the executive committee shall organize a local section for that district, to which all members in that district shall be eligible. Such local section shall admit to active membership only members in good standing. It shall hold not less than two meetings each year, and shall be governed by such constitution and by-laws not inconsistent with the constitution of this association as the section membership may adopt and the executive committee of the association approve.

Section 2. The parent association shall not be put under any obligation, either financial or in the matter of policy or opinion, by any local section.

ARTICLE IX.
AMENDMENTS

Section 1. This constitution may be amended at any regular meeting by a two-thirds vote of the members present, provided that notice of the proposed amendment or amendments has been sent to the members at least 30 days previous to said regular meeting.

BY-LAWS
TIME OF MEETING

1. The regular meeting of this association shall convene annually during the month of September, the exact date to be fixed by the Executive Committee.

PLACE OF MEETING

2. The place of holding the annual convention shall be Chicago, Ill.

†Amended October 17, 1940.
*Article adopted 1922.
**Amended September 20, 1948.
‡Amended September 21, 1957.
3. It shall lie within the power of the executive committee to change the location or time of the meeting if it becomes apparent that it is for the best interests of the association.

QUORUM

4. At the regular meeting of the association, 15 or more members shall constitute a quorum.

**DUES

5. The annual dues, for the fiscal year ending August 31, and payable in advance, shall be as follows:* 
   Members, $5.00; Associate Members, $4.00; Junior Members, $2.50.

DUTIES OF OFFICERS

6.† The president shall have general supervision over the affairs of the association. He shall preside at all meetings of the association and of the executive committee; shall appoint all committees not otherwise provided for, and shall be ex-officio member of all committees. He shall with the secretary sign all contracts or other written obligations of the association which have been approved by the executive committee. He shall render a detailed report at least three times during the year to the members of the executive committee, showing the financial condition of the association and its activities.

At the annual meeting the president shall present a report containing a statement of the general conditions of the association.

7. The vice-presidents in order of seniority shall preside at meetings in the absence of the president and discharge his duties in case of a vacancy in his office.

8.† It shall be the duty of the secretary to keep a correct record of the proceedings of all meetings of this association, and of all accounts, between this association and its members; to collect all moneys due the association, and deposit the same in the name of the association. He shall pay all bills when properly certified and approved by the president and the treasurer, and make such reports as may be called for by the executive committee. He shall also perform such other duties as the association may require.

9.‡ The treasurer shall have charge of the funds, check all deposits as made by the secretary, sign all checks after they have been approved by the president, and invest all funds not needed for current expenses as directed by the executive committee. He shall report at each annual meeting on the condition of the finances.

NOMINATING COMMITTEE

10.‡ After each annual meeting the president shall appoint a committee consisting of five members. Two Past Presidents shall be members of this committee, one of whom shall act as Chairman. No other officers of the Association shall be appointed to this committee. This committee shall prepare a list of names of nominees for officers to be voted on at the next annual convention in accordance with ARTICLE VI of the Constitution, said list to be read at the business session of said convention. Nothing in this section shall be construed to prevent any member making further nominations.

AUDITING COMMITTEE

11.‡ Prior to each annual meeting the president shall appoint a committee of three members, not officers of the association, whose duty it shall be to examine the accounts and vouchers of the secretary and the treasurer and certify as to the correctness of their accounts.

COMMITTEE ON SUBJECTS FOR DISCUSSION

12. After each annual meeting the president shall appoint a committee whose duty it shall be to prepare a list of subjects for investigation to be submitted for approval at the next convention.

†Amended October 17, 1940.
‡Adopted October 17, 1940.
*Amended October 16, 1941.
**Amended September 20, 1948.
‡Amended December 4, 1950.
COMMITTEE ON INVESTIGATION

13. After the association has adopted the list of subjects for investigation the president for the succeeding year shall appoint the committees who shall prepare the subjects for report and discussion. He may also appoint individual members to prepare reports on special subjects, or to report on any special or particular subject.

PUBLICATION COMMITTEE

14. After each annual meeting the executive committee shall appoint a publication committee consisting of three active members whose duty it shall be to cooperate with the secretary in the issuing of the publications of the association. The assignment of this committee shall be such that at least one member shall have served on the committee during the previous year.

ORDER OF BUSINESS

15.† Call to order by president.
   Opening prayer or invocation.
   President's address.
   Report of secretary.
   Report of treasurer.
   Appointment of special committees.
   Reports of standing committees and presentation of papers.
   Unfinished business.
   New business.
   Election of officers.
   Installation of officers.
   Adjournment.

DECISIONS

16. The votes of a majority of the members present shall decide any questions, motion or resolution which shall be brought before the association, unless otherwise provided. Unless specifically provided herein otherwise, all discussions shall be governed by Robert's rules of order.

AMENDMENTS

17.† The By-Laws can be amended by a two-thirds vote of those present at any regularly called Executive Committee Meeting.

†Amended September 20, 1948.
DIRECTORY OF MEMBERS
as of February 1, 1959

(Figure after each name indicates year when member joined the association)

* Indicates Junior Member

HONORARY MEMBERS

Bechtelheimer, A. E. (Retired) Br. Engr., C. & N. W., Chicago, Ill. (1920)
Budd, Ralph, (Retired) President, C. B. & Q., Santa Barbara, Calif. (1927)
Vandenburgh, E. C., (Retired) Ch. Engr., C. & N. W., Chicago, Ill. (1925)

ACTIVE MEMBERS

A
Alley, F. T., Asst. B. & B. Supvr., St. L. S. W., Tyler, Texas (1955)
Anderson, A. C., Gen. B. & B. For., D. M. & I. R., Two Harbors, Minn. (1952)

B
Baker, R. C., Engr. of Struc., C. & E. I., Danville, Ill. (1940)
Barhan, L. M., Asst. B. & B. Supvr., N. P., Minneapolis, Minn. (1956)
Barranco, S. H., Supvr. Str., P. R. R., Richmond, Ind. (1951)
Bateman, E. F., B. & B. Supvr., U. P., Nampa, Idaho (1958)
Benson, G. W., Div. Engr., C. of G., Macon, Ga. (1940)
Beringer, M. A., Br. Insp., I. C., Chicago, Ill. (1929)
Billmeyer, F. D., Brdg. & Str. Eng., W. M., Baltimore, Md. (1955)
Block, M., Asst. to Ch. Engr., I. C., Chicago, Ill. (1948)
Bodie, B. V., Gen. Mgr., G. M. & O., Mobile, Ala. (1951)
Booth, H. E., B. & B. Mast., C. N., Regina, Sask., Canada (1957)
Born, J. O., Eng. Str., M. C., Portland, Me. (1956)
Bredfeldt, C. C., Drafts., C. M. St. P. & P., Chicago, Ill. (1955)
Brice, W. T., (Retired), B. & B. Mast., C. N., Regina, Sask., Canada (1946)
Brown, L. W., B. & B. Supvr., C. & O., Peru, Ind. (1951)
Bunge, W. H., Asst. Eng., M. P., St. Louis, Mo. (1941)
Burkel, J. N., Draftsman, M. P., St. Louis, Mo. (1951)
Bush, R. H., W. S. Supvr., T. & N. O., Ennis, Tex. (1952)

C

Cameron, W. M., Ch. Carp., C. M. St. P. & P., Milwaukee, Wis. (1955)
Carlson, A. W., Engr. of Brdg. & Str., W. P., San Francisco, Calif. (1953)
Carter, T. S., Ch. Eng., M. K. T., Dallas Texas (1954)
Chamberlain, H. L., Supvr. Str., P. R. R., Indianapolis, Ind. (1956)
Chamberlain, P. C., Asst. to Engr. of Struc., Erie, Cleveland, Ohio (1941)
Chaney, A. B., Eng. M. of W., M. P., St. Louis, Mo. (1947)
Clarke, R. J., Area Engr. Str., P. R. R., Philadelphia, Pa. (1956)
Collier, P. B., Supt. of Scales, M. P., St. Louis, Mo. (1938)
Collings, J. E., Ch. Carp., C. M. St. P. & P., Savannah, Ill. (1953)
Converse, D. W., Br. Engr. A. C. & Y., Akron, Ohio (1940)
Cooledge, V. R., Engr. of Br., S. P., San Francisco, Calif. (1953)
Cornett, B. J., B. & B. Supvr., T. M., Alice, Texas (1958)
Cox, R. C., B. & B. Supvr., W. P., Sacramento, Calif. (1950)
Creek, C. W., Gen. Fore. B. & B., P. R. R., Valparaiso, Ind. (1957)
Croft, P. H., Asst. Engr. M. of W., I. C., Memphis, Tenn. (1947)
Curie, H. D., Mast. Carp., B. & O., Garrett, Ind. (1947)

D

Dahlberg, A. R., B. & B. Supvr., W. M., Hagerstown, Md. (1957)
Day, F. D., Area Supvr. Str., P. R. R., Pittsburgh, Pa. (1949)
DeMate, M. A., Str. Engr., St. L. S. F., Springfield, Mo. (1955)
Derryberry, J. T., Gen. B. & B. Inspr., W. M., Cumberland, Md. (1955)
Dick, H. M., Supvr. of Struc., Penna., Harrisburg, Pa. (1942)
Dick, M. H., V. P. & Editor, Ry. Trk. & Str., Chicago, Ill. (1937)
Duffy, P. E., Supvr. B. & B., G. N., Minneapolis, Minn. (1957)
Dunn, W. M. S., Staff Engr., C. & O., Huntington, W. Va. (1957)
E

Ellerbrock, W., Tr. Mast., St. L. S. W., Texarkana, Texas (1953)
Eble, A. E., Tr. Mast., St. L. S. W., Texarkana, Texas (1953)
Ellis, P. O., Asst. Ch. Engg.-M., M-K-T., Dallas, Texas (1954)
Elower, L., Trav. Br. Insr., Erie, Cleveland, Ohio (1948)
Erickson, H. G., Ch. Engr., L. A. J., Los Angeles, Calif. (1953)
Erickson, O., Asst. B. & B. Supvr., S. P., Sacramento, Calif. (1950)

F

Ferry, M. H., Mast. Carp., Erie, Hornell, N. Y. (1952)
Fest, C., Sr. Asst. B. & B. Supvr., S. P., Milwaukee, Ore. (1957)
Forman, H. C., Ch. Engr., L. & N., Louisville, Ky. (1958)

Freeman, C. J., Div. Engr., C. & N. W., St. Paul, Minn. (1957)
Fritzinger, G. F., Asst. Engr., Wabash, St. Louis, Mo. (1957)
Fronabarger, H. C., (Ret.) B. & B. Supvr., T. & P., Fort Worth, Texas (1949)

G

Gabrio, C. W., Engr. of Str., Virginian, Norfolk, Va. (1947)
Garcelon, C. E., Asst. to Mgr. Oper., B. & A., Bangor, Me. (1945)
George, S. W., Div. Engr., W. M., Cumberland, Md. (1956)
Gilmore, R. W., Gen. Br. Insr., B. & O., Cincinnati, Ohio (1943)
Gossard, J. T., Supvr. B. & B., W. M., Hagerstown, Md. (1952)
Gottsabend, W. J., Asst. Supvr. Str., P. R. R., Columbus, Ohio (1957)
Grieder, R. E., Asst. to Brdg. Engr., G. N., St. Paul, Minn. (1958)
Gunderson, R. R., Eng. Maint. of W., W. M., Baltimore, Md. (1947)

H

Hagemmaier, C. E., Asst. B. & B. Supvr., S. P, Los Angeles, Calif. (1950)


Hamilton, C. W., Engr. of Design, Washab, St. Louis, Mo. (1950)


Hansen, A. E., Ch. Carpr., C. M. St. P. & P., LaCrosse, Wis. (1954)

Harding, W. G., Arch., Washab, St. Louis, Mo. (1957)


Harper, W. B., Supvr. Trk., I. C., Vicksburg, Miss. (1953)

Harris, A. R., Engr. Br., C. & N. W., Chicago, Ill. (1940)


Hayes, J. W., Arch., G. N., St. Paul, Minn. (1957)


Hedley, W. J., Ch. Engr., Wabash, St. Louis, Mo. (1950)

Hefte, A., Asst. B. & B. Supvr., N. W. P., San Rafael, Calif. (1952)


Hickok, B. M., Supvr. B. & B., N. Y. C., Cleveland, Ohio (1951)


Hillman, W. C., Mast. Carpr., Clinchfield, Erwin, Tenn. (1953)

Hiner, J. T., Asst. Ch. Engr., Sou., Cincinnati, Ohio (1950)


Hodgson, A. W., Ch. Carpr., C. M. St. P. & P., Deer Lodge, Mont. (1955)


Holmes, E. J., Mast. Carpr., Erie, Huntington, Ind. (1952)


Hopton, J. P., Engr. of Maint., C. U. T., Cincinnati, Ohio (1955)


Huffman, W. H., Asst. Ch. Engr., C. & N. W., Chicago, Ill. (1941)


Hutchings, V. W., B. & B. Supvr., S. P., Bakersfield, Calif. (1941)


J


Jackson, S. M., Spec. Engr. Oil & Gas Dev., M. P., St. Louis, Mo. (1951)


Jenkins, R. W., Str. Engr., St. L.-S. F., Springfield, Mo. (1955)


Johnson, A. C., Ch. Engr., E. J. & E., Joliet, Ill. (1944)

Johnson, B. L., B. & B. Mast., C. N., Winnepeg, Man., Canada (1957)


Johnson, E. A., Engr. of Br., I. C., Chicago, Ill. (1953)


Johnson, G. C., B. & B. Supvr., C. & N. W., Green Bay, Wis. (1955)


Jones, A. C., B. & B. Supvr., Southern, Birmingham, Ala. (1938)


K


Kelly, J. R., B. & B. Supvr., Southern, Lexington, Ky. (1952)

Kendall, J. T., Asst. Supvr. Str., P. R. R., Cleveland, Ohio (1949)


Knapp, P., Mast. Carp., Erie, Jersey City, N. J. (1951)


Kruze, H. H., Ch. Carp., C. M. St. P. & P., St. Paul, Minn. (1957)


L


Layman, D. C., B. & B. Supvr., I. C., Jackson, Tenn. (1952)


Leinweber, F. J., B. & B. Mast., C. N., St. Thomas, Ont., Canada (1947)


Lingle, T. N., Supvr., B. & B., I. C., Carbondale, Ill. (1951)


Little, H. C., Supvr. Wat. Serv., I. C., New Orleans, La. (1948)


Lowry, J. M., Ch. Engr., St. L. S. W., Tyler, Tex. (1950)


Luce, W. L., Mast. Carp., Erie, Youngstown, Ohio (1952)

Luck, R. P., Draftsman, C. & N. W., Chicago, Ill. (1920)

Lund, C. V., Asst. to Ch. Eng., C. M. St. P. & P., Chicago, Ill. (1947)

Lundgren, H. M., Asst. B. & B. Mast., C. N., Kamloops, B. C., Canada (1957)

Mc

McCall, H. W., Ch. Carp., C. M. St. P. & P., Miles City, Mont. (1955)
McCosky, L. E., Asst. B. & B. Supvr., C. & N. W., Green Bay, Wis. (1958)
McDermott, A. A., B. & B. Supvr., S. P., Dunsmuir, Calif. (1945)
McFadden, W. E., Ch. Carp., C. M. St. P. & P. Tacoma, Wash. (1955)
McGrew, B. H., Supvr. B. & B., St. L. S. W., Tyler, Tex. (1951)
McGrew, F. O., Ch. Carp., C. M. St. P. & P., La Crosse, Wis. (1948)
McIver, J., B. & B. Supvr., N. S., Edenton, N. C. (1956)
McKibben, D. H., Supvr. Str., P. R. R., Columbus, Ohio (1951)
McMillan, R. J., B. & B. Mast., C. N., Kamloops, B. C. Canada (1957)

Mathis, R. C., Br. Insp., I. C., Memphis, Tenn. (1947)
Mayfield, L., Prin. Asst. Eng., M. P., St. Louis, Mo. (1944)
Meredith, W. E., Supvr. Str., P. R. R., Canton, Ohio (1950)
Merrill, B. W., Supvr. B. & B., N. Y. C. & St. L., Conneaut, Ohio (1956)
Messman, D. V., Engr. of Bdg., Southern, Knoxville, Tenn. (1955)
Meyers, B. R., Ch. Engr., C. & N. W., Chicago, Ill. (1930)
Midkiff, R. B., Ch. Engr., M. W. & S., Sou., Knoxville, Tenn. (1953)
Miesenhelder, P. D., Concrete Engr. Research Staff - A.A.R., Chicago, Ill. (1952)
Moore, I. A., Ch. Engr., C. & E. I., Danville, Ill. (1937)
Moore, J. D., Supvr. Str., P. R. R., Harrington, Del. (1953)

M

MacQuarrie, A. C., B. & B. Mast., C. N., New Glasgow, N. S., Canada (1957)
Malone, J. W., Asst. Engr., Wabash, St. Louis, Mo. (1957)
Martin, J. D., Ch. Carp., C. M. St. P. & P., Sioux City, Iowa (1955)
Mason, S. K., Ch. Engr., T. M., Laredo, Tex. (1950)

Morrison, R. H., Ch. Engr., L. S. & I., Marquette, Mich. (1941)


Myers, E. T., Asso, Editor, Modern R. Rs., Chicago, Ill. (1957)

Myers, R. L., Supvr. W. S., I. C., Clarksdale, Miss. (1950)

N

Neal, G. W., Supt., Chattahoochee Valley, West Point, Ga. (1948)


Nelson, M. S., Brdg. Insp., N. Y. C., St. Thomas, Ont., Canada (1956)


O


Ogle, H., Bridge Insp., C. & E. I., Salem, Ill. (1956)


Olson, O. D., B. & B. Supvr., C. & N. W., Chicago, Ill. (1953)

Olson, V. E., B. & B. Supvr., M. St. P. & S. S. M., Stevens Point, Wis. (1948)

O'Neil, T. G., Asst. Engr., M. P., St. Louis, Mo. (1958)


Owens, B. H., Supvr. B. & B., I. C., Vicksburg, Miss. (1956)

P


Pahl, W. H., Jr., Supvr. Str., P. R. R., Cleveland, Ohio (1950)


Patterson, R. H., Asst. to Ch. Engr., St. L. S. W. Tyler, Texas (1955)


Pease, B. W., Asst. Supvr. B. & B., M. C., Bangor, Me. (1957)


Peffley, J. E., Asst. B. & B. Supvr., P. F., Los Angeles, Calif. (1958)


Peterson, H. R., Ch. Engr., N. P., St. Paul, Minn. (1953)


Peterson, N. E., Ch. Engr., C. & I. M., Springfield, Ill. (1938)

Petty, W. F., Engr. M. of W., Erie, Jersey City, N. J. (1948)

Pfeiffer, A. B. & B. Supvr., S. P., Stockton, Calif. (1939)


Potts, H. F., Supvr. Str., P. R. R., Fort Wayne, Ind. (1957)

Pound, F. R., Mast. Carp., B. & O., Newark, Ohio (1952)


R
Raessler, V. D., Supv. B. & B., I. C., Memphis, Tenn. (1951)
Rapant, F., Asst. Supvr. Str., P. R. R., Newark, N. J. (1955)
Raver, H. E., Engr. B. & B., L. I., Jamaica, N. Y. (1952)
Riffle, L. F., Ch. Carp., C. M. St. P. & P., Perry, la. (1956)
Rose, J. A. B. & B. Mast., C. P., Montreal, Que., Canada (1958)
Ross, J. E., B. & B. Insp., St. L-S. F., Amory, Miss. (1957)


S
Salmon, J. M., Jr., Ch. Engr., Clinchfield, Erwin, Tenn. (1938)
Sathre, C. O., B. & B. Supv., C. & N. W., Madison, Wis. (1950)
Saunders, T. D., Ch. Engr., O. N., North Bay, Ont., Can. (1930)
Savage, F. E., Asst. B. & B. Supvr., N. P., Minneapolis, Minn. (1957)
Sawyer, J. H., Jr., Ch. Engr., C. G. W., Oelwein, la. (1951)
Schoener, J. T., Asst. Engr. Str., M. P., St. Louis, Mo. (1957)
Shepley, S. H., Ch. Engr., E. J. & E., Joliet, Ill. (1945)
Short, W. L., Asst. Engr., M. P., St. Louis, Mo. (1951)
Simsonon, E. F., B. & B. Supvr., S. I., Sandpoint, Idaho (1958)
IT'S A LONESOME ROAD

"In Transit" Service through 34 treating plants

Adelaide, Pa.  |  Houston 14, Texas
Alexandria 7, La.  |  Kansas City 29, Mo.
Baltimore 25, Md.  |  Montgomery 2, Ala.
Carbondale, Ill.  |  Nashua, N. H.
Charleston, S. C.  |  Newport, Delaware
Grossett, Arkansas  |  N. Little Rock, Ark.
Denver 16, Colorado  |  Oroville, Calif.
Everett, Washington  |  Orrville, Ohio
Columbia Park, O.  |  Port Newark 5, N. J.
Florence, S. C.  |  Port Reading, N. J.
Fordyce, Arkansas  |  Richmond, Virginia
Gainesville, Florida  |  Russell, Kentucky
Green Spring, W. Va.  |  Salem, Virginia
Grenada, Miss.  |  Superior, Wis.
Guthrie, Kentucky  |  Texarkana, Texas
Hagerstown, Md.  |  Wauna, Oregon
Horseheads, N. Y.  |  Wilmington, Cal.

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Smith, A. E., Ch. Engr., C. G. W., Oelwein, Iowa (1958)
Smith, E. L., B. & B. Supv., Southern, Hattiesburg, Miss. (1952)
Smith, G. H., Insp., M. P., St. Louis, Mo. (1958)
Smith, H. E., Pres. & Gen. Mgr., G. H. & H., Galveston, Texas (1941)
Smith, J., B. & B. Supv., S. P., Sacramento, Calif. (1943)
Smith, L. L., Asst. B. & B. Supv., S. P., Dunsmuir, Calif. (1948)
Smith, R. H., Jr., Dist. Engr., P. R. R., Chicago, Ill. (1957)
Snavely, A. F., Engr., P. R. R., Fort Wayne, Ind. (1957)
Snyder, E. F., Asst. to Ch. Engr., I. C., Chicago, Ill. (1948)
Spofford, F. R., Ch. Engr., B. & M., Boston, Mass. (1940)
Stanczyk, W., Detailer, C. M. St. P. & P., Chicago, Ill. (1957)
Stephen, T. J., Engr.-Insp., U. P., Kansas City, Mo. (1958)
Sumner, J., W. S. For., St. L. - S. F., Springfield, Mo. (1948)

T
Taylor, F. H., Eng. M. of W., F. E. C., St. Augustine, Fla. (1951)

Templin, R. S., Fore. Carp., Reading, Phil.,ipsburg, N. J. (1947)
Termunde, W. L., Asst. Rdm., Belt Ry. of C., Chicago, Ill. (1956)
Thomason, C. G., Bldg., Insp., M. P., Harlingen, Texas (1956)
Throckmorton, W. B., Ch. Engr., C. R. I. & P., Chicago, Ill. (1957)
Tilley, E. L., Bridge Insp. I. C., Memphis, Tenn. (1956)
Todd, D. C., Engr. Str., P. R. R., Pittsburgh, Pa. (1942)
Toh, J. S., Str. Eng.-Brdg. Dept., M. P., St. Louis, Mo. (1956)
Tomer, H., Water Serv. Fore., B. & O., Bel- laire, Ohio (1956)
Tracy, D. E., B. & B. Supvr., S. P., Los Angeles, Calif. (1956)
Trickey, R. E., Sup. B. & B., B & A., Houl- ton, Me. (1957)
Trulove, J. D., Sr. Asst. B. & B. Supvr., S. P., Ogden, Utah (1945)

V
von Sprecken, R. E., Asst. Engr.-M. of W. Dept., F. E. C., St. Augustine, Fla. (1951)

W
Wachtel, C. D., Brdg. Insp., M. P., St. Louis, Mo. (1958)
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<tr>
<td>Kore, A. B.</td>
<td>Supvr. B. &amp; B.</td>
<td>Monon, Lafayette, Ind.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
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<tr>
<td>Ware, W.</td>
<td>Div. Eng., C. R. I. &amp; P.</td>
<td>Little Rock, Ark.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
</tr>
<tr>
<td>Warfield, H. J.</td>
<td>(Ret.), Insp. of W.</td>
<td>New Brunswick, N. J.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
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<td>Warfield, W. B.</td>
<td>Supvr. Str. P. R. R.</td>
<td>Camden, N. J.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
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<tr>
<td>Weyand, J. A. &amp; B.</td>
<td>Insp., M. P.</td>
<td>San Antonio, Texas</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
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<td>Warrenfells, J. F.</td>
<td>Ch. Engr., J. T.</td>
<td>Jacksonville, Fla.</td>
<td>1922</td>
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<td>Webber, G. R.</td>
<td>Ch. Carp., C. M. St. P. &amp; P.</td>
<td>Tacoma, Wash.</td>
<td>1922</td>
<td>1918</td>
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<td>Welch, J. W.</td>
<td>Supvr. B. &amp; B.</td>
<td>F. E. C., St. Augustine, Fla.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
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<td>Weyand, J.</td>
<td>Draftsman, U. P., Denver, Colo.</td>
<td>1922</td>
<td>1918</td>
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<td>White, S.</td>
<td>Gen. B. &amp; B. Supvr., S. P.</td>
<td>San Francisco, Calif.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
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<td>Wiener, H. C. &amp; B. Supvr.</td>
<td>N. P., Duluth, Minn.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
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<td>Williams, C.</td>
<td>Asst. Supv. B. &amp; B.</td>
<td>C. &amp; O., Ashland, Ky.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
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<td>Williams, D. R.</td>
<td>Brdg. Insp., C. &amp; E. I.</td>
<td>Danville, Ill.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
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<td>Williams, W. T. &amp; B. Supvr.</td>
<td>T. &amp; N. O., Ennis, Texas</td>
<td>1922</td>
<td>1918</td>
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<td>Wilson, H. M.</td>
<td>Asst. Supvr. Str. P. R. R.</td>
<td>Chicago, Ill.</td>
<td>1922</td>
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<td>Wintoniak, S. G.</td>
<td>Supvr. Str. P. R. R., Chicago, Ill.</td>
<td>1922</td>
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<td>Wistrich, H. A.</td>
<td>Ch. Engr., L. V., Bethlehem, Pa.</td>
<td>1922</td>
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<td>Wohlschlaeger, M. A.</td>
<td>Asst. Engr., M. P.</td>
<td>St. Louis, Mo.</td>
<td>1922</td>
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<td>Wood, R. E.</td>
<td>Supvr. B. &amp; B.</td>
<td>G. N., Great Falls, Mont.</td>
<td>1922</td>
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<td>Woodward, J. D.</td>
<td>Supvr. Str. P. R. R., Altoona, Pa.</td>
<td>1922</td>
<td>1918</td>
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<td>Woolford, F. R.</td>
<td>Ch. Engr., W. P., San Francisco, Calif.</td>
<td>1922</td>
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<td>Wray, H. O.</td>
<td>Sec. &amp; Ch. Engr., T. C. Term., Texas City, Tex.</td>
<td>1922</td>
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<tr>
<th>Name</th>
<th>Position</th>
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### B

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<tr>
<td>Batey, W. A.</td>
<td>(Ret.), Const. Engr., U. P.</td>
<td>4303 South St., Lincoln Neb.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
</tr>
<tr>
<td>Benjamin, H. I.</td>
<td>(Ret.), Vice Chair. Sys. Com. on Ins., S. P.</td>
<td>San Francisco, Calif.</td>
<td>1922</td>
<td>1918</td>
<td>1938</td>
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<td>Bost, M. A.</td>
<td>(Ret.), Asst. Engr., C. M. St. P. &amp; P.</td>
<td>322 S. Carolina, Mason City, Iowa</td>
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Cota, G. M., (Ret.), Ch. Clk. Engr. Dept., C. of V., Box 114, St. Albans, Vt. ....... 1913

D

Decker, H. H. (Ret.), Engr. of M., C. & N. W., 2915 Ingersoll Ave., Des Moines, Ia. 1908

E

Engman, V. E., (Ret.), Ch. Carp., C. M. St. P. & P., 3429 - 17th Ave., So., Minneapolis 7, Minn. ......................... 1920

G

Glander, A. M., (Ret.), Ch. Carp., C. M. St. P. & P., 2008 Lake Shore Dr., Austin, Minn. .............................................. 1936

H

Hand, G. W., (Ret.), Asst. to Pres., C. & N. W., 412 Courtland Ave., Park Ridge, Ill. 1909
Harding, C. R., (Ret.), Pres. The Pullman Co., Easton, Md. ......................... 1924
Harman, W. C., (Ret.), Supvr. B. & B., S. P., 656 Cedar St., San Carlos, Calif. ................................. 1911
Heiszenbuttel, H., (Ret.), B. & B. Supvr., C. & N. W., 808 So. 3rd St., Norfolk, Neb. 1917
Hemstad, B., (Ret.), Mast. Carp., G. N., 1120 Becker Ave., West, Willmar, Minn. 1937
Huntsman, F. C., (Ret.), Asst. Eng., Wabash, 7421 Bruno Ave., St. Louis 17, Mo. 1922

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Koch, H. L., (Ret.), Supvr. B. & B., N. Y. C. & St. L., 637 Main St., Conneaut, Ohio ... 1922

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Lacher, W. S., (Ret.), Secretary, A. R. E. A., 407 E. Fuller Rd., Hinsdale, Ill. .... 1922
Lampson, W., (Ret.), Supvr. B. & B., M. C., 170 Caleb St., Portland, Me. .... 1930
Larsen, H. C., (Ret.), Str. Iron Fore., C. St. P. M. & O., 1084 Sims Ave,
St. Paul 6, Minn. .................................................. 1928
Lord, H. T., (Ret.), B. & B. Mast., C. P., 415 Third St., So., Kenora, Ont., Canada ... 1940

Mc

McKay, A. G., (Ret.), Supvr. B. & B., N. Y., N. H. & H., 11 Pine Island Road,
Jupiter Pt. Groton, Conn. ........................................... 1915
McMahon, T. D., (Ret.), Arch., G. N., 223 Lake Avenue, White Bear Lake 10, Minn. ... 1918

M

Madson, H. C., (Ret.), Draftsman, C. & N. W., Ames, Iowa .... 1940
Manley, B. F., (Ret.), Supvr. B. & B., P. E., Los Angeles, Calif. .... 1916
Mead, E. L., (Ret.), Div. Engr., C. & N. W., 536 N. E. 69th St., Miami, Fla. ... 1923
Merwin, P. B., (Ret.), Asst. Engr., C. & N. W., Rte. 2, Box 565, Washougal, Wash. ... 1929
Highland Pk., Ill. .................................................. 1916
Mottier, C. H., (Ret.), Vice Pres., I. C., Chicago, Ill. .... 1942

N


O

O'Brien, W. J., (Ret.), Dist. Carp., C.M.St.P. & P., Juneau County, Necedah, Wis. ... 1919

P

Parker, W. V., (Ret.), Gen. Fore. B. & B., St. L. S. W., R. R. #1, Box 122,
Arlington, Tenn. .................................................. 1911
Patenaude, E., (Ret.), B. & B. Mast., C. P., 133 John St., Sturgeon Falls, Ont., Can. ... 1930
Chapultepec, Mexico City, Mex. .................................. 1923
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Shobert, F., (Ret.), Sys. Steel Const. Fore., S. P., Castro Valley, Calif. 1918
Smith, C. E., (Ret.), Vice Pres., N. Y. N. H. & H., 282 Prospect St., New Haven, Conn. 1911
Wait, R. E., (Ret.), Supvr. B. & B., Wabash, 1638 N. Maple, Decatur, Ill. 1923
Walden, W. H., (Ret.), Rdman., Southern, 1012 Porter St., Richmond 24, Va. 1920
Whitehouse, B. M., (Ret.), Ch. Fire Insp., C. & N. W., 2008 Isabella St., Evanston, Ill. 1927
Winkelhaus, L. C., (Ret.), Arch. Engr., C. & N. W., 6921 Oriole Ave., Chicago 31, Ill. 1934
Womeldorf, C. F., (Ret.), Div. Engr., C. & N. W., 111 No. 12th St., Norfolk, Neb. 1917
Wright, C. W., (Ret.), Mast. Carp., L.I., 67 Nassau Pkwy., Oceanside, N. Y. 1908
Yewell, J. E., (Ret.), Ch. Engr., B. & L. E., Greenville, Pa. 1941
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Akers, R. H., RR. Sls. Mgr., Armco Drainage & Metal Prod., 1516 Keith Bldg.,
Cleveland 15, Ohio ................................................................. 1958
4345 Lyndale Ave., N, Minneapolis, Minn. ................................. 1958

B

Baker, D. L., Vice Pres. & Treas., Baker & Hickey Co., P.O. Box 5008, Tri Village
Sta., Columbus 12, Ohio ............................................................ 1946
San Antonio 5, Tex. ....................................................................... 1958
Bishop, D. B., Dist. Mgr., Dearborn Chemical Co., 2 Gateway Center,
Pittsburgh 22, Pa. ................................................................. 1946
Boo, A. K., Sales, Bethlehem Steel Co., Prudential Bldg., Chicago, Ill. .... 1956
Baltimore, Md. ............................................................................ 1947
Boulton, C. R., R. R. Contractor, 10 E. Town St., Columbus 15, Ohio ...... 1946
Brennon, L. D., M. of W. Instr., Air Reduction Sales Co., 620 King Drive,
Pine Lake, Ga. ............................................................................. 1950
Brietzke, W. F., Mgr. R. R. Mach., Pettibone Mulleniken Corp., 4710 W. Division St.,
Chicago 51, Ill. ................................................................. 1956
Bryant, C. E. Jr., Johns-Manville Sls. Corp., 22 E. 40th St., New York, N. Y. 1951
San Antonio 5, Texas .................................................................... 1956
Chicago 10, Ill. ............................................................................ 1956
Omaha 2, Neb. ............................................................................ 1949

C

Clark, H. Jr., Mgr. R. R. Sls., Armco Drainage & Metal Products Co.,
20 N. Wacker Dr., Chicago, Ill. ..................................................... 1953
Clarke, R., American-Marietta Co., P. O. Box 391, La Grange, Ill. ....... 1948
Cummins, C. P., Bridge Engr., St. L. Co. Div. of Hiways, Clayton, Mo. .... 1948

D

Davidson, T., Asst. Mgr., Globe Chemical Company, 80 E. Jackson Blvd., Chicago, Ill. 1955
Davis, V. W., Mgr. RR. Sls., Armco Drainage & Metal Prod. Inc., P. O. Box 1343,
Atlanta, Ga. ............................................................................ 1956
Denton, J. H., Sls. Engr., Southern Amiesite Asphalt Co., 3401 5th Ave., N.,
Birmingham, Ala. ........................................................................ 1958
Detzel, G. E., Geo. E. Detzel Co., 2303 Gilbert Ave., Cincinnati, Ohio .... 1945
Deubel, H. R., Mgr. RR. Div., Chicago Pneumatic Tool Co., 936 E. 87th St.,
Chicago 19, Ill. ........................................................................... 1956

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Eckert, F. L., Schramm Inc., West Chester, Pa. .................................... 1958
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G

Gibboney, J. L., Vice Pres., Nat'l. Aluminate Corp., 422 No. Dover St., La Grange Park, Ill. 1949
Giles, J. M., Spl. Repr., Off-Track Equip., Caterpillar Tractor Co., Peoria 8, Ill. 1938

H

Haak, W. A., Industrial Sales, Alban Tractor Co., Inc., 8531 Pulaski Highway, Baltimore 6, Md. 1957
Hickey, J. F., Pres., Baker & Hickey Co., P. O. Box 5008, Tri-Village Sta., Columbus 12, Ohio 1946
Hoffman, T. E., Factory Rep., Zone Co., 2502 Wilson St., Falls City, Nebr. 1949
Holderman, H. L., Sls. Repr., Bird & Son, Inc., 203 S. West Ave., Elmhurst, Ill. 1951
Holmberg, V. V., Vice Pres., The Ellington Miller Co., 25 E. Jackson Blvd., Chicago 4, Ill. 1942
Holmes, J. L., Rep., Bird & Son, Inc., 721 Second Ave., West Haven, Conn. 1956
Holstein, F. W., Ry. Supply & Engineering, Hopatcong, N. J. 1948

I

Itter, R. C., Sls. Corresp., Pettibone Mulliken Corp., 4710 W. Division St., Chicago 51, Ill. 1957

J

Johnson, I. K., 3958 N. 54th St., Milwaukee, Wis. 1953
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SECTION MOTOR CARS
GANG MOTOR CARS
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K

Kelly, R. J., Kelly System Inc., 422 N. Western Ave., Chicago, Ill. 1958
Kizak, S. F., Dist. Slsman, National Painting & Oil Co., 5401 S. Laflin St., Chicago, Ill. 1956

L

Chicago 1, Ill. 1946
Lipscomb, W. P., Mgr. RR. Sls., Armco Drainage & Metal Prod., Inc., P. O. Box 1699,
Houston, Texas 1956
Loffler, J. S., R. R. Sls. Mgr., Armco Drainage & Metal Prod., Inc., 4345 Lyndale
Ave., N., Minneapolis, Minn. 1955
Birmingham 3, Ala. 1956
Lyons, C. A., Reg. Mgr., Master Builders Co., 16420 W. Seven Mile Road,
Detroit, Mich. 1945

M

McDaniel, W. L., American-Marietta Co., 101 E. Ontario St., Chicago, Ill. 1945
Mann, E. A., Pres., Champion Transportation Sls., Inc., 222 W. Adams St.,
Chicago 6, Ill. 1951
Maurer, S. S., Western Div. Mgr., Fabreeka Prod. Co., 325 W. Huron St.,
Chicago 10, Ill. 1952
Chicago 16, Ill. 1952

N

Chicago 10, Ill. 1958

P

Parke, J. R., Salesman, Pacific Coast Borax Co., Wilford Bldg., 33rd & Arch St.,
Philadelphia, Pa. 1956
Patterson, R., Const. Consul., 80 E. Jackson Blvd., Chicago 4, Ill. 1946
Patton, R. C., Roy C. Patton Co., 3416 Silver Palm Rd., Jacksonville Beach, Fla. 1952
Phillips, R. O., Asst. to Pres., The Zone Co., Fireplate Div., P. O. Box 789,
Fort Worth, Texas 1956
Piepmeier, A. L., Vice Pres., Turner Engineering Co., 112 Union St.,
Nashville 3, Tenn. 1951
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Metal Prod., Inc., Curtis St., Middletown, Ohio ..................................... 1958

Houston, Texas .......................................................................................... 1956
Scott, J. M., Sls. The Arco Co., 614 Delaware St., Scranton 9, Pa. ................. 1945
Scruggs, J. E., Mgr. R. R. Dept., Carter-Waters Corp., 2440 Pennway,
Kansas City, Mo. .......................................................................................... 1945
Pittsburgh 19, Pa. ....................................................................................... 1958
Smith, F. C., R. R. Dept., Marsh & McLennan, Inc., 231 S. LaSalle St. Chicago 4, Ill. 1948
Smith, Wm. T., Vice Pres., Geo. E. Detzel Co., 2303 Gilbert Ave., Cincinnati 6, Ohio 1950
Stiles, C. C., Vice Pres., The Zone Co., 917 N. Main, Ft. Worth, Texas ........... 1957

Thoresen, H. B., Sales, Globe Chemical Co., 80 E. Jackson Blvd., Chicago, Ill. 1955
Truss, F. W., Mgr., RR. Sales, Armco Drainage & Metal Prod. Inc., 10 S.
Brentwood Blvd., Clayton 5, Mo. ................................................................. 1946
Twomey, J. F., Vice Pres., McCracken Contracting Co., 7340 S. Western Ave.,
Chicago, Ill. ................................................................................................. 1956

917 N. Main St., Ft. Worth, Texas ............................................................... 1949

Van Wolf, A. F., Gen. Mgr., General Concrete Restoration Corp.,
330 S. Dearborn St., Chicago, Ill. ............................................................... 1955
Von Kampen, K., Ch. Eng., Pettibone Mulliken Corp., 4710 W. Division St.,
Chicago 51, Ill. ........................................................................................... 1956

Walters, W. R., 1535 Rand Tower, Minneapolis, Minn. ............................... 1949
Weiss, W. E., Sls. Eng., Pettibone Mulliken Corp., 4710 W. Division St.,
Chicago 51, Ill. ........................................................................................... 1956
Wicker, W. S., Ch. Engr., Transportation Mutual Insurance Co.,
150-10th Street, N.E., Atlanta 5, Ga. ............................................................ 1953
Chicago 43, Ill. ........................................................................................... 1957
Williams, C. B., Pres., Ever Tight Bolt Assembly Co., 238 Lincoln Ave.,
Council Bluffs, Ia. ......................................................................................... 1954
Williams, G. S., Supt., Southern Amiesite Asphalt Co., Inc., 3401 5th Ave. No.,
Birmingham, Ala. ......................................................................................... 1956
Wingerson, C., Ry. Sls. Engr., Pittsburgh Screw & Bolt Corp., P. O. Box 1708,
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Culvert Pipe - Flatbase Pipe - Cribbing

Relay Houses - Battery Boxes - Signal Foundations
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<th>Membership by Roads</th>
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**Louisville & Nashville**

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<td>Currier, L. F.</td>
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<td>Forman, H. C.</td>
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<td>Hotard, A. E.</td>
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<td>Lackey, J. B.</td>
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<td>McGee, M. A.</td>
<td>Reed, T. C.</td>
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<td>Sellers, J. B.</td>
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**Maine Central**

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<td>Born, J. O.</td>
<td>Lampson, W.</td>
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<td>Dixon, C. E.</td>
<td>(Ret.) Manter, E. E.</td>
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**Minneapolis, St. Paul & Sault Ste. Marie**

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<td>Gannon, J. P.</td>
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<td>Krefting, A. S.</td>
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**Minnesota Mining & Mfg. Co.**

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<td>Howard, P. D.</td>
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**Missouri-Kansas-Texas**

(Inc. M. K. T. of T.)

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<tr>
<td>Carter, T. S.</td>
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<td>Cummins, C. P. (Ret.)</td>
<td>Huckaby, V. T.</td>
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**Missouri Pacific**

(Incl. I. & G. N.)

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<td>Anderson, J. L.</td>
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<td>Bach, S. A.</td>
<td>Mayfield, L.</td>
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**Monon**

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**Monongahela Connecting**

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**National Railways of Mexico**

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<td>Piccone, C.</td>
<td>(Ret.)</td>
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Garland, E. F.

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<tr>
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<td>Weeks, A. H.</td>
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Koch, H. L. (Ret.)       Milne, A. P.
MckKenney, C. E.         Moris, R. F.
Merrill, B. W.           Singer, E. W. (Ret.)

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Boling, E. C.            McIver, J.
White, J. A., Jr.

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Morris, C. R.            Wiemer, H. C.
Wold, O. R.

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Harman, C. A.
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Langan, G.
Laurick, M. J.

McKibben, D. H.
Mays, J. W. N.
Meredith, W. E.
Montague, C. F.
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Warfield, W. B.
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Woodward, J. D.

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Reading Company

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| **Southern Pacific** |
| (Incl. T. & N. O.)  |
| Baker, F. A.        |
| Benjamin, H. I. (Ret.)|
| Black, A. R.        |
| Brown, G. W.        |
| Bush, R. H.         |
| Camelle, E. J.      |
| Cooledge, V. R.     |
| Crane, J. C.        |
| David, J. J.        |
| Erickson, O.        |
| Fest, C.            |
| Gogl, E. U.         |
| Haase, E. H.        |
| Hagenmaier, C. E.   |
| Harman, W. C. (Ret.)|
| Harwood, M. S.      |
| Howard, W. A.       |
| Hutchings, V. W.    |
| Jackson, T. E.      |
| Jarratt, M.         |
| Kelly, G. E.        |
| Lehman, H. G.       |
| Lyon, L. E.         |
| McDermott, A. A.    |
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| Latimer, J. A.      |
| Leak, V. L.         |
| McDonald, J. W.     |
| Matthews, H. A.     |
| Meeth, P. W.        |
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Sverdrup & Parcel Engineering Co.
Engineers-Architects
915 Olive Street St. Louis 1, Mo.
<table>
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<th>No.</th>
<th>Place of Meeting</th>
<th>Date</th>
<th>Membership</th>
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