A MODERN EMPIRE BUILDER

RALPH BUDD

by

Stanley Huntington Barriger

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Signature redacted

Signature of Author.....

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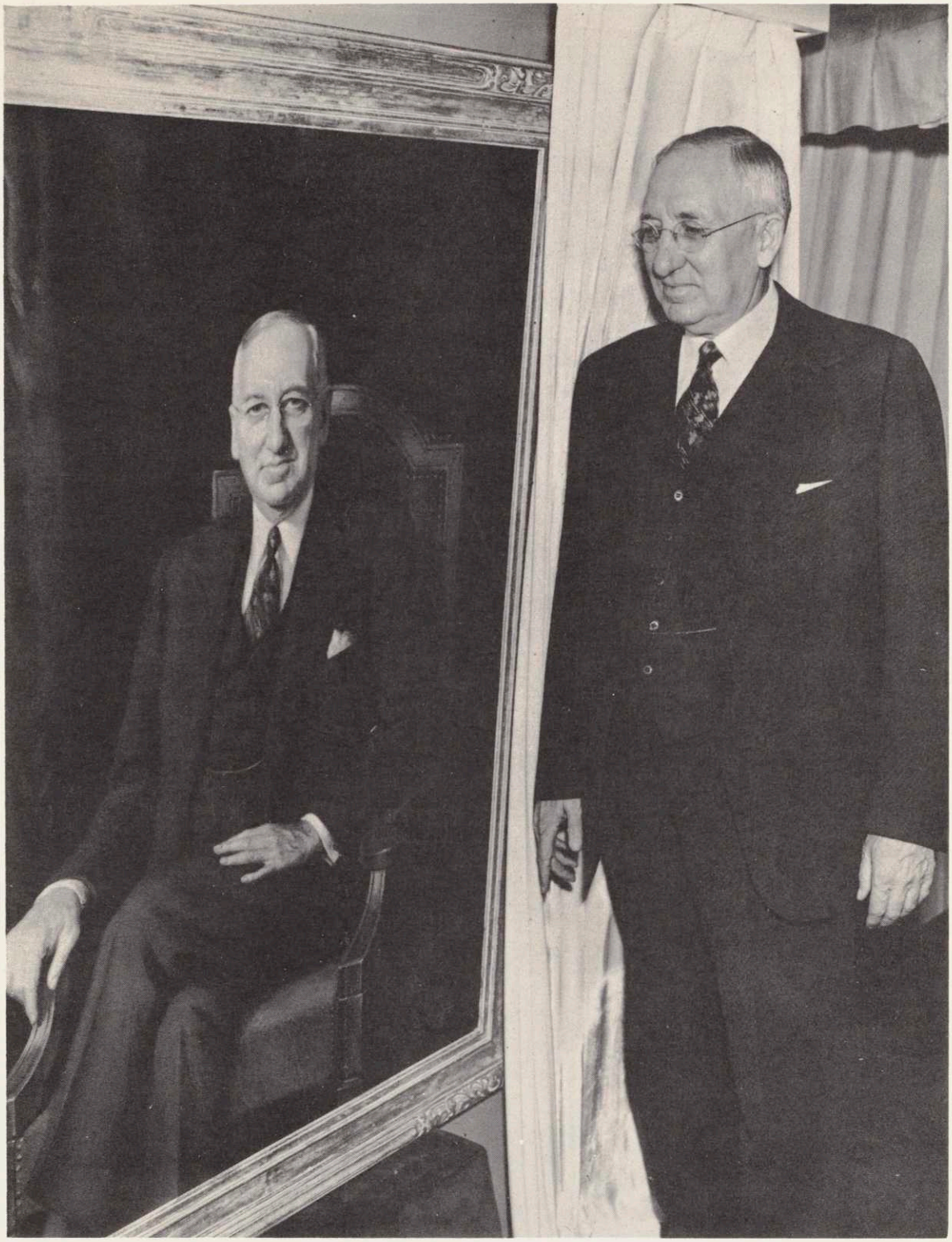
Certified by.....
(Faculty Advisor of Thesis)



Ralph Budd, with portrait by John Docktoroff presented to him at testimonial dinner on Ralph Budd Day, Aug. 31, 1949, at Harbor View restaurant at Chicago Railroad Fair.

A TWENTIETH CENTURY EMPIRE BUILDER

RALPH BUDD

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M.I.T. Dormitory - East Campus
3 Ames Street
Cambridge 39, Mass.
May 20, 1955

Professor Leicester F. Hamilton
Secretary of the Faculty
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dear Professor Hamilton:

In fulfillment of the Institute's requirements for the degree of Bachelor of Science, I submit herewith a thesis entitled "A Modern Empire Builder; Ralph Budd."

In doing so, I wish to thank those friends who cooperated, in many ways, in the preparation of this biographical study. Primarily, I am indebted to Mr. Ralph Budd, himself, for approval of this use of his career as a thesis subject and for his constant and patient helpfulness which was invaluable.

A number of the general and division officers of the Great Northern and Burlington Railroads also extended their assistance through answering questions, making data available or referring me to sources of material. Likewise, they afforded me desk space in the railways' offices in St. Paul and Chicago, respectively, access to files and engineering records and opportunities to consult with members of the organization.

Mr. John M. Budd, President of the Great Northern, arranged for me to ride a freight train from Wishram, Washington, to Keddie, California, over the Oregon Trunk (Spokane, Portland & Seattle Railway), Great Northern and Western Pacific Railroads. This permitted me to see lines which figure prominently in two chapters of this narrative but are routes not served by passenger trains.

During the past year, I have made trips of observation over the Great Northern between the Twin Cities and Lake Superior and the Pacific Coast, and over the principal lines of the Burlington and its affiliated Colorado & Southern from Chicago to Montana, Colorado and Texas. These travels enabled me to familiarize myself more thoroughly with the railroad background of the man about whom I would write. The assistance of those who cooperated with the plans and purposes of these journeys at headquarters and along the way was of great service in the preparation of this report.

A complete list of all who aided in one way or another would extend over several pages, and then probably omit a number of persons whose names might not now be recalled but who helped me at the time.

However, those who did most for me and, therefore, to whom I feel the deepest debt of gratitude, in addition to Mr. Ralph Budd, are:

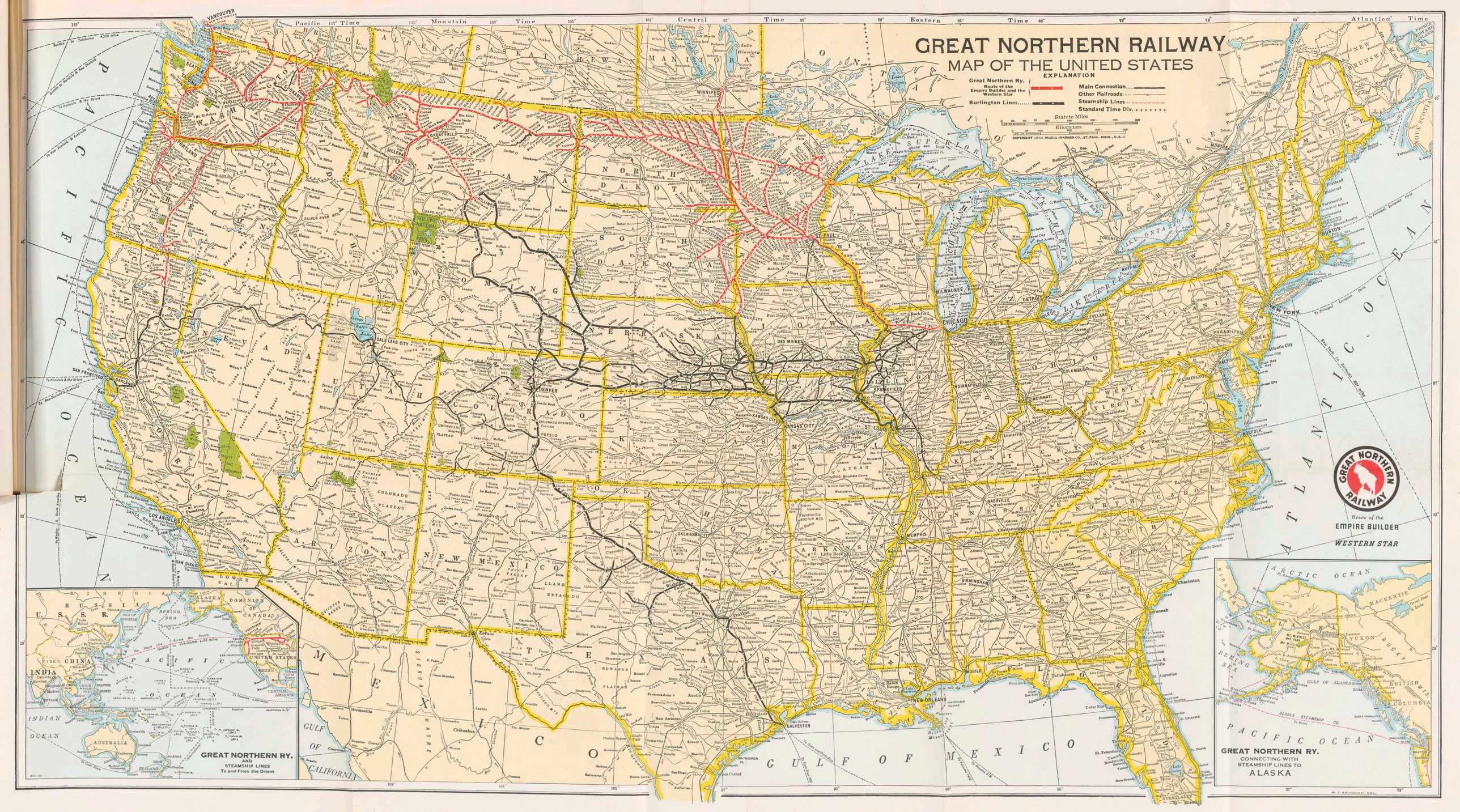
Messrs. J. M. Budd, President, Great Northern Railway, St. Paul, Minn.
V. P. Turnburke, Vice President, Great Northern Railway, St.Paul, Minnesota
C. W. Moore, Executive Assistant - Public Relations & Advertising,Great Northern Railway, St. Paul, Minn.
W. B. Irwin, Assistant to Vice President - Operation, Great Northern Railway, St. Paul,Minn.
E.F. Oviatt, now Superintendent, Mesabi Division, Great Northern Railway, Superior, Wisc., but Superintendent Klamath Division, Klamath Falls, Oregon, when I made my trip last year.
H. C. Murphy, President, Burlington Lines, Chicago, Ill.
B.Henry, Secretary to President, Burlington Lines, Chicago,Ill.
H. A. Aalberg, Chief Engineer, Burlington Lines, Chicago, Illinois (now retired)
Mrs. Grace Flandrau, Farmington, Connecticut.

Here at MIT, the Research Staff of the Engineering Library were patient in assisting me to locate the works of reference available therein that contained many items necessary to connect and supplement the various subjects comprising the main theme of this thesis which was developed in broad outline during my travels and related work in the summer of 1954.

Yours respectfully,

Signature redacted

Stanley H.Barriger


GREAT NORTHERN RAILWAY
MAP OF THE UNITED STATES
EXPLANATION
Great Northern Ry. Route of the Empire Builder and the Western Star
Burlington Lines
Main Connection
Other Railroads
Steamship Lines
Standard Time Div.
Statute Miles
Kilometers
COPYRIGHT 1952 McGILL-WARNER CO., ST. PAUL, MINN., U. S. A.
Pacific 117° Time
Mountain 105° Time
Central 97° Time
Eastern 85° Time
Atlantic 69° Time
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO
GREAT NORTHERN RAILWAY
Route of the
EMPIRE BUILDER
WESTERN STAR
GREAT NORTHERN RY.
AND
STEAMSHIP LINES
To and From the Orient
GREAT NORTHERN RY.
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ALASKA
ALASKA STEAMSHIP CO.
M. J. BRINDHEM DEL.

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A MODERN EMPIRE BUILDER
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A THESIS
By Stanley H. Barriger

INTRODUCTION

If college education fulfills its larger purposes, young people entering the years that lie beyond the classroom will realize that their training for life must be prolonged continuously through their work and the associations which it provides. Just as one chooses schools for the traditions of leadership and the quality of their teaching, in the same manner, graduates should give first consideration, in the selection of future employers, to organizations, large or small, which are managed by men possessing the stamp of outstanding character and ability.

A deep interest in railroads and a father in the railroad business have brought me acquaintances with many railroad men. In this way, and through travel and study, I have learned of the achievements of the leaders of this great industry.

While many of these fine men have impressed me deeply, one individual stands out among the rest: Mr. Ralph Budd, President of the Great Northern, 1920-1931, and of the Burlington, 1932-1949. I have frequently heard my father and others say that the greatest opportunity a young man could have had would be to serve under and be trained by Mr. Ralph Budd. Look at the number who did that are railroad presidents today; his own son, John - Great Northern; his Burlington successor,

Harry C.Murphy; F. G.Gurley of the Santa Fe; F. B.Whitman, Western Pacific; J. D. Farrington, Rock Island; and A. E. Perlman, New York Central. Reference to Mr. Budd's junior associates who became railroad presidents is also a reminder of the late Duncan J. Kerr. (1) Mr. Kerr left the Operating Department of the Great Northern in 1936 to go to the Lehigh Valley. A year later he was elected president of that road but died in 1940 after a long illness.

Since differences in years make it impossible for me to work for a company run by Mr. Budd, the most effective substitute is to use his career as the subject of my M. I. T. thesis. Learning of the details of his long, useful and busy life will have educational value through bringing me an informed understanding of the projects with which he was successfully identified and the manner in which he met the problems that arose as he advanced through the years. Writing this biographical sketch allows me, in effect, to walk with Mr. Budd through the episodes narrated herein.

Emerson observed that every institution is but the lengthened shadow of a man. The great mantle of James J. Hill, fell upon a worthy successor in Ralph Budd. The latter carried forward to heighths of still greater achievement the fine traditions of engineering, management and development which epitomized the work of the "Empire Builder" in the Great Northern and the Burlington and their affiliated properties. These two systems now personify Mr. Budd through his direct accomplishments and

(1) He visited in our home and we in his. Although a very little boy at the time, I can still remember Mr. Kerr's summer house on Echo Lake in the Flathead Valley near Glacier Park.

those of the men whom he trained, even more than do their original creators.

Acknowledgments of gratitude are made to Mr. Ralph Budd, for his patience in outlining the details of facts, events and background set forth in the following pages. Likewise, I am under a deep debt of obligation to the present President of the Great Northern, Mr. Budd's younger son, Mr. John M. Budd, and to Mr. Budd's successor as the President of the Burlington, Mr. Harry C. Murphy. Both have given me their assistance personally or indirectly through the cooperation of members of their organization. The pleasure and interest of this assignment has been increased by their consideration and friendship. This foreword carries my lasting thanks to all in the Great Northern and the Burlington who have assisted me in fulfilling this assignment.

In mentioning those to whom I am indebted in the preparation of this report over the past year, perhaps I should mention that the beginnings of its preparation probably started when I was a young boy. The heroes in my father's home were less the men of history and of the Bible, although the great names associated with each were often heard, than railroad men -- both those living ones who were then running railroads and those no longer living who had helped create the present systems.

My earliest recollections center around hearing my father talking both with his friends and to his family about the innumerable subjects associated with railroads. While most children's acquaintances with names outside their neighborhood began with the characters in Mother Goose and nursery classics, my brother's and mine began with James J.Hill, E. H. Harriman, A. J. Cassatt, Commodore Vanderbilt and the railroad presidents

of 1935-1950. Then when I first became aware of the travels I was making, I heard about grades and curves, yards, terminals and signals. These terms first began to make an impression upon me when all I knew about a railroad was to call it a "choo choo."

I wish to mention here my debt to my father for beginning to explain the significance of "ruling grades", "prior classifications", the technique of train dispatching, the functioning of air brakes and signals and interlockings, and the endless array of subjects which enter into railway operation and traffic while I was a very little boy -- and for patiently supplementing all of these things by showing them to me in practice or action in actual railway work, from the outset of my life. Fifteen years of this type of railway education accompanied by continuous and extensive travel throughout the United States have made me become gradually aware of how railroad history explains much of the technical, commercial and corporate development of the railroads and permits one to understand better both the accomplishments and the inadequacies of modern systems.

Railroad history is largely a story of the achievements of the many able men, who for more than a century of development have been pouring forth their creative genius and courage into the betterment of railway properties and equipment and organizing ways to use these improvements to haul freight and passengers faster and more economically. There are a great many names which would deserve a place in railroading's "Hall of Fame", if there were such a place. However, among the industry's "Immortals", the greatest of those who lived during the present

generation is Ralph Budd. If a vote could be taken on such a subject among railroad men it would be virtually unanimous.

Ralph Budd has always seemed to me to have done more to have advanced the science of railroading, through his own work and the leadership which he has supplied in helping develop other great railroad men, than any other single living man. He deserves a place in the history of the railway industry alongside that of its founder, George Stephenson. While Mr. Budd's work is not related to a single-handed epoch making development, such as the successful adoption of the steam engine to land transportation, the beneficial effect of his progressive mind and personality upon every phase of modern railroading, and particularly in the case of the diesel locomotive, justifies this claim.

Mr. Budd has earned a high place in railroad history and in the affections of railroad men, but little has been written about his life and its achievements. If this brief narrative may assist in providing his many admiring friends a broader acquaintance with the events of his career and stimulate some one to make a thorough study of his life and work, and write an authoritative biography of him, this thesis will have achieved a purpose far beyond its deserts.(2) The purpose which prompted me to write it was only to inform myself of the principal details of his career through a systematic compilation of some of them.

The idea of writing an account of Mr. Budd's life probably began

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(2) This might most appropriately be done by the historian of the Burlington and the biographer of its founders, Prof. R. C. Overton, formerly on the faculty of Northwestern University, Evanston, Illinois, but soon to become associated with the state university of his beloved Vermont and at Burlington, by happy coincidence.

six years ago, even though the definite intention of doing so did not occur to me until last year. The 1949 season of the Chicago Railroad Fair provided a particularly happy and interesting summer for me. I had a job turning the San Francisco cable car (one of my favorite means of transport) at the Western Pacific Railroad's exhibit. Every Saturday I worked until after midnight, too late to go home to Winnetka. This provided an opportunity to go to the Chicago Club for the night. Mr. Budd was living there at the time and I usually had breakfast with him alone. He had time to talk to me and these conversations with him were of lasting interest. He told me, as an older man often will relate to a boy, the important incidents in the senior's early life.

This thesis only gives expression to the information and inspiration I gained from Mr. Budd during those happy summer morning visits with him and the others which have followed since.

R A L P H B U D D

A TWENTIETH CENTURY EMPIRE BUILDER

CHAPTER I

EARLY YEARS

Ralph Budd's career literally began with the opening of the twentieth century for he entered railway service, with the Chicago Great Western Railway about January 1, 1900. He was then not yet 21 years of age. A half century later, having passed his seventieth birthday ten days before, he relinquished the Presidency of the Burlington on August 31, 1949. Five years of public service followed as Chairman of the Chicago Transit Authority. On June 15, 1954, he retired completely from business life. He and Mrs. Budd established their residence temporarily at Grey Eagle, Minnesota. This little town is near the better known community of Sauk Centre, a station on the Great Northern Railway, which his son, John, has served as President since 1952, as he did between 1920-1931. Recently, Mr. and Mrs. Budd moved to Santa Barbara, California, where they have purchased a house at 3514 Los Pinos Drive, and will make this delightful Pacific Coast City their permanent home. However, his continuing responsibilities as a Director of the Chicago, Burlington & Quincy Railroad Company, and International Harvester Corporation make him a relatively frequent visitor to Chicago, where he retains many close friendships among the leading citizens of that great city in which he lived for nearly a quarter of a century.

* * * * * *

On January 1, 1900, there were nearly two hundred thousand miles of railways in the United States. All had been built during the previous seventy years. Within the next quarter of a century, this total would be pushed beyond the quarter of a million mark (before falling back to 225,000 miles now.)

A long period of rapid promotion and building of new lines, which had averaged twenty miles per day throughout the decade of the '80s and continued high during the '90s was tapering off about the time Ralph Budd began railway work. While he was identified with a number of significant projects on construction of strategic railway mileage, his outstanding achievements center around the improvement of railway property and equipment and the development of the officers and organizations who run them. Taking all of his work together, Mr. Budd has accomplished as much as any one man has done to advance rail service and efficiency to continuously higher standards.

Mr. Budd became associated, in the opening decade of his business life, with two of America's greatest railway men, James Jerome Hill, "The Empire Builder" (1838-1916), and John F. Stevens (1853-1943) pathfinder for both Canadian Pacific and Great Northern and constructor of the Panama Canal. Mr. Budd modestly attributes his success to his early associations with these distinguished men. The opportunity of working with them was undoubtedly a significant factor in shaping his career and accelerating his attainment of success. However, many other railway men of that period were also closely identified in business relationships with

Messrs. Hill and Stevens. It remained for Mr. Budd alone among them to achieve high position, international prestige and a permanent place in railroad history's "Hall of Fame." He was acclaimed the outstanding railroad man of his day and generation. This position was gained on merit alone, through his own superior qualities of mind, character and personality. These attributes when coupled with industry, loyalty and perseverence, led steadily onward and upward. Mr. Budd brought success to every enterprise with which he was identified and in so doing gained happiness and renown for himself.

The American chronicles of the Budd family begin in the 17th century. Four brothers emigrated from England to a part of the British colony of New Jersey which is included within Burlington County, in the present state. There they established their own "Buddtown". Other well known families of the same surname; Edward G., of Philadelphia, and possibly Britton I., of Chicago, also trace their lineage to these ancestors.

Ralph Budd's paternal grandfather, Charles James Budd, was born in Buddtown, New Jersey, on July 16, 1802. His parents were William and Sarah (Croshaw) Budd. As a young man he followed the trail of emigration across the Alleghenies into Ohio and settled near Salem where he worked at the cabinet makers trade. On November 27, 1827, Charles James Budd married Esther Beulah Scroggy. This event in his life took place in the little town of Franklin Square, Columbiana County, Ohio. His wife, like himself, had come from Burlington County, New Jersey, where her parents had been residents of its Northampton Township.

There she had been born on August 23, 1809 to Job Rogers and

Elizabeth (Dalton) Scroggy). During their married lifetime, Mr. and Mrs. Charles James Budd lived at Franklin Square, Ohio, at Holy Cross, Dubuque County, Iowa, and in Waterloo, Blackhawk County, Iowa. They had nine children whose births and deaths are recorded below:

William S.	Born	December 10, 1829, died August 1, 1901 (unmarried)
Job Jones	"	June 26, 1831, died March 4, 1900 (married) Elizabeth Catherine Atcheson
Sarah A.	"	August 7, 1833, died October 29, 1855
Ann S.	"	January 13, 1837, died November 4, 1843
Charles Wesley	"	August 7, 1839, died March 30, 1917 (married) Mary Ann Warner
James C.	"	April 13, 1843, died April 21, 1866 (unmarried)
Elizabeth C.	"	August 2, 1844, died October 19, 1913 (married) Josiah Lichty
John C.	"	September 25, 1847 (married) Sarah Jane Wheeler
Etta A.	"	December 23, 1850, died April 26, 1924 (married) Milton Noggles

Esther Beulah Budd died on February 4, 1866 and her husband, Charles James Budd, on April 21, 1881. Both lie buried in Waterloo, Iowa, the principal community of Blackhawk County.

The fifth child of Charles James and Esther Beulah Budd was Charles Wesley Budd, who was born in Ohio in 1839. Forty years later, in 1879, he became the father of Ralph Budd. In 1854, when this son was 15 years old, his parents and their seven other living children, moved to Iowa, settling first on a farm in Dubuque County and a few years later near the little town of Washburn. The latter community is located seven miles southeast of Waterloo, on the route of what was then the Burlington, Cedar Rapids and Northern Railway, but since 1902 has been a component of the Rock Island Lines.

After moving to Iowa, Charles Wesley Budd was educated at the Epworth Seminary, a Methodist School, located ten miles west of Dubuque.

Shortly after completing his education, and while a young man in his early twenties, Charles Wesley Budd enlisted with the 27th Iowa Volunteers to serve his country in the Civil War. He returned to his Iowa home at the end of that conflict and became, first, a schoolmaster and, later, a farmer. In 1869 at the age of 30, he married Miss Mary Ann Warner, a girl who lived in the neighborhood and whose family had come to Blackhawk County, Iowa, from Maryland. Charles Wesley and Mary Ann Budd purchased a farm near Washburn in Blackhawk County, Iowa. There six children were born to them, three girls and three boys; Ralph, the fourth child, on August 20, 1879.

Young Ralph Budd lived the normal life of an Iowa farm boy, raised in a God-fearing family. This background gave him a keen mind and a resolute, independent character, along with a strong and healthy physique. Young Ralph attended the local grade school. High schools were not then available outside of the larger cities so he went to Des Moines for that part of education, graduating in 1895. He continued his studies at Highland Park College, Des Moines, where he earned his Bachelor's degree in June 1899, through the study of science and civil engineering.

Ralph, then aged twenty, spent the last four months of 1899 teaching mathematics and science at the Oak Park High School in Des Moines. He resigned at the and of the year to enter railway service. This significant change in the direction of his career was to lead forward to the active years and events which will be outlined in this biographical sketch.

CHAPTER II

STARTING A RAILROAD CAREER

Around January 1, 1900, Mr. Budd became a draftsman in the office of the Engineering Department of the Chicago Great Western Railway in Des Moines, Iowa, at a salary of $65.00 per month. He promptly manifested those characteristics of dependability and capacity which would become increasingly recognized as the years progressed. When spring permitted track maintenance to begin, at his request he took a position as instrument man at a salary of $45.00 per month and $30.00 per month expenses while out on the job. His first assignment was to run levels and place center and grade stakes for ballasting of tracks between Des Moines and Oelwein, Iowa. The quality of his work, and his capacity for doing it brought another promotion quickly. Before the summer of 1900 closed, Mr. Budd was appointed assistant engineer with jurisdiction between St. Joseph, Missouri, and Oelwein. This position represented a large measure of responsibility for a young man of 21.

Mr. Budd's services for the Chicago Great Western occurred during the quarter century period (1884-1909) while its promoter and builder, Alpheus B. Stickney, served as President of the Company. Stickney's organization included a number of men who subsequently attained prominence in railway engineering and operation. Mr. Budd found associations with them interesting and helpful. In reminiscing about that period of his life, he refers particularly to three men, Henry B. Merriam, William B. Causey and J. R. W. Davis. All were Division Engineers. This report, being written at the Massachusetts Institute of Technology, prompts

mention of the fact that H. B.Merriam was a graduate, in civil engineering, of its class of 1886.

J. R. W. Davis, in later years, went to the Great Northern and became Chief Engineer. While Mr. Budd was in the employ of the Great Western, Causey resigned in December 1900 to accept the post of Chief Engineer of the Elgin, Joliet & Eastern Railway. This railroad was the Chicago switching and terminal affiliate of the Federal Steel Corporation which had been recently formed by Judge E. H. Gary. Within the next year, Federal Steel would be merged by Gary and J. Pierpont Morgan into the United States Steel Corporation. Mr. Causey invited Mr. Budd to accompany the former to the E. J. & E. but the latter declined since his prospective duties would be limited to maintenance and he was ambitious to gain experience in railway construction. This opportunity came late in 1902. Meanwhile, towards the end of Mr. Budd's first year in railway service, a most important personal event occurred when in December 1900, he married Miss Georgia Ann Marshall of Des Moines, Iowa.

The early years of life are ones of the utmost importance since it is during them that many habits, characteristics and patterns of work and of mind are formed. These inevitably shape the development of future years and determine the measure of success which they bring. Therefore, inquiries were made of Mr. Budd respecting some of the details of his experiences on the Chicago Great Western which stand out most prominently in his memory as factors of principal significance in their influence upon his later career. The installation and use of spirals and of rail of unusual length were among them.

Curves require "super-elevating", or "banking", the outside rail

from one to six inches, depending upon the radius and maximum permissible speed, in order to bring the force of gravity to bear upon the train tilted inward in this manner and thereby offset the centrifugal force tending to throw the train outward. At the point where curved track ends and the straight, or tangent, track begins, early railway engineers were confronted with the problem that the cross section of the tangent track should be level but the immediately adjacent curves required super-elevation. The dilemma was unsatisfactorily resolved by super-elevating the track at the point where the curve began and the tangent ended, half the amount required by the curve. From this point the super-elevation around the curve was increased at the rate of about 1" per 100' until required heighth was attained. Similarly, proceeding in the opposite direction down the tangent from the end of the curve, the super-elevation was decreased in the same proportions until the heighth of both rails became equalized. This was an unsatisfactory, but necessary, expedient. It had the effect of causing the train to lurch inward where super-elevation occurred on straight track but none was needed. Upon reaching the curve and throughout the length of it where the super-elevation was below the required amount, the deficiency caused the train to lurch outward. This uncomfortable sequence of jolts was repeated again at the leaving end of the curve.

The problem of effecting a smooth "transition" from a tangent to a curve of any stated degree and heighth of super-elevation and then return from the curve to the tangent was solved by the use of the spiral. The latter is a curve which has its radius diminish progressively and rapidly from infinity, where the curve flattens into a straight line,

down to that of the "simple", or continuous, curve which takes over where the spiral ends. On the leaving end of the curve, the procedure is reversed. Several different mathematical formula are used to proportion the reduction in the radius of the spiral to its length. In this way, curvature and super-elevation increase or decrease in harmonious progression and trains can operate smoothly around curves laid out with spiraled transitions.

The late Lenor F. Loree (1858-1940) Chairman of Kansas City Southern and President of Delaware & Hudson and one of the railroad industry's great men, writing in his authoritative "Railroad Freight Transportation" (3) outlines the historical background of the development of the transition curve, including his own early work in standardizing practice for its use. The statement is made by Loree that "The entire subject was further developed and published in 'The Transition Curve' by C. L. Crandall in 1893. The same spiral was used by Prof. A. M. Talbot in his publications between 1891 and 1904. While there is but little difference between the curves, the cubic hyperbola and the cubic parabola used in easements, the fact that the former is applied with the transit and the latter by offsets has always made the former seem the most workmanlike job."

Railroads had not been originally built with spiraled curves. Around the turn of the century, the main lines of many progressive companies were being revised to include these easements in the alignment. Doing this effectively and economically required a sound knowledge of the theory and practice of railway engineering and surveying. This

(3) Published by D. Appleton, New York, 1922, See Page 8.

important work on the Chicago Great Western's lines across Iowa and Missouri was entrusted to Ralph Budd and served as an excellent background for the later lengthening of the spirals on the Burlington required for its 100 m.p.h. Zephyrs in 1935.

A subject such as this aroused the intense professional interest of the young engineer who quickly mastered it. He used the spirals that had been computed by Prof. A. M. Talbot of the University of Illinois. Prof. Talbot was prominently identified with the railway engineering experimental laboratory as well as the classrooms of that institution. The breadth and extent of the latter's work together played an important part in the advancement of railway engineering. A mutual interest in the subject of spiral curves soon brought these two men into communication with one another. This led to a long personal and professional friendship that proved of advantage to the railway industry (4) and ended only upon Prof. Talbot's death.

In the instance just outlined, Mr. Budd gained valuable experience through the success of the project upon which he was working. In another significant case, he learned through its unsatisfactory results, although such an outcome was not a failure assignable to him. Rail joints have always been a source of additional maintenance expense, and occasionally of trouble, too. The reduction of their number has, therefore, long been an objective of railway engineers. Standard rail lengths are now 39'. In 1900 they were 30'. For a considerable interim period they were 33'. Great Western made one of the first attempts to utilize rail of

(4) By an interesting coincidence, "The Railway Age" of April 4, 1955 lists the current publication of a newly revised edition of "Talbot's Railway Transition Spiral." It is still the standard authority on the subject.

extraordinary length. During Mr.Budd's period of service with Chicago Great Western as assistant engineer, a considerable quantity of 60' length of 75 lb. section (i.e., weight per yard) was laid on his division east of Des Moines. The alignment contained successions of sharp curves, grades were steep and timber trestles frequent. Moreover, maintenance standards were mediocre, since this was not a prosperous railroad and its budgets for improvements were meagre. Successions of hot Iowa summer days caused an epidemic of sun kinks which threw the track dangerously out of line and required strenuous emergency measures to be taken by the resourceful young assistant engineer to meet the problem of keeping the railroad safe for normal movement of trains. This experience with long rail lengths made Ralph Budd conservative about later proposals to add to the proved conventional dimension.

Another important feature of Mr. Budd's early professional experiences on the Great Western centers around the substitution of permanent masonry culverts, of Mankato stone, for the temporary construction expedients used in the original building of the line. The economics of building for long life early impressed him.

CHAPTER III

THE ROCK ISLAND ENTERS ST.LOUIS

1901 was characterized by great prosperity. Momentous economic expansion occurred and mergers of industrial and railroad corporations flourished. One of the latter events centered around a well known syndicate of railroad promoters of that period comprising William B.Leeds, "The Tin Plate King", (5), the Moore brothers, William H. and James Hobart, and Daniel G. Reid, (6), gained control of Rock Island during that year. An ambitious program of expansion was soon generated. Acquisition and completion of an unfinished line between Kansas City and St. Louis was included among their many projects for that system. Construction under Rock Island direction began in 1902 to permit the operation of trains to start by the middle of 1904, when the opening of the St. Louis World's Fair would make that city the center of a heavy movement of tourists from all over the country.

The projected St. Louis-Kansas City line which the Rock Island had bought bore the name of St. Louis, Kansas City and Colorado Railway. It was purchased from two St. Louis capitalists, David R. Francis and John Scullin. A decade before, the St. L. K. C. & C. Railway had been owned by the Santa Fe which bought it with a similar objective. Custody of this incompleted and inactive affiliate was dropped in the financial reorganization of the parent company's system consummated in 1895.

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(5) A term related to his being the organizer of the American Sheet & Tin Plate Company then just being merged with other companies to form the United States Steel Corporation.

(6) Reid and the Moore brothers were identified with the formation of American Can Company which became an important consumer of tin plate.

When this route was acquired by the Rock Island, the line was completed and in service only between St. Louis and Union, 60 miles. By the end of 1902, Rock Island had extended "the end of steel" to Belle, 45 miles further west.

Early in 1903, Ralph Budd joined the construction forces that were being organized by the Rock Island to hasten extension of the line on west to Kansas City. His initial assignment was that of General Roadmaster but was soon promoted to Division Engineer. Building a railroad was a great experience for the young engineer who gained rapidly in knowledge and capacity not only in respect to engineering and construction, but, most important of all, in the organization and handling of men. Mr. Budd's work embraced varied activities in all of these respects. The line traversed a rugged terrain over most of its length for the routes adjacent to the Missouri River had been preempted by the construction of the earliest railroads across the state. This last of the several railroads necessarily had to find a course well south of the others and in so doing was obliged to cross the northern extremity of the Ozark highlands and run through a sparsely populated and relatively unproductive area. Accordingly, its physical characteristics of relative distances, grades and curves appear unfavorable in comparison with those of competing lines. These basic factors, however, were beyond the control of the locating and construction engineers whose ingenuity was tested to hold grades to 1% maximum and curvature to 6 degrees, and yet keep within estimates and budgets.

The present President of the Rock Island, Mr. John D. Farrington,

is, as will be later mentioned, a man who served on the Burlington Lines under Mr. Budd during the first four years of the latter's Presidency. Mr. Farrington is known to have reminded his former superior about the inconsistency of the standards of grades and curves incorporated into the first railroad Mr. Budd built compared with the ones which characterized his later work on the "Hill lines."

While Mr. Budd was in Rock Island's service, its Chief Engineer was William L. Darling, who was one of the prominent personages of the times in railroad and professional circles. Mr. Budd saw much of Mr. Darling during 1903-04 and speaks of his qualities as an engineer, an executive and a superior officer in terms of esteem. The Reid-Moore Syndicate engaged Lenor F. Loree, whose name was mentioned in the preceding chapter, to assume the Presidency of the Rock Island. Loree, originally a Pennsylvania ("Lines west of Pittsburgh")man, had been sent by the great President of that System, A. J. Cassatt, in 1901 to become President of the Baltimore & Ohio, when the former obtained control of this competitor pursuant to its "community of interest"policy.

John F. Stevens, who as previously mentioned, was the "pathfinder" of the Hill's Great Northern, and had long been intimately identified with "The Empire Builder", also served briefly as Vice President-Operation of the Rock Island under Loree. The incumbency of both of these imported officials was brief and unhappy and they were not congenially disposed towards one another. Mr. Budd has interesting memories of his occasional visits with these two principal executives of the railroad for which he worked in 1903-04. On one, when both Loree and

Stevens made a trip over the line on the construction of which Mr. Budd was working, the two gentlemen previously mentioned were not speaking to each other, although traveling together. Rock Island's Chief Engineer, W. L. Darling, also resigned when Loree and Stevens left.

Railroad building was fraught with many difficulties and dangers. Ralph Budd was constantly experiencing them. In the spring of 1903, tracklaying was proceeding west of the Osage River so rapidly that it had caught up with the grading but ballasting had fallen behind schedule. Construction of water stations followed rather than preceded the main work so locomotive boilers frequently had to be supplied with water siphoned out of ditches and ponds found along the right of way. Such circumstances made it necessary to wash out the boiler frequently. Mr. Budd was riding on a train distributing supplies. Turning back, after its work had been accomplished, to take the engine to the roundhouse for boiler washing and while moving over unballasted track, with the subsoil frozen under one rail but not under the other, the locomotive was derailed and turned over. One man in the cab was killed and another seriously injured. Mr. Budd was scalded by steam and hot water when the glass water gauge broke (which device was not protected against such emergencies in those days as it would be later on.) Two months' hospitalization in St. Louis followed before Ralph Budd could return to the job.

Mr. Budd's series of interesting reminiscences of this period of his career include a description of the first large passenger train movement over the line shortly after it was opened on July 4, 1904. Several special trains carrying members of the Masonic Order from west-

ern cities used it en route to the St. Louis World's Fair.

Throughout these Rock Island years of 1903-04, Mr. Budd's family lived in Eldon, Missouri, the "division point" of the line, midway between its terminals and not far from Missouri's capital, Jefferson City. During 1903, Mr. and Mrs. Budd's first child, Margaret, was born in Eldon, Missouri. A second one, Robert, followed in 1904 in Des Moines, Iowa.

When the construction of the line had advanced far enough towards completion to permit the formation of the operating organization, Thomas H. Beacom was appointed Superintendent with headquarters at Eldon. Budd met Beacom for the first time while working on the completion of the bridge over the Gasconade River. Beacom continued in Rock Island service until 1923 when he resigned the operating vice presidency to become Receiver of the Denver & Rio Grande Railroad.

CHAPTER IV

BACK TO THE CHICAGO GREAT WESTERN

While the railroad map of the United States was under construction, the organizations which actually built the component lines dissolved when their work had been completed. Soon after the construction department of the Rock Island turned the new Kansas City-St. Louis line over to the custody of the Operating Department to run and maintain, Ralph Budd's responsibilities were fulfilled. This occurring towards the end of 1904, he submitted his resignation at that time.

The Chicago Great Western, Mr. Budd's first railway employer, was then planning to add a second track to part of its route across Illinois between the Mississippi River, opposite Dubuque, and Chicago. Budd was invited to return and take charge of the work. He accepted and spent the next year and a half on that assignment. It also included a wide range of improvements designed to raise the engineering standards of the railroad in order that it could become a more effective competitor of its larger and stronger rivals.

This chapter in Mr. Budd's career contained no unusual events but much hard work. It came to an end with his resignation and departure for Panama in June 1906.

CHAPTER V

PANAMA

The Panama Canal was the greatest engineering achievement of its time and remains one of the outstanding feats of this character ever accomplished. Ralph Budd devoted three years to important work for this project.

In 1904, Congress authorized President Theodore Roosevelt to take over the French property and rights in Panama and appropriated money to start the construction of the Isthmian Canal with American forces. Nearly two years of confusion, delay and discouragement followed. The first chief engineer of the Panama Canal Commission was John F. Wallace, who came to it from a similar post on the Illinois Central. Wallace terminated his association with the Canal in 1905 and was succeeded by John F. Stevens, whose name has been previously mentioned in this report. Upon reorganization of the Panama Canal Commission in 1906, Stevens became its Chairman and also retained his former post of Chief Engineer.

The ill-fated attempt of the French Count de Lesseps to build the Panama Canal is well known. Fresh from the successful completion of the Suez Canal, he undertook the task of digging a sea-level ship canal at one of the most forbidding spots on earth, from a construction standpoint. The difficulties, unforeseen and unprovided for, were amply recorded by the later forced changes in plans in the famous Culebra Cut; first to a one-lift high level, then to higher levels and more locks. de Lesseps failed in his tragic but brave attempt.

The basic construction questions surrounding a sea level versus a lock canal had not been settled when Stevens reached Panama in 1905. Stevens went to Panama with an open mind, although somewhat in favor of a sea-level profile. Most non-engineers were attracted by its alluring sound. However, the rugged topography to be traversed, the geology of the terrain and the 20 foot differences in tides between the Atlantic and the Pacific entrances to a canal led Stevens to recommend the lock type of waterway. His report was accepted by the Isthmian Canal Commission, and in turn by the Secretary of War, Honorable William Howard Taft, President Theodore Roosevelt and by Congress. Echoes of the controversy over a lock type and sea-level canal are still heard as proposals come before Congress to add to the capacity of the present canal or build a supplementary channel in Nicaragua.

These essential preliminaries being completed in the forepart of 1906, the great work of organizing the project in its manifold aspects of engineering, construction, supply, housing, sanitation and finance began. John F. Stevens was a civilian and hence a civil engineer. The work was begun and started under such auspices. Later, after Mr. Stevens' resignation in 1907, the military engineers took charge and remained in control until the Canal was opened.

John Stevens retained favorable impressions of Ralph Budd from observations of the latter's work on the extension of the Rock Island into St. Louis, while the former was Vice President in charge of that system's operations. Ralph Budd was, therefore, one of the engineers whom Stevens invited to join him in Panama. Budd fully recognized the opportunities presented by the responsibilities of important association with

construction of such extraordinary size and difficulty, international importance and engineering prestige. He, therefore, accepted with promptness and alacrity.

Ralph Budd arrived in Panama on July 4, 1906. His family followed as soon as satisfactory arrangements could be made to establish a home for Mrs. Budd and their two young children in the headquarters city erected by the Canal Commission near the famous Culebra Cut. His initial assignment was that of engineer of maintenance of way of the Panama Railroad. This little "P.R.R." was a five foot gage line 48 miles long. It had first been opened for service in January 1855, and was America's first transcontinental railroad. (7) The Panama Railroad had, therefore, long served a useful purpose in transporting passengers and cargo across the narrow but in some places rugged, and others swampy, neck of land which joined the two American continents where the Pacific and Atlantic Oceans almost come together. This line of railway was destined to play a very important role in the construction of the canal and in the career of Ralph Budd.

During the construction period, the Panama Railroad was called upon to perform its normal functions of international trade and travel while immense new tasks were added. Great quantities of machinery, materials and supplies had to be brought in continuously. These represented not alone the huge requirements of the construction project itself but the needs of the communities, where canal personnel and their families lived for ten years. Supplies of all kinds for most of the necessities as well as the conveniences of life had to be brought in from far away

(7) Previously mail was carried across the Isthmus by mule pack and canoe.

places. Moreover, the railroad provided the sole means of transport beyond the range of horse-drawn vehicles for taking workers to and from the job and for travel within the canal zone. Most important of all was the movement by the railroad of the fleets of steam shovels, being steadily advanced as the working faces of the cuts receded before their excavation and the endless trains of dump cars were shuttled back and forth to carry dirt and rock away from the work for wasting. In order to accommodate this continuous stream of heavy traffic, the Panama Railroad served as the exclusive transportation facility of the construction forces by day and worked as a commercial carrier by night.

Ralph Budd's first duty in his new capacity was to rebuild the "P.R.R." (Panama -- not Pennsylvania Railroad.) This required raising engineering and maintenance standards to those equal to the needs of a heavy duty railroad, capable of meeting the traffic demands of a decade of canal construction. The line was relocated throughout most of its length. The Gatun Dam, to be built across the Chagres River, would create Gatun Lake having a surface elevation 85' above sea level and flooding railway right of way. The Culebra Cut and the locks also required areas occupied by the railroad.

The "P.R.R.'s" single track would be quite inadequate. Plans for revision included a second track throughout; from Panama City on the Pacific, to Colon, on the Atlantic. Third and fourth tracks were added where operating or traffic conditions produced a high density of train movement. Shops, yards, enginehouses and all other facilities were modernized and enlarged and additional equipment acquired.

Ralph Budd accomplished the rehabilitation and development of the Panama Railroad with his characteristic diligence, efficiency and dispatch. These qualities were soon widely recognized and officially noted by his promotion within a year to the position of its chief engineer. He continued to serve in this capacity until he left the service of the Canal Commission in 1909.

Mr. Budd's experiences in Panama covered broad ranges of business, engineering and transportation. Moreover, it required work under unusual circumstances of isolation in self-contained communities in a tropical climate where large groups of men, and their families, far away from their previous homes, had to live and work together on a project of heroic magnitude and difficulty. This in itself presented problems of organization, tact and diplomacy which undoubtedly helped develop to an unusually high degree many of those fine qualities later so clearly evident in Mr.Budd, and which contributed so greatly to his personal success and the achievements which he brought to the companies he directed.

It would be easy to digress to tell the story of the Panama Canal but while Mr. Budd contributed materially to the success of that work, through provision of the transportation facility so essential to this vast construction program in a distant tropical country, the significance of that episode in this narrative is what he learned from it and who he worked with there. The former aspect has been touched upon. In the latter respect, the associations with John F.Stevens held greatest immediate significance.

Stevens resigned his associations with the Isthmian Canal Commission and the planning and direction of the work in 1907. This event coincided with the decision of President Theodore Roosevelt to turn the project over to military engineers to complete notwithstanding the successful progress of the work under civilian administration and organization. Colonel George W. Goethals followed John F. Stevens as chief engineer and chief executive officer.

A friendship of great significance formed during Mr. Budd's residence in Panama was with Robert E. Wood, who only last year retired as Chairman of the Board of Sears, Roebuck & Co., after having gained distinction as one of America's outstanding business men and public-spirited citizens. Wood, a West Pointer of the Class of 1900, came to Panama after campaigning in the Philippines. Then a Captain, he served ten years in Panama advancing from an assistant quarter master to the chief supply officer on this great project. It evidently proved to be as fine training for (later) General Wood's subsequent career, as Mr. Budd's engineering and transportation experiences in Panama provided in the case of the latter's subsequent years of railroad service.

Another associate destined to gain prominence, although to a lesser degree, was William G. Bierd who served as operating manager of the Panama Railroad. After returning to the United States in 1909, Bierd joined Stevens on the New Haven. Bierd's railroad career ended with his retirement when the bankrupt Alton, of which he had been President and later Receiver, was sold to the Baltimore & Ohio in 1930.

Another valued associate of Panama years but who was destined to work again under Mr. Budd's direction was Frederick Mears. His name

is well known in railway engineering circles although not outside of them. As Assistant Chief Engineer of the Great Northern, he would, between 1926-1929, have principal "on the ground" responsibility for the construction of the greatest single project sponsored by Mr. Budd -- the Cascade Tunnel.

Budd remained in Panama for two years after John F. Stevens left, serving loyally and efficiently with Colonel Goethals' organization. During 1907, the third and last child, John Marshall Budd, now President of the Great Northern Railway, was born to Ralph and Georgia Ann Budd. John's birthplace, however, was in his grandparents home in Des Moines rather than in his father's house in Panama.

CHAPTER VI

BUILDING A RAILROAD IN OREGON

This important chapter in Mr. Budd's life story brings him again -- and for the third time -- in association with John F. Stevens.

When the latter withdrew from the Panama Canal Commission and its related work in 1907, Stevens returned to the United States with the intention of visiting Europe before again accepting new professional responsibilities. An invitation from the then President of the New York, New Haven and Hartford Railroad, Charles S. Mellen, interrupted these plans.

The Mellen administration of the New Haven spanned a decade, 1903-1913. In 1907, he was in the midst of carrying out ambitions and designs for the development of this company both internally and externally. Prospects of the latter character not only included acquisition of a number of traction and boat lines but also control of the Boston & Maine Railroad. It is significant to recall this in an M. I. T. thesis written at a time when the present management of the New Haven Railroad is again trying to establish a "community of interest" between them. Mr. Stevens in 1907 was invited to accept the Presidency of the Boston & Maine Railroad when its control by the New Haven then in process of accumulation through stock purchases, had progressed to the point that the prospective new owner could name the Board of Directors and executive staff of the other company. The idea was appealing to Stevens who had long shared the generally prevailing ambition of railway engineers to become operating or

chief executive officers, so he accepted. Moreover, he as a native of Maine, and Mrs. Stevens, also a New Englander by birth, were attracted by the idea of returning to that section of the country where their lives began.

Mellen's plans to take control of the Boston & Maine management were delayed by adverse public opinion, largely marshalled by Louis D. Brandeis, whom President Woodrow Wilson would appoint to the Supreme Court in 1916. Stevens, therefore, did not become President of the Boston & Maine (8) but instead was appointed Vice President-Operation of the New Haven. W. G. Bierd, the operating manager of the Panama Railroad, soon was invited to the New Haven to rejoin his former chief. Mellen's ambitions overextended the New Haven and Stevens was disappointed that the deteriorating financial condition of the company nullified the aspirations of the management to make rapid progress in developing the property and service. Mr. Stevens was not happy in the New Haven Vice Presidency so sent an affirmative reply to his former chief, James J. Hill, when the latter invited him, in 1909, to become the promoter and builder of the Oregon Trunk Railway. This route was projected down the Deschutes River Valley in Oregon from a connection at Wishram, Washington, with Spokane, Portland & Seattle Railway. This latter route is jointly owned by the two Hill lines, Great Northern and Northern Pacific. It was placed under construction in 1905 and completed in 1908. S. P. & S. principally follows the Snake and Columbia Rivers to provide the parent

(8) C. S. Mellen, himself, filled that office from 1910-1913 in addition to the presidency of the New Haven. He also served as President of the Maine Central during that three year period, 1910-1913.

companies' transcontinental lines with direct outlets from Portland to the east.

With both the Union Pacific and Southern Pacific then in control of Edward H. Harriman, the latter's system possessed almost a complete monopoly of rail transportation within the state of Oregon. The Hill lines, Great Northern and Northern Pacific reached Portland over the latter's line from Seattle, and via the "North Bank" (i.e., in the state of Washington) road of the Spokane, Portland & Seattle Railway. (9) An S. P. & S. branch extended into Astoria, at the outlet of the Columbia where John Jacob Astor had established a fur trading post a century before. The Hill lines had also recently acquired the Oregon Electric Railway extending a short distance down the Williamette River valley south from Portland. The two latter affiliates virtually comprised Hill's entire mileage to Oregon.

The Empire Builder's ambitions for his railroads included sharing in the traffic and transportation of this great state. His primary objective was the great untouched timber reserves; among the largest in the United States, standing on the east slope of the Cascades between the Columbia River and the California state line (where the name of this range ends and it becomes known as the Sierra Nevada.) At that time this whole vast area in Oregon, on the east slope of the Cascades was devoid of rail mileage, except for a Southern Pacific branch extending from Weed, California (10) on the Portland-San Francisco ("Siskiyou")

(9) Union Pacific's "Oregon-Washington Railroad & Navigation Co.'s track occupies the south bank or Oregon shore of the Columbia.

(10) A connection changed to Black Butte with opening of S.P.'s Naton Cut-off or Cascade line in 1926.

line across the Cascade range at Grass Lake, California, and down to Klamath Falls, where the Klamath River flows into Upper Klamath Lake. These immense timber resources were a rich traffic prize for the railroad which could obtain access to them. Moreover, the mileage required to do so, if built by the Hill lines, would provide a direct north - south line across Oregon, down the high and barren plateau east of the Cascades, and lead directly into California -- the Golden "Empire State" of the West.

In 1909, the year after Spokane, Portland & Seattle was completed, Hill decided that the time had come to carry it into central Oregon, through construction by an affiliate. The route of attack would necessarily be down the rugged canyon of the Deschutes River, which lies east of and parallel to the Cascade Mountains in a canyon 100 miles long. The Deschutes flows into the Columbia, 100 miles east of Portland. Bend, Oregon, 150 miles south of the Columbia and well east of the mountains, was the logical immediate goal of the Oregon Trunk. Klamath Falls, 150 miles farther south, would be the second objective in the advance of the Hill lines on the timber resources of Oregon and towards a through route to California. The latter would represent the third and final goal.

Hill's ambitions were generally surmised although the time, place and circumstances of his attack were not. "The Empire Builder's" strength and talent for strategy were equally well known, but the Harriman lines were no less aggressive in their determination to keep their great rival out of a domain which the Union Pacific and Southern Pacific considered lay wholly within their sphere of exclusive development. This set the stage for one of the historic "battle of giants" which have

furnished many romantic chapters of railway history.

Hill opened the contest, necessarily secretly. Stevens enlisted again under Jim Hill's banner but without public knowledge of his action. Upon leaving the New Haven but without announcing his new affiliations, Stevens went to Portland, Oregon, "sub rosa" to survey the situation and lay plans for the acquisition of the required charter and franchises, the procurement of right of way and the organization of engineering and construction forces, to take the Hill lines into central Oregon. The initial step was the clandestine purchase of the charter outstanding to a dormant corporation, the Oregon Trunk Railway, which had given up the attainment of its objective to build down the Deschutes River Canyon after a little preliminary work had been done.

No intimation of the project reached the rival railroad interests or the public, until developments had advanced to the point where construction actually commenced. Then the veil of secrecy was abruptly torn aside and the press was full of public information respecting the Empire Builder's latest project. It at once attracted widespread public interest and support.

The Harriman lines, immediately countered through efforts at law to block the Oregon Trunk and to meet it by construction of a paralleling line that would be built by the Union Pacific's affiliated Oregon-Washington Railroad & Navigation Co. Stevens soon met with Julius Kruttschnitt, Harriman's first lieutenant and Director of Maintenance and Operations of the Union Pacific-Southern Pacific System, to propose a joint line but the proposal was not accepted and the race was on.

Before either was completed, the two roads agreed to use joint trackage for 10 miles between North Junction (71 miles from Wishram) and South Junction, to be built by Oregon Trunk. Parallel construction continued by both to Metolius but U. P.'s "Deschutes RR." never built south of that point in consideration of obtaining O.T. trackage into Bend. Later on, U.P. leased its property between Metolius and South Junction to Oregon Trunk for 999 years and obtained trackage rights over the line it owned. In 1936 joint operation was completed by U.P. abandoning its line between the Columbia River and North Junction and obtaining trackage over the paralleling O.T. This eliminated all duplicate mileage and brought the entire line under O.T. operation. U.P. uses it as a tenant. O.T. owns all of the track except as stated between South Junction and Metolius. The construction record precedes reference to Mr. Budd in the narrative but it did not begin until after he came.

Mr. Budd was on leave in the United States when invited by Stevens to join the latter again in the construction of this momentous project. The proposal was accepted. Mr. Budd became a reconnaissance, or locating engineer, stationed near The Dalles, Oregon on the Columbia River.

Hill's opponents had intended to delay the flow of supplies down the Deschutes Canyon. It was evidently supposed that these could not be brought across the Columbia until a bridge was built for the new road and that would require a year or more. This contingency had been foreseen. Materials and equipment were carried between the S. P. & S. on the north bank to the railroad of the Oregon Trunk on the opposite shore. The latter's steel bridge spanned the Columbia a year later.

In 1910, Ralph Budd was promoted to Chief Engineer of the Spokane, Portland and Seattle Railway and Oregon Trunk Railway and Stevens was elected their President. Work proceeded slowly, even though pushed with all possible vigor. The cramped, narrow gorge restricted the size of forces, hamper-

ed the flow of supplies and made construction unusually difficult and expensive. Extensive bridge work further complicated matters. From time to time the rival Harriman and Hill organizations, working competively on opposite sides of the river, had opportunities, which they fully utilized, to hinder the other in every way possible. Such incidents furnished sensational material for the press.

Nearly one hundred miles south of the Columbia, the Deschutes Canyon ends near the present station of Gateway, where the railroad emerges on the high barren plateau. The next sixty miles of track then crosses relatively open country where no unusual obstacles impeded rapid progress in building the line.

Finally the work was completed to Bend in 1911, and Mr. Hill decided that the Oregon Trunk would halt there for a while before proceeding over the next step of 150 miles to Klamath Falls. This decision was made after Ralph Budd had completed the surveys, acquired the right of way and had completed the grading for a short distance south of Bend.

Bend remained the terminus of the line until 1928 when during Ralph Budd's administration as President of Great Northern, he carried the route begun by the Oregon Trunk, on south to Klamath Falls. Three years later in 1931, it would penetrate California and connect with Western Pacific. But both of these events belong to later chapters.

The Oregon Trunk is a subsidiary of Spokane, Portland & Seattle Railway, which in turn, as has been previously noted,was [illegible] built jointly by the Great Northern and Northern Pacific and completed in 1908. It provided a direct outlet to Portland, from a connection with

the two owner lines at Spokane. The line, 380 miles in length, was built to unusually high physical characteristics of grades and curves and directness. The first 125 miles southwestwardly from Spokane crosses the rolling, wheat producing plateau of the "Inland Empire", as that district is locally known, on 0.4% grades. Twenty-five miles of rugged side hill location within the spectacular canyon of the Snake River take the railroad track from an elevation high above the river down an easy 0.4% grade to the water's edge near Pasco. There the S. P. & S. meets the less direct and heavier grade main line of the Northern Pacific also coming from Spokane. Two hundred and thirty miles of river grade line of 0.2% along the Columbia take S. P. & S. trains through the Cascades where the second mightiest stream within the United States has cut a gorge to provide a path for the trains as well as an outlet for itself.

Ralph Budd served as Chief Engineer for both the Oregon Trunk and its parent company. (11) He was only 31-32 years old at the time.

While his identity with the construction of the Oregon Trunk is the better known of his two simultaneous functions, he necessarily gave a substantial part of his time and attention to the engineering problems of this then newly completed S. P. & S. Its "water level grade

(11) During the year 1912, Carl R. Gray was President of the Spokane Portland & Seattle, having come to it the year before at the age of 44 from the Frisco. Subsequently, Mr. Gray spent two years as President of the Great Northern. He and Mr. Hill did not prove to be a congenial managerial team so Mr. Gray resigned. He promptly became associated with Mr. John D. Rockefeller's railway interests as President of the Western Maryland Railway. Carl R. Gray, Jr., who retired recently as Director of the Veterans Administration and previously had served as Vice President of the Chicago & North Western Railway and Major General in the Army Transportation Corps, began his railroad career (after a brief early period on the Frisco) on the S. P. & S. in 1911 and 1912.

line" embodied the finest of Mr. Hill's construction ideals in order to incorporate the principles of mass transportation and heavy trainloads into the physical characteristics of a long and important railroad. The character of construction required to carry such a route through difficult mountain terrain inevitably produced continuous problems of roadbed stabilization until the subgrade seasoned under the action of years of use and exposure to the elements. All this time, Mr. Budd was working constantly to improve the details of construction and maintenance standards of the S. P. & S.

His work on these two railroads, identified with the states of Oregon and Washington, earned him the confidence, respect and gratitude of "The Empire Builder",himself. Ever since Mr. Budd had first met Mr. Hill in August 1909 while working as a reconnaissance engineer "on location" near The Dalles, Oregon, Mr. Hill had recognized the superior character and qualities and personality of the young engineer whom Mr. Stevens had brought to the S. P. & S. from Panama. By the end of 1912 the progress of Mr. Budd's work in the west gained him a promotion to Chief Engineer and Assistant to the President of the Great Northern. This was just as Carl R. Gray was succeeding Louis W. Hill, the "Empire Builder's" second of three sons, as President of Great Northern, the latter becoming Chairman.

CHAPTER VII

GREAT NORTHERN RAILWAY

The mantle of James J. Hill, the "Empire Builder", was destined to fall on Ralph Budd, first on the Great Northern and later on the Burlington. It is essential to a proper understanding of the latter's administration of those properties to trace the history of their development up to the time their associations began with each other.

In the year 1856 Minnesota was a territory with a population of little more than 100,000; St. Paul, its principal city, contained only 5,000 inhabitants, and its name had only recently been changed from Pig's Eye. No railroad served either place or any part of the vast inland empire extending westward to Puget Sound. From the east, only three railroads reached the upper Mississippi River, the Chicago & Rock Island at Rock Island, the Galena & Chicago Union (now Chicago & North Western Railway) at Fulton, Illinois, opposite Clinton, Iowa, and the Chicago, Burlington & Quincy at East Burlington, Illinois. The Rock Island's bridge completed in April 1856 was the only structure across "The Father of Waters." Steamboats plied the entire length of the Mississippi up to St. Paul immediately below the falls of St.Anthony (now Minneapolis) and in connection with those railways provided transportation to Minnesota.

Minnesota became a state in 1857 and the history of the Great Northern began then, too. Its corporate ancestor, the Minnesota and Pacific Railway was chartered on May 22, 1857 to build from Stillwater, on the St. Croix River, to St. Paul and then through St. Anthony (now Minneapolis) to Breckenridge, on the Red River at the boundary with Dakota territory. A branch of the Minnesota and Pacific was projected via St.Cloud to St.Vincent where the Red River crosses the international border to enter Canada. Grading was completed westward for more than 60 miles from St.Paul,almost to St.Cloud,but no track had

been laid, when the project collapsed financially and was purchased by the state at foreclosure sale in 1860 for $1,000.00.

The Saint Paul and Pacific Railroad, incorporated in 1862, acquired that unfinished property and placed the line in service between St. Paul and St. Anthony on July 2 of that year, using a little engine destined to become one of America's most historic and best known locomotives, the "William Crooks."[a] The latter, as GN #1 has been maintained in good working order to this day. It is a familiar spectacle at railroad exhibitions throughout the nation. The 75 mile line, paralleling the upper Mississippi River to St. Cloud and Sauk Rapids was completed in 1866-67. Construction from Minneapolis via Willmar and Benson to Breckenridge, 200 miles, followed in 1869-70-71. A 60 mile extension continuing along the Mississippi from Sauk Rapids to Brainerd and another running below it towards Melrose but pointed towards Barnesville, Crookston and St. Vincent were financed by the sale of bonds in Holland, to Dutch investors. These debts overstrained the company's meagre financial resources and a receivership eventuated.

Stock control of Saint Paul and Pacific was acquired by Jay Cooke's Northern Pacific in 1870. The latter, starting at Duluth, was projected through to Puget Sound. The Saint Paul and Pacific would connect with Northern Pacific at Brainerd and provide an outlet to St. Paul for the owner's transcontinental line. Likewise, Saint Paul and Pacific would provide the Northern Pacific with an extension through the agriculturally productive valley of the Red River of the

(a) In honor of the Chief Engineer of the St. Paul and Pacific Railroad. His name was also given to Crookston, Minnesota.

North towards the Canadian boundary and thereby control the trade with the growing settlement that had been developed by Lord Selkirk around Fort Garry near Lake Winnipeg in Rupert's Land.(12) This corporate relationship with Northern Pacific was terminated by the Panic of 1873 which was precipitated by the failure of the banking house of Jay Cooke & Co. The latter disaster had been caused by the burden of financing the construction of Northern Pacific west for 450 miles as far as the Mandan Indian villages on the Missouri River in Dakota Territory. Saint Paul and Pacific also failed in 1873 and Northern Pacific followed in 1874.

When those momentous events were occurring in 1873-74, James J. Hill was 35 years old and had been living in St. Paul for seventeen years. He had come there as a young man of eighteen, the Canadian (Rockwood, Ontario) born son of Scotch-Irish parents. Young Mr. Hill possessed those qualities which made him a successful business man almost from the outset of his career. Before he was thirty he became

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(12) The British North-America Act of 1867 created the Dominion of Canada by amalgamating Upper and Lower Canada (Quebec and Ontario, respectively) with the maritime provinces of Nova Scotia and New Brunswick. Title to "Rupert's Land" was conveyed to the new nation and the former became known as the Northwest Territories. Subsequently, the Canadian provinces of Manitoba, Saskatchewan and Alberta were formed out of part of that area. Rupert's Land had previously been the exclusive domain of the Hudson's Bay Co. The former name honored Prince Rupert. Prince Rupert was one of the founders, a cousin of King Charles II and the first Governor of that great corporate colonizer, fur trader and merchant, the Hudson's Bay Co., which was formed through a Royal Charter, issued in 1670 by King Charles II of England. Its terms conveyed to the Hudson's Bay Co. all lands draining into Hudson's Bay. Appropriately they became known as Rupert's Land.

recognized as a man of standing and of influence in his community and had accumulated a moderate amount of capital as a dealer in fuel and as agent for rail and water carriers. This work brought Hill into close commercial relationships with a prominent business man, and later Mayor of St. Paul, Norman W. Kittson, who was also Canadian born. Hill's activities either with or directly influenced by the ones he had with Kittson, led to a significant sequence of developments which successively brought the former into the "Red River trade" between St. Paul and Fort Garry, the early development of the Saint Paul and Pacific Railroad, steamboat operations on the Red River and finally the friendship and confidence of Donald A. Smith, of the Hudson's Bay Co., and Commissioner of the newly formed Dominion of Canada to its Northwestern Territories. Smith was destined to become Governor of the Hudson's Bay Co., and to be elevated to the British peerage as Lord Strathcona and Mount Royal.(b)

Hill clearly foresaw the future development of the northwest and was keenly aware of the need for all-rail transportation between St. Paul and Winnipeg to release commerce from the uncertainties of the Red River, which was frozen during the long winter months, and during the late summer navigation was interrupted by periods of low water. N. W. Kittson and D. A. Smith were aware of Hill's enthusiasm for the possibilities of railway development in Minnesota and Manitoba. Donald Smith's cousin was George Stephen, then head of the financially powerful Bank of Montreal and learned of Hill and his ambitions to acquire and develop the Saint Paul and Pacific. In 1877, George Stephen and Richard B.

(b) Hill and Smith met personally for the first time in March 1870 under dramatic circumstances. Each was crossing the snow covered sub-arctic prairies of Manitoba by dog sled during a storm from the north. "Riel's Rebellion" which captured and briefly held the Hudson's Bay Co. post of Fort Garry

(continued on P-44)

Angus, the Bank's General Manager, chanced to visit St. Paul. They met Hill and Kittson and went over the Saint Paul and Pacific with the former. The road was still in receivership. It was said to have been at a particularly discouraging time to inspect the line, for the country had been devastated by drought and a plague of grasshoppers; nevertheless they were impressed with the fertility of the soil and Hill's enthusiasm was contagious.

As previously noted, the Saint Paul and Pacific had been financed with Dutch capital and its bonds were in default. Following this memorable visit of Stephen and Angus with Hill and Kittson, Stephen went to Amsterdam and secured an option to buy the bonds of the Saint Paul and Pacific at about 30 cents on the dollar. A syndicate was formed consisting of Hill, Stephen, Angus, Smith, Kittson and Kennedy, a banker in New York who represented some of the bondholders of this bankrupt line. The property of the Saint Paul and Pacific, from the Twin Cities to Breckenridge and St. Vincent, was bought at foreclosure during 1879 and conveyed to the St. Paul, Minneapolis and Manitoba Railway. The 60-mile line from Sauk Rapids, along the Upper Mississippi, to Brainerd was lost in the reorganization and subsequently acquired by Northern Pacific.

George Stephen was named President of the St. Paul, Minneapolis and Manitoba Railway and James J. Hill was appointed its General Manager. Hill advanced to the presidency on August 21, 1882. At its corporate birth in 1879, the St. P. M. & M. had 565 miles of completed and 110 miles of projected railway.

In the next decade, Hill added over 2,000 miles of strategically located and well built lines which covered the finest grain-growing

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(b) (Cont. from P-43)
had occasioned the travels of both. Smith had been appointed Special Commissioner to the Northwest Territories and been sent out by the
(continued on P-45)

areas in Minnesota and North Dakota, with extensions into Manitoba and central Montana, and outlets to Duluth and Sioux City. Significant related events are the formation, all by Mr. Hill, of the St. Paul Union Depot Co. in 1879, of the Minneapolis Union Railway in 1881, and the Minnesota Transfer Railway in 1883. The first and last named of these three companies provided jointly owned freight and passenger terminal facilities, respectively, for all railroads in St. Paul. Minneapolis Union Railway was solely controlled by the Hill interests and provided Great Northern with its principal properties in Minneapolis, including the famous double track stone arch viaduct, 2100 ft. long and 82 ft. high carrying the railway over the Mississippi River at the falls of St. Anthony.

In 1881, this same group which had developed the Manitoba, undertook the construction of the transcontinental Canadian Pacific when the Dominion Government turned the latter project over to private enterprise after a decade of serious discouragement. It was Hill's belief that the Canadian Pacific should not build through the wilderness separating the productive agricultural areas of central Manitoba from those of eastern Ontario but instead should use mileage through the United States which would include the St. Paul, Minneapolis and Manitoba system. His Canadian partners refused to limit the development of the Canadian Pacific in this way. Hill, therefore, resigned from the Canadian Pacific syndicate in 1883. Smith, Angus and Stephen withdrew at the same time from the St. Paul, Minneapolis and Manitoba. This separation should not disguise the important fact that in their earliest

(b) (Cont. from P-44)
Dominion Government at Ottawa to reestablish peace. He was returning there to report on the suppressions of the uprising and the restoration of order. Hill was en route to Fort Garry to ascertain conditions there.

years both St. P. M. & M. and C. P. R. were intimately related and Hill had a vital part in shaping the destinies of the Canadian Pacific. The latter opened its line to Port Moody, B. C., on a deep water inlet of the Pacific in 1886 and to Vancouver in 1887. Canadian Pacific's second and third presidents, Sir William Van Horne and Lord Thomas Shaughnassey were former officers of the Milwaukee whom the former company engaged at Hill's suggestion to take charge of construction and purchases, respectively, for the new Canadian transcontinental.

In 1888, St. P. M. & M. organized the Northern Steamship Company which built six steamers for service on the Great Lakes. Later on Hill would extend his waterway interests by extensive maritime operations on the Pacific.

As soon as Hill's position was secure in Minnesota and North Dakota, he released his ambition to project the road to Puget Sound. In order to give his company a better capital base and a corporate title more consistent with its scope, the St. Paul, Minneapolis and Manitoba was consolidated with several affiliated companies and recapitalized as the Great Northern Railway in 1890. The latter had been incorporated in 1889 to provide for that larger purpose.

Hill was the first to build into his railroads a full understanding of the economics of transportation as understood today. More specifically, this means direct lines with low grades, easy curves and auxiliary facilities and equipment carefully designed to secure maximum economy of operation consistent with the capital required therefor. The superior physical characteristics and development of the Great Northern are the basis of its financial success and the standard of its service.

Great Northern was built into Puget Sound ten years after the transcontinental lines of the Northern Pacific and the Union Pacific entered the Pacific Northwest. As a result, the two latter routes had initial advantages of access to traffic; but Hill intended to gain for Great Northern the even greater benefit of the operating conditions which would permit hauling heavier trains at lower costs. To secure these, it was first necessary to obtain a favorable crossing of the Rockies and the Cascades.

While Great Northern was being organized, Hill sent John F. Stevens, whose name has already been frequently mentioned, out into the Montana Rockies in the early winter of 1889 to find a pathway through them. While known passes west of Great Falls and Helena were available, the ascents were too high and steep to meet Hill's operating standards and required diversion from the direct route which he had determined to follow close to the northern boundary of North Dakota and Montana. The mountain belt in the United States reaches its maximum breadth and altitude in Colorado. North or south of it the ranges narrow, the passes become lower and the number and height of intermediate mountain chains decrease. Moreover, gradually increasing average rainfall permits the western limits of wheat production to move continuously west as one goes north across Montana and into Canada. Only along Great Northern, within the United States, can grain be raised all of the way west to the Rockies. The number of days interval between the last killing frosts of spring and the first ones of fall decrease but the hours of sunshine in the spring and summer days in high northern latitudes increase more than proportion-

ately so the risks of crop failures are reduced.

Such significant operating and traffic factors caused Hill to order his surveyors to find a route for the Great Northern close to the Canadian border. That was not a difficult task across the plains but was there a mountain pass in such a location that would be relatively low in altitude and accessible by moderate grades? Only Indian legends supported hopes that there might be. It remained for Hill's renowned pathfinder, and later the builder of the Panama Canal, John F. Stevens, to find, in December 1899, at the headwaters of the Marias River, a tributary of the Missouri, the lowest pass through the Rocky Mountains traversed by any railroad in the United States. (See Appendix "A".)

Construction was immediately pointed west from Pacific Junction, near Havre, Montana, and by the end of 1890, the first 100 miles of this line were opened up to Shelby. Work was soon in progress all along the line beyond that temporary "end of steel." The entire route was completed into Everett, Washington, on January 5, 1893. There connection was made with the line that Great Northern had completed in 1891, along Puget Sound from Seattle to Burlington, Washington. This would be extended into Vancouver in 1909.

The basic characteristics of Great Northern are the most favorable grades and curves of any of the transcontinental routes in the United States. However, the initial line included two temporary physical handicaps. After descending the west slope of the main range of the Rockies from Marias Pass to the valley of the Flathead River near Belton, Montana, Great Northern, in continuing west, had to cross an offshoot of the

Cabinet Range to reach the valley of the Kootenai at Jennings. This difficulty was corrected in 1904 by building 60 miles of new line from Whitefish, in the valley of the Flathead, to Rexford, on the branch built in 1901-02 alongside the Kootenai from Jennings, into the Crow's Nest coal fields of British Columbia. As a matter of major interest to this study, the Kootenai River Dam projected near Libby, Montana, will flood the present Great Northern line through Rexford, and far beyond, necessitating another major relocation of the railroad in this area. In order to hold the grades on a new route to the moderate limits characteristic of the Great Northern, it will be necessary to bore a long tunnel, possibly the longest in the world.

The Northern Pacific being the first railroad across the Cascades secured Stampede Pass which offered the least difficult path over this range, although it required a circuitous approach up the valley of the Yakima River from Pasco, on the Columbia. This, however, was compensated by the great agricultural development of the latter area when later placed under irrigation for raising fruit and vegetables that move to distant markets. Hill desired to develop an agricultural area at the Great Northern's crossing of the Columbia which would be exclusively served by that railroad. The Wenatchee apple orchards resulted from this policy. Accordingly, he sought a pathway over the Cascades some distance above the Northern Pacific. John F. Stevens, the discoverer of the Marias Pass in the Rockies found it for him. Very appropriately, the pass through the Cascades bears Stevens' name.

The ascent to Stevens' Pass from the Columbia on the east and from Puget Sound on the west is very steep. Four per cent grades and

"switchbacks" were required. These represent very difficult operating conditions. The line standards which Hill desired for a permanent location of the Great Northern over the Cascades entailed greater time and expense of construction than could be afforded in the early '90s or was justified by the traffic initially available to the road. The first relocation of the Cascade mountain crossing commenced in September 1897. It involved driving a tunnel 14,000 ft. long, which was electrified in 1910, but only between its portals, not beyond. This sufficed for the needs of the railroad until Ralph Budd's eight mile Cascade tunnel was completed and brought Great Northern to the original standards set by "The Empire Builder." This achievement will be the subject of a later chapter.

Hill's interest in Canada, of which he was a native son, was second only to his devotion for the great northwestern empire of the United States which he helped develop. He naturally capitalized the location of the Great Northern to build many extensions into Canada. At one time these closely approached providing a continuous Great Northern line on Canadian soil from the Pacific Coast to the eastern limits of the Rockies. Other spurs penetrated eastern Manitoba. Hill disliked tariff barriers and if there was not to be free trade, he at least expected that reciprocity would be established between these two neighboring countries. The failure of such a policy to be adopted, however, prevented the fulfillment of his expectations to develop Canadian traffic adequate to support all of these extensions into that Dominion. This mileage has been liquidated except for the important line along the shore of Puget Sound, northward from Blaine, Washington, and White Rock, B. C., into New

Westminster and Vancouver, B.C.

When the success of the Great Northern was firmly established by the middle 1890's, Hill also became active in the affairs of the Northern Pacific through having been invited by the Deutsche Bank of Berlin (13) and J.P. Morgan & Co. to participate in the reorganization of that line consummated in 1895. It was in this way that Great Northern and Northern Pacific were brought into a "community of interest."

These great enterprises brought Hill in touch with the House of Morgan and the First National Bank of New York. About this time he began to give serious consideration to acquiring an entrance into Chicago. Hill wanted the Burlington, but the elder Morgan suggested the Milwaukee. Hill approached the latter's principal stockholders, who were unwilling to sell. Later he negotiated for the Burlington which had been financed and built by Boston capital. It shares were still largely owned or controlled there by the Forbes, Perkins and Thayer families. He still desired the C. B. & Q. particularly because it reached Illinois coal producing areas by routes that could be developed into low grade freight lines permitting this traffic to be moved into the northwest on very low rates. Moreover, in order to secure westbound tonnage to fill the box cars which came east with lumber, (14) he had successfully endeavored to interest the Japanese to introduce cotton manufacturing

(13) The relationship of this great financial institution dated back to days of Jay Cooke. Henry Villard, who completed Northern Pacific after its 1874 failure, had come to the United States to represent German creditors in the previous receivership. German capital helped Villard complete Northern Pacific.

(14) One of Hill's best known aphorisms was "Trust in the Lord and haul no empties." "The Empire Builder" regarded the movement of empty cars almost as "the original sin" of railroading.

into that densely populated island kingdom. Great Northern then owned trans-Pacific ships which, together with this railroad and the less complete regulation of rates than the Commission exercises today, enabled Hill to quote the low through rail-water freight charges necessary to move American cotton to Japan. But he needed closer connection with cotton-producing roads. The Burlington would extend his northern lines to junctions with them. This was also a factor in Burlington's acquisition of Colorado & Southern in 1909. Finally, Hill needed additional outlets for lumber produced in the northwest; and the territory served by the Burlington, in his opinion, offered better markets for it than the ones served by the Milwaukee.

Edward H. Harriman also wanted the Burlington, which was ideally complementary and supplementary to his Union Pacific. Hill feared that acquisition of C. B. & Q. by Union Pacific would so greatly strengthen the latter as to place Great Northern and Northern Pacific at a decisive competitive disadvantage. He, therefore, rebuffed Harriman's suggestion that they acquire it jointly and bought the Burlington in 1901. A total of 1,075,772 shares (96%) of C. B. & Q. capital stock were acquired at a cost of $200.00 a share. This was paid through issuance of $215,000,000 Great Northern-Northern Pacific Joint Collateral Trust 4% Bonds. (Hill thought 4% was a high rate for money, so limited the term of the loan to 20 years.)

Harriman determined to obtain an interest in the Burlington through acquiring control of Northern Pacific. Competitive buying followed between Harriman and Hill which led to the famous "Northern Pacific Corner" on May 9, 1901, when frantic bidding by "short sellers"

running to cover forced the price of the stock up to $1,000.00 per share. The outcome of this financial encounter was the formation of the Northern Securities Company to hold control of both Great Northern and Northern Pacific. The Hill interests were dominant in it but Harriman held an important minority position. This arrangement was promptly attacked by President Theodore Roosevelt, acting through his Attorney General, who instituted suits leading to a Supreme Court decision in 1904, requiring Northern Securities to divest itself of control of these railroads. Another controversy arose between Harriman and Hill, as to whether or not, in the dissolution, each should receive back the same shares which were actually turned into Northern Securities or their proportion of the total assets which it would distribute. Harriman wanted the former in order to get back the Northern Pacific stock which he had conveyed to Northern Securities Company. The Hill interests did not wish this to be done. The matter was litigated and their point upheld. Harriman received both Great Northern and Northern Pacific shares which were promptly liquidated.

An unusually interesting but little known feature of James J. Hill's railway developments is his related activities on the Great Lakes and the Pacific Ocean, which assumed extensive proportions. Between 1901-04-05, Hill built two 21,000 ton ships, "The Minnesota" and "Dakota" for trans-Pacific service. These were the largest vessels afloat at that time. Two other fine ships followed in 1915. These were the "Great Northern" and "Northern Pacific"; 525 ft. long and having a displacement of 8,225 tons. After two years of popular service between San Francisco and

the mouth of the Columbia, they were converted into transports to carry troops to Europe. While they survived the war, they did not return to Great Northern service after it ended.

Mesabi iron ore is the principal single factor in Great Northern's present traffic and earning power. The acquisition of the Great Northern iron ore properties, and the development of the railway routes into them is one of the most important single events in this railway's history. Reference to it is all the more important in this biography since its subject, Ralph Budd, has long been one of the trustees of Great Northern Iron Ore Properties.

Great Northern's predecessor, the St. Paul, Minneapolis and Manitoba Railway, entered the Duluth-Superior area in 1888 through 70 miles of construction by the affiliated Eastern Railway of Minnesota. (c) Development of a port on Allouez Bay on Lake Superior, at Superior, Wisconsin, soon followed. Ten years later, 1898, Great Northern completed westward extensions of the Eastern Railway of Minnesota which provided a direct connection into Duluth from a connection in the Red River Valley, at Crookston, with the main line west to Puget Sound and the route running north and south through the Red River Valley. This was essential to avoid a detour, via St. Cloud and Hinckley, of the heavy and increasing tonnages of grain from areas served by that mileage.

The presence of iron ore in the wilderness lying to the northwest of Lake Superior had been recognized as far back as 1850 but the systematic exploration of the area did not occur until the decade of the 1890's. During the latter part of this period, J. J. Hill, and his two elder sons, James N. and Louis W., became interested in the mineral

(c) Construction Record: Hinckley - West Superior, Wisc. - 66 miles - 1882
East St.Cloud - Hinckley, Minn. - 70 " - 1888
Coon Creek, Minn.-Hinckley,Minn.- 65 " - 1899

potentials of this region. The extension of the Eastern Railway of Minnesota to provide the Crookston-Duluth route had required the purchase of railways and lands that formed the basis of Great Northern's subsequent development of the iron ore resources of the area.

These were speculative. Hill's conservative policies led him to keep the purchase of ore bearing lands segregated from the railway's business and accounts. In order to do this, a separate Lake Superior Co., Ltd. was organized for that purpose which over the next six years acquired 65,000 acres of properties on which iron mining operations later developed rapidly. Concurrently Great Northern made the necessary extensions of routes and trackage into this zone through connections with the affiliated Eastern Railway's route westward from Duluth towards Crookston.

In 1906 Hill transferred the assets of the Lake Superior Co., Ltd. to Great Northern Iron Ore Properties, Ltd. This is a landlord corporation owning iron ore properties leased to others to mine. Its income is wholly from rents and royalties which are distributed to the holders of its trust certificates. The capitalization of the Great Northern Iron Ore Properties was established at a number of shares of beneficial interest, approximately 1,500,000, which were exactly equal to the number of outstanding shares of Great Northern capital stock. The Iron Ore Properties' securities were conveyed by Mr. J. J. Hill as an outright gift to Great Northern Railway, and it in turn distributed them to the latter's stockholders as a dividend.

This extraordinarily generous and conscientious action by Mr. Hill was entirely voluntary. The iron ore properties had been assembled by him as an individual and without use of the railroad's capital

or credit. It would have been entirely proper for him to have considered them as a personal asset. High ethical standards led him to conclude that this rich iron ore development properly belonged to Great Northern, since its original separate development had been required in the interests of a conservative policy of separation of land development when it appeared speculative and might have entailed heavy losses. After it proved profitable, J. J. Hill turned it over to the railroad which was thereby placed in the same favorable position as though this asset had been its original development.

Mr. Hill's influence upon the agricultural development of the northwest and its general economic progress was no less marked and beneficial than his work for the construction and improvement of its transportation facilities. Likewise he was equally active in matters relating to the conservation of forest resources which he insisted must be considered as a crop to be grown rather than be regarded as a mine to be exploited.

Two significant events in these respects are the establishment by the Great Northern of one of the first tie-treating plants in the country at Somers, Montana, on Flathead Lake in 1901. In 1910, James J. Hill published an important book, "Highways of Progress" which epitomized his philosophy in respect to all of the varied interests which engaged his penetrating and active mind. He was a prolific speechmaker. This is fortunate since it insured his leaving relatively complete, permanent public record of his opinions and information on many subjects. One of the important sources of information for this chapter is a thick volume of bound copies of his speeches which is currently being used in

the preparation of this thesis. The flyleaf indicates that it was presented by Mr. Ralph Budd to my father at Klamath Falls, Oregon, on November 10, 1931; the night before the Great Northern-Western Pacific Northern California extension was completed at Bieber, California.

Hill's philosophy is set forth in vigorous and colorful language throughout his speeches and other public papers. These emphasize his views on an immense range of subjects. The most hideous sight in his eyes was an empty freight car. He strongly believed in "communities of interest" instead of destructive competition between railroads. He observed that if the Chinese would consume an ounce of flour a day an annual market would be created for 50 million bushels of American wheat.

The "Empire Builder" believed in low freight rates, and these required low cost operation. He advocated conservation of national resources, yet intensive development of the country, and increasing its population. Emigration from Europe was required to supplement the natural increase through the normal excess of births over deaths. Probably no one did as much to bring desirable emigrants into America as Jim Hill. Perhaps the most frequently quoted and best known observation of Mr. Hill's is "Land without people is a wilderness; people without land is a mob."

James J. Hill used statistics with the same brilliance of insight and effect with which he used words and ideas. Every great movement related to development of the northwest had his active interest and support; irrigation, immigration, conservation, forestry, the development of improved breeds of animals and strains of agriculturally useful plants, et al.

He was opposed to regulation of railways or of shipping.

He believed that if American shipping could be freed from such controls, vessels flying the Stars and Stripes would again rule the seas commercially. In addition to his ambitions for his railroads, Hill dreamed that he might restore the United States to the high position of those glorious days when its clipper ships rode proudly at anchor in every harbor of the world and dotted the oceans between them.

"The Empire Builder" did not fear the effect of the Panama Canal upon his railroad because he intended to make rates which would successfully compete with intercoastal shipping. Unfortunately, the timing of completion of the Canal in relation to World War I demands for shipping delayed the onset of rail-water competition for transcontinental traffic until after 1920 and then it was too late to obtain "Fourth Section Relief."

Great Northern, during Mr. Hills lifetime was so completely representative of and responsive to his judgment, policies and decisions that he remained its chief executive officer, in fact if not in title, up until the time of his death. However, it should be noted, although its effect upon Great Northern history was merely incidental, that "The Empire Builder" resigned the presidency of the company in 1907 in order to relinquish this post of command to his second son, Louis W. Hill. The father then became Chairman of the Board.

During 1911, Mr. Hill had invited Carl R. Gray, who is better known as Union Pacific's President from 1920-1937, to leave a Frisco vice presidency to become president of Spokane, Portland & Seattle. After a year (1912) in this office, Mr. Gray advanced to the presidency

of Great Northern, J.J. Hill then withdrew as Chairman and L. W. Hill succeeded to that post. Mr. Gray resigned, as previously noted, at the end of 1913 and Louis W. Hill filled both the chairmanship and presidency.

Shortly before the end of Mr. Hill's life,through his generosity and that of some of his admirers and associates in New York, the James J. Hill Chair of Transportation was endowed at the Graduate School of Business Administration then recently organized at Harvard University. William J. Cunningham, formerly an officer of the New Haven and of the Boston and Maine Railroads, was appointed to this Professorship, which is now held by Dr. George P. Baker.

This outline brings Great Northern history down to the beginning of 1913 when Ralph Budd first became directly identified with it.

CHAPTER VIII

FOUR YEARS AS ASSISTANT TO GREAT NORTHERN'S PRESIDENT

Louis Walter Hill was Mr. Budd's superior but while his father, James J. Hill, lived, "The Empire Builder" was Great Northern's "chief." The latter's standards and traditions remained enduring. Ralph Budd's own qualities as an executive, an engineer and a leader were no less important in endowing the Hill traditions with qualities of endurance than the work of the founder himself.

James J. Hill's philosophy of transportation was ingrained into the entire property, organization and methods of the Great Northern. Every division and department bore the stamp of his individuality, initiative and originality. However, the foundation which supported all was the economics of location and development built into the fixed plant of the railroad. This basic characteristic made the office of Chief Engineer a principal agency for the fulfillment of the plans and ambitions which Mr. Hill's constructive and courageous imagination conceived and the policies which he determined to make effective.

In Ralph Budd, the "Empire Builder" had chosen a man possessed of capacity and understanding capable of development into greatness equal to his own. The new Chief Engineer and Assistant to the President would soon become the thoroughly effective architect and builder of the standards and objectives which Mr. Hill sought for Great Northern. It will be recalled that in addition to the post of Chief Engineer, Mr. Budd had also been appointed Assistant to the President. During 1913, Carl R. Gray had succeeded L.W.Hill as President but Gray left at the end of the

year and his immediate predecessor (L. W. Hill) returned as his (Gray's) successor.

Budd then filled two important positions; Chief Engineer and Assistant to the President. After a year of serving in these dual capacities, it was apparent that the separate duties associated with each required Ralph Budd's full time and attention. His superiors suggested that he retain the position of greater interest and relinquish the other. He chose to continue as Assistant to the President, and successfully urged, with the support of L.W. Hill, that his predecessor as Chief Engineer be recalled to that office which he would vacate. J. J. Hill acceded to the recommendation which proved to be a good choice. The man in question had been relieved because of Mr. J.J. Hill's displeasure with him due to some snowsheds failing under the impact of slides.

Ralph Budd's duties and responsibilities as Assistant to the President enlarged rapidly as he developed experience and capacity in executive, administrative and corporate matters. Within a short span of time, the scope of his official activities, prerogatives and influence would have been more accurately described by the title of Executive Vice President. That corporate office, which while commonplace now was then infrequently used. However, Mr. Budd would carry this designation for two years but during a time when the corporation of which he would continue as an officer, did not direct the operation of its railway properties.

In 1913, Great Northern's transcontinental route was completing its 20th service year. This is a relatively short time in the life of a large corporation. Railways are complex physical organisms, which utilize

an extensive range of properties and equipment. There is roadway and track, bridges and structures, tunnels, signals and interlockers, the telegraph and telephone, yards and terminals, stations and office buildings, shops, wharves, warehouses and elevators, cars and locomotives of many types and descriptions; tools, materials and appliances in endless array. Every one of these myriad items has been undergoing continuous improvement throughout the years. The standards which represent great achievement and progress at one period may become obsolete within a decade.

The primary responsibility of railway management is to keep abreast of technological development. Budd, like the elder Hill, was distinguished by his unrelenting determination to keep Great Northern moving forward as rapidly as technological progress permitted and as traffic and earning power would afford. The day-to-day story of Great Northern during these years between 1913-1919 and others which followed is the record of transforming these principles into reality. Manifold individual projects, all part of a coordinated plan of development, converted the Great Northern into a railroad of unusual capability to move trains efficiently and economically and maintain superior standards of service.

Changes in an individual cannot be observed within a month or a year but over a span of time they become strikingly apparent. Railways, too, are continuous living organisms of such vast scope and dimension that single events and developments seem imperceptible but when accumulated over years, they afford startling contrasts. The story of this multiple achievement is the detailed record of the development of the physical details and service of the Great Northern Railway. These extensive

improvements were concentrated, not within a single location, but were widely diffused over a system serving an area 1,500 miles in length and several hundred miles in breadth. This report entails a study not only of what was done, but where it was done and what were the benefits sought and obtained.

James J. Hill had the best understanding of the economic principles of location of any railway builder. He was the first one to comprehend thoroughly the beneficial effects which favorable physical characteristics of grades, curves and distances would have upon operating costs and service standards. One of Hill's often quoted maxims is "The straight, level line wins." While geography and topography prevent the literal attainment of such ideals, he sought to approach them as closely as skilful engineering and the prudent use of capital would permit. Great Northern embodies the most favorable physical characteristics of grades and curves of any transcontinental carrier within the United States. These advantages appear statistically in Appendix "A", listing the mountain crossings of the western lines.

One of Hill's basic principles for development of the country led him to substitute an alternate single track line for a second track. From the standpoint of train movement capacity, alone, a double track line has four times the capacity of a single track with similar grades, curves and auxiliary facilities. Construction of two single track lines is also more expensive than to build a double track one, and the latter will have twice the capacity of two equivalent single track routes. However, this policy permitted a greater area to be served by main lines and this afforded better service than could be provided by branches.

This will explain the alternate main lines within several parts of the system. The most familiar examples are found between Twin Cities and Fargo, and between the Red River and Minot. The second route between the latter was provided by the 200 mile New Rockford Cut-off completed in 1912, just prior to Mr. Budd's direct association with Great Northern. The new route reduced distance, gradients and curvature in addition to serving its principal purposes of providing additional capacity and opening up new areas for development.

The first project of line extension, began after Ralph Budd became Great Northern's Chief Engineer, was a plan conceived by Mr. Hill to build an alternate main track from New Rockford, North Dakota, on the previously mentioned Cut-off, to Great Falls, Montana. There it would connect with existing mileage between Billings and Shelby, which would continue the projected route westward to rejoin the original main line near the eastern base of the Rockies. Had this been built it would have run through Watford City, North Dakota, entered Montana at Fairview on the Yellowstone River and continued west following the latter stream through Sidney before striking across country to Richey, Lewistown and Moccasin, the intersection with the Shelby-Billings route.

Reference to the map serving as the Frontispiece will show the points named and indicate the portions of the route that were actually built. In 1913, Mr. Budd's first year as Great Northern's Chief Engineer, a 15 mile branch was laid down alongside the Yellowstone River, from its confluence with the Missouri near Snowden, Montana, close to the location of Old Fort Union, to Fairview (17 miles) and Sidney

(25 miles.) From Fairview construction was carried eastward for 30 miles to Arnegard, North Dakota, in the same year and extended 8 miles further to Watford City, in the following one. The latter point has remained the terminus to this day although considerable grading was subsequently done between it and New Rockford, but no track was placed in service. The Watford City line runs through a 1456' tunnel; the only one in North Dakota. In 1916, a fifty mile extension westward carried the line from Sidney to Richey. At the same time, a little grading was done on the route projected eastward from Lewistown. Northern Pacific's main line parallels the Yellowstone River for 350 miles from Livingston, Montana, the Gateway to "The Park", to Glendive, at the very eastern end of the state. It had built a branch alongside the Yellowstone from Glendive to Sidney, 55 miles, prior to the time Great Northern reached the latter point.

In considering Great Northern's plans for spreading mileage most effectively for the development of its territory, attention must be called to the unique pattern of "herringbone" branches which extend in a northwestwardly direction from Great Northern's main line across the northern part of the state of North Dakota. The spacing of these feeder lines into the rich wheat fields of that area represents the approximate distances, variously, from 20 to 40 miles, which would make a line of railroad accessible to all of the farms within the economical wagon haulage limits for moving wheat to railway served elevators, and yet not be so close to one another as to dilute the tonnage accessible to each below the limits of economical operation. This pattern of mileage was also

intended to block any western extension of Canadian Pacific's Soo Line.

Shortly before Mr. Budd became directly associated with Great Northern, the Federal Congress had passed legislation setting aside the great mountain forest areas now known as Glacier Park in the region bounded by Canada on the north, the Great Northern on the south, the Flathead River on the west and the base of the Rockies on the east. Mr. Hill had been advocating that action for many years and had promised to develop fine resort hotels and related facilities within the Park when it might be established. Important construction related to these improvements followed as one of the unusual engineering activities of the new Chief Engineer and Assistant to the President.

The "Empire Builder" took a leading part in educating Americans to travel extensively in the western part of their own country. The familiar slogan "See America First" -- first appeared, probably around 1910, on Great Northern travel literature and freight cars. At that time the complete legend was "See Europe if you will, but see America first." Louis W. Hill is credited with the authorship of this famous slogan. Mr. Budd's work has continuously facilitated the accomplishment of its objective. Some years later, this popular phrase was reinforced by Great Northern's now well known trade mark, the mountain goat. This symbol was suggested by W. P. Kenney, then Vice President in charge of traffic and Mr. Budd's successor as president.

Five busy years followed in quick succession, 1913-1917. Traffic increased steadily with the development of the northwest and the world-wide demand for American products following the outbreak of World

War I in August 1914. The railways of the United States established new peaks in 1916. America's entry into the conflict in the spring of 1917 led to the creation of an American Expeditionary Force. Intensified efforts followed to supply it and the allies with munitions and general supplies. Great quantities of freight backed up at Atlantic seaboard ports awaiting unloading from railroad cars. Congestion followed which slowed down railway operations on the principal eastern trunk lines as far west as Pittsburgh and Buffalo.

The railways attempted to meet the emergency by unification of services and operations under the control of the Railway War Board, a conference of presidents representing the principal railways of the nation. The Department of Justice was unwilling to grant the assurances of immunity from the requirements of the Sherman Anti-trust Act that was necessary to clothe the Railway War Board with adequate authority. President Woodrow Wilson attempted to meet the transportation emergency by seizure of the railways and operation under the United States Railroad Administration. This form of control began on December 28, 1917, and ended on March 1, 1920. William G. McAdoo, Secretary of the Treasury and the President's son-in-law, served as Director General of Railroads for one year and was then succeeded by his principal assistant, Walker D. Hines, who prior to Federal Control had been Chairman of the Executive Committee of the Santa Fe. (15)

(15) Mr. Hines returned to private practice of law in New York City after the termination of Federal Control. Great Northern was among his clients. He represented it in many important cases, particularly the "Great Northern Pacific Consolidation" of 1927-30. Mr. Hines also served as a Director of the Burlington. He died early in 1934.

The inevitable adverse effects of Federal Control were widespread, although generally less detrimental to the western than the eastern lines. When it ended, the earning power, property condition and morale of the rail carriers was impaired throughout the nation. During that period, the railways had been operated by Federal Managers reporting to Regional Directors on the staff of the Director General of Railroads in Washington. Administration of the corporate affairs of the individual railroad companies was continued by officers who were not identified with the operations under Federal Control. Mr. Budd took charge of these in a new capacity, the Executive Vice Presidency which he filled during 1918-1919. At the outset of 1920, he was advanced to the the Presidency of the company but its properties, like those of all of the principal railways, were still under Federal Control. This status ended on March 1, 1920 and on the next day Ralph Budd became the chief executive officer of the Great Northern Railway.

Approximately midway through this initial six year period in Mr. Budd's associations with Great Northern, and before American entry in the War and the Federal Control period which followed, the "Empire Builder" died on May 31, 1916. This terminated the work of one of the nation's most useful citizens. Perhaps it is just as well that James J. Hill was spared the great unhappiness that this unfortunate episode in the history of every railway would have caused him.

"Greatness became" James J. Hill, said the New York Times in commenting editorially upon the "Empire Builder" at his death. "Whatever he had done, it had been greatly done" that newspaper further observed.

CHAPTER IX

PRESIDENT OF THE GREAT NORTHERN
(1920-1931)

The immediate task ahead of the Great Northern's new President was the rehabilitation of its property and equipment, earning power and organization after the deterioration which Federal Control caused in each. There were also major corporate problems of reaching settlements with the government on the question of rentals due to the railway, along with offsetting adjustments for capital improvements made with government funds. In addition railway claims for undermaintenance had to be prosecuted to a satisfactory settlement and the rights of the carrier protected during the six months following the end of Federal Control while the "standard (rate of) return" paid during that period was continued as guaranteed minimum earnings while the transition to private management was in progress.

The period of readjustment was a difficult one for all railroads and was only satisfactorily concluded through the purchase of large numbers of new units of equipment of all classes and intensive work in the restoration of the condition of fixed property. Replacement of equipment, materials and structures had proceeded during the Federal Control period, at a rate much below that at which the life of the existing property was dissipated through intensified use and through normal exposure to the weather.

Service standards, both freight and passenger, had deteriorated throughout the country. This had caused widespread dissatisfaction among shippers and travelers everywhere. Notwithstanding the fact that Federal operation caused the circumstances, their very existence paradoxically

threatened the continuation of private operation unless marked improvement could be effectuated with reasonable promptness. The problem of restoring pre-war standards, and going on from them to attain better ones, was further handicapped by serious labor troubles which were manifest by prolonged strikes of switchmen throughout the spring and summer of 1920 and of the shopmen for an extended period beginning July 1, 1922.

By 1923 the most serious difficulties had been surmounted by all of the railroads. Under the leadership of the President of the American Railway Association, Richard H. Aishton, who had formerly been Director of the Central Western Region, U. S. R. R. A. at Chicago, and before that President of the Chicago and North Western Railway, the railroads at their annual member road meeting in New York in October 1923, adopted a comprehensive program committing the individual carriers to the most extensive programs of equipment acquisition and rehabilitation of fixed property ever undertaken. In consonance with this was the formation of the Regional Shippers' Advisory Boards, designed to bring the railways and the traffic managers of their industrial patrons together quarterly in conferences to study current problems of car supply and freight service cooperatively. These organizations proved highly successful from the outset and have become permanent institutions linking railways and shippers. The initial work in organizing the Regional Shippers' Advisory Boards is deserving of special mention in this narrative, since the very first meeting of this nature was the one held on October 25, 1923 at Williston, North Dakota, which small city Great Northern serves exclusively. Donald D. Conn, then recently appointed manager of the Public Relations Section of the Car

Service Division of the American Railway Association, in close collaboration with Mr. Budd and other officers of the Great Northern laid foundations successfully in this first conference for the subsequent nation wide development and permanent influence and usefulness of the Regional Shippers' Advisory Boards.

Under the vigorous leadership of Ralph Budd, Great Northern made a quick recovery from the adverse effects of Federal Control and the depression of 1921. By the end of 1923, these handicaps had been liquidated and the company stood on the threshold of another period of extensive and intensive development. Increasingly generous appropriations of capital expenditures were made for motive power and equipment, both freight and passenger and for improvement of the many components of the fixed property.

Meanwhile the principal single financial problem occurring during Mr. Budd's administration of Great Northern had been met. It centered in the maturity on July 1, 1921 of the $215,000,000 4% bonds issued jointly with Northern Pacific in 1901 to finance acquisition of the Burlington. This heavy indebtedness, requiring the largest corporate refunding on record to this day, occurred during a period of business depression and an adverse money market characterized by the highest interest rates since the Civil War. Funds were provided through the sale of another joint issue of Great Northern-Northern Pacific bonds. The amount was $230,000,000, and to make them salable around par an interest rate of 6½% was required. It is significant by comparison that Mr. Hill had objected to the original (1901) rate of 4% as excessive and, hence, had limited the term of the original bonds to 20 years, as previously noted.

This debt certainly fell due at a most inconvenient time.

The high interest rate made it desirable to restrict the term of the new loan to 15 years but, in order to make the bonds readily salable, the joint issue was convertible, at the option of the holders, into Great Northern General Mortgage 7% bonds, Series "A" due 1936, or into Northern Pacific Refunding and Improvement Mortgage 6% bonds, Series "B" due in 2047, or in any ratio betweenthe two, subject to the right of conversion into bonds of either company ceasing when $115,000,000 of its bonds had been issued in this manner.

The new issue of Great Northern-Northern Pacific Joint Collateral Trust and Convertible 6½% bonds, due 1936, were sold by the bankers for both companies, J. P. Morgan & Co., First National Bank of New York and National City Co. of New York in April 1921 at 96½. The joint bonds were quickly converted. The Great Northern then asserted that the exchange of the Joint 6½% bonds for its 7% bonds, as compared with Northern Pacific's 6% bonds, resulted in an increased interest burden, subject to equalization as part of the joint cost of the financing. The controversy was concluded by arbitration which in 1923, awarded Great Northern $1,500,000 in settlement of its claim.

This refunding wound up with Great Northern's liability therefor being $115,000,000. This was reduced to $106,000,000 in 1927 and around $100,000,000 in 1936, but that large indebtedness confronted Great Northern for refunding again in a depression year. This maturity came due after Ralph Budd had left the Great Northern for the Burlington, so the problem remained for his successor, Mr. W. P. Kenney, to negotiate in 1935-36. Approximately $100,000,000 ten year 4% bonds in two series

"G" and "H" of equal amounts convertible into Great Northern capital stock at $40.00 per share for series "G" bonds and $75.00 per share for series "H" were sold to stockholders of the company. (16) The financing was underwritten by the Reconstruction Finance Corporation.

Following the Great Northern tradition of increasing locomotive capacity as rapidly as technical progress permitted, the program of equipment acquisition was featured by the initial order for thirty heavy 2-10-2 ("Santa Fe") type locomotives (G.N. designation Q-1) having 63" wheels and producing 87,000 lbs. tractive effort. These engines were designed to haul 3,000 ton freight trains over the 0.8% grades of the Rocky Mountain District of Kalispell Division. They went into service in 1923. At the same period, 28 new 4-8-2 mountain type engines were obtained for passenger service.

James J. Hill had never evidenced any particular interest in passenger service or its improvement and development. His observations on transportation economics were generally critical of this function of their work, even in that pre-automobile era when railroads necessarily provided virtually all of the intra-city passenger movement, except that using the electric interurban lines. Ralph Budd's career, on the other hand, has been identified with many important developments of passenger service and equipment, and a keen awareness of the usefulness that fine, fast passenger trains have fostering competitively successful shipper and community relations and high morale among employees.

(16) Par value of stock changed from $100 per share to no par value in order to permit this conversion at less than $100 per share.

The first important development of this character associated with Mr. Budd was an order of new cars to reequip Great Northern's Chicago (in connection with C. B. & Q.) -- Twin Cities Seattle "Oriental Limited"; a name reminiscent of Hill's trans-Pacific maritime ambitions. The new "Oriental Limited" and Glacier Park together soon proved a very effective combination in strengthening Great Northern's competitive traffic position. This fine newly outfitted train, placed in service in 1924 on a 70-hour Chicago-Seattle schedule was advertised as being "As wonderful as the country it serves." Such a slogan was an appropriate sequel to Louis W. Hill's "See America First."

Included among a number of individual changes designed to improve passenger services and practices was the transfer to Pullman operation of sleeping car lines on secondary routes which had previously been operated by the railroad itself. (d)

Great Northern during this period became a leader in substituting small, light weight rail coaches powered by gas engines usually through electric drive for steam operated local passenger trains that were beginning to become unprofitable due to diversion of their business to the highway.

These same busy years of 1924-1925 witnessed Great Northern's initial entry into the field of highway transportation through newly organized affiliates. Great Northern Transit Co., the Northland Transportation Co., and the Minnesota Transportation Co. This action is positive proof that Ralph Budd was one of the very first railroad executives to foresee the future significance of the motor bus and the motor truck

(d) Prior to Federal Control, G.N. provided both its own sleeping cars and its own Great Northern Express Co. Following return to private management, G.N. arranged for Pullman owned and operated cars to be assigned to the

(continued on P-75)

both as competitors and as effective affiliates of the railway. Great Northern's rapidly expanding passenger carrying operations over the highways of Minnesota and other states which it served were destined to grow to 3,300 route miles by 1929 and then be sold to the Greyhound System and operated as Northland Greyhound with G. N. retaining a minority interest. Meanwhile, Ralph Budd's elder son, Robert W. Budd, had become identified with this work for Great Northern. The latter followed Northland Transportation Company into the custody of its new owners and is now the President of the Greyhound subsidiary having jurisdiction over its extensive central operations having their headquarters in Detroit.

The Signal Department of the Great Northern had been organized in 1905. Prior to that time a limited mileage of automatic signals had been installed on the heavy ore carrying Mesabi Division and a number of interlocking plants had been built. Beginning in that early year (1905) a progressive signaling program had been carried out. Interlockings of railroad grade crossings, drawbridges and junctions came first, totaling 132 plants with 2,300 working levers by the end of 1924. Five of the former were all-electric installations, and there were 25 automatic interlockers.

Between 1910-1916, the greater part of the mileage in the Rocky and Cascade mountains was equipped with automatic block signals. In 1922, 165 miles of road from Whitefish, Montana, to Stryker; from Rexford, Montana, to Troy, and from Bonners Ferry, Idaho, to Newport, Washington, were signaled with semaphores. Starting in 1923, color light signals using three indications were adopted as standard, with the exception of a few short sections of semaphores which were installed since then to

(d) Cont. from P-74)
principal long distance trains but the railroad provided its own sleepers on the less important runs until the above change to complete Pullman operation began in 1925.

to close up gaps on divisions otherwise equipped with the latter type. In 1923, color light signals were installed on 409 track miles and in 1924 on 202 miles. Installation of 350 additional miles in 1925 and an equal distance in 1926 completed the automatic signalling of the main line, via the New Rockford Cut-off, from St. Paul to the Pacific Coast.

The Great Northern was one of the pioneer roads to use low voltage remote control switch machines for the operation of passing track and junction switches and it was the first road to make extensive use of automatic interlockings for the protection of train movements at ends of double track crossings and gauntlets. Twenty-five of these installations were in service by 1925.

The record of each succeeding year contains significant evidences of additions and betterments to plant and equipment designed to permit the Great Northern Railway to produce better freight and passenger transportation more efficiently. 1925 witnessed further improvement in motive power with the delivery of four huge 2-8-8-2 Great Northern Class R-1-S Mallet type locomotives producing 128,000 lbs. tractive effort. This represented the highest rating of any locomotive built up to that time. The R-1-S engines were placed in service across the Rocky Mountains between Cut Bank and Whitefish, Montana, and raised the tonnage rating over the 0.8% ruling grades of the Kalispell Division from 3,000 tons with Q-1 locomotive to 4,000 tons. In both cases helpers were required up the 1.8% maximum grades for 14 miles from Walton to Summit.

All railroads were then endeavoring to extend the length of their locomotive runs in order to derive increased average daily engine mileage and to reduce the expense and time losses of servicing at intermediate

points. Great Northern established a record for that period when, during September 1925, one of its oil-burning 4-8-2 type locomotives, G. N. No. 2517, made a round-trip between St. Paul and Seattle, 3,571 miles, in continuous service. On the eastward return trip, it hauled a special train of silk of 18 cars in 52 hrs. and 25 minutes.

That same year evidenced an unusual instance of practical public relations, particularly in the northwest wheat country where the farmers and ranchers had traditionally been uncooperative with the railroads due to differences over rates, car supply and service. By this time, Great Northern and its agricultural neighbors were living together in such amity, that those who would be benefited by the extension, subscribed at par to $250,000 of Great Northern stock, at a time when it was selling below 80, to finance a fifty mile extension in northeastern Montana from Scobey to Opheim. The line was promptly placed under construction and was completed in the following year (1926). It represented the first railway extension to open up new wheat growing areas in the northwest built by any railroad since before the War.

As a disciple of "Jim" Hill, economic waste occurring through duplicating service and facilities has always been repugnant to Ralph Budd. Contrary to prevailing characteristics of most managements which have preferred to maintain individual competitive corporate identities, in spite of such attendant circumstances, both Hill and Budd have ever been in the forefront of policies designed to effectuate coordinations and consolidations. Abundant evidence of this is found in the detailed records of their respective administrations to reinforce their public statements on this subject.

The Transportation Act of 1920 legalized pooling of services and revenues, under Interstate Commerce Commission authority, although such action had been continuously prohibited since the original act became effective in 1887. Availing themselves of these new privileges, Great Northern, Northern Pacific and Union Pacific pooled their passenger train services between Seattle-Tacoma and Portland in 1925. During the following year, Great Northern, Northern Pacific and the Soo Line did likewise between the Twin Cities of St. Paul-Minneapolis and the Twin Ports of Duluth and Superior.*

Ralph Budd's varied interests covered every subject identifiable as of consequence in the affairs of the Great Northern Railway, and the region which it served. He has long been a thorough and understanding student of history, geography and economics who traced the sequence of cause and effect between events of the past and developments of the present. The historic northwest offered an immense field for his alert and inquiring mind and constructive imagination.

He not only wished to derive the pleasure and benefits of such activities for himself but to share them with others. In accomplishing the latter he utilized Great Northern's identity with places of historic importance to focus the additional attention of the public upon the railway and the region it served. To this end, the Great Northern cooperated with the work of historians and historical societies and the railway itself sponsored a notable series of historical booklets,

* These are the only pooled passenger train services in the United States and have remained in effect.

mostly issued in 1925, which are listed in the footnote below. (17)

It is significant that the year of the publication of most of the Great Northern historical summaries coincided with a notable journey of the Upper Mississippi Valley Historical Society, and collaborating organizations, over the Great Northern from St. Paul to the Pacific Coast. The itinerary, arranged by Mr. Budd personally, permitted stops at all points of historic interest along the route. It was designed with special reference to following the journeys of such famous pathfinders as Lewis and Clark, Pierre Gaultier de la Varennes (Sieur de la Verendrye), David Thompson and John F. Stevens. Monuments were dedicated along the way to Thompson at Verendrye, North Dakota, to Lewis and Clark at Meriwether, Montana, and to John F. Stevens at Summit station, Marias Pass, Montana. Mr. Stevens himself was present at the

(17) "Lewis & Clark Expedition." By Grace Flandrau
"Frontier Days Along the Upper Mississippi". By Grace Flandrau
"Koo-koo-sint The Star Man." By Grace Flandrau
"Astor & The Oregon Country." By Grace Flandrau
"The Verendrye Overland Quest of the Pacific". By Grace Flandrau
Reprinted from "Quarterly of Oregon Historical Society" - June 1925.
"Historic Northwest Adventure Land." By Grace Flandrau
"Ft. Union and its Neighbors on the Upper Mississippi." By F. B. Harper
"Story of Marias Pass." By Grace Flandrau
"A Glance at the Lewis & Clark Expedition." By Grace Flandrau
"Chief Joseph's Own Story." By Grace Flandrau
Reprinted from "North American Review" - April 1879
"An Important Visit."
An excerpt from the itinerary of Zebulon M. Pike St. Paul to Leach Lake - 1805
"Red River Trails." By Grace Flandrau

Mrs. Flandrau, the authoress of a number of the foregoing historical summaries, is now a resident of Farmington, Connecticut, but is a member of a prominent Minnesota family and spent her earlier life in that state. She has studied and written extensively on the history of the northwest. Mrs. Flandrau has assisted me in this biography through information, advice and encouragement.

event honoring him. The principal address on that notable occasion was delivered by the Honorable Pierce Butler of St. Paul, a member of the Supreme Court of the United States.

Mr. Budd's widening interests and enlarging reputation made him in increasing demand as a speaker at gatherings of all kinds which brought railroad and business men together. Files of his addresses and reprints of them in the "Railway Age" and other journals attest to the number of such appearances, the breadth of topics which Ralph Budd covered in them and the scholarly qualities of the papers he prepared.

The mid-twenties was a period of increasing general prosperity in the nation. By that time, all traces of the difficulties of 1917-1922 had been eliminated by the progress of internal improvements on the Great Northern. The cumulative effect of these factors in improving the earning power and credit of the company enabled Mr. Budd to secure Board approval in 1924-25 for the two most important developments of his administration. The first of these was the extension of the Oregon Trunk Railway from Bend into the "Klamath Basin" with Klamath Lake, Oregon, as the immediate goal, but California as the probable ultimate objective. The second was the Cascade Tunnel. These projects represented not alone Mr. Budd's ideas and ambitions for Great Northern but the fulfillment of those of the late James J. Hill, himself. Each will be the subject of a separate chapter so are not included in this part of the narrative but are necessarily mentioned here in order to preserve chronological continuity. A third and even larger and more significant proposal followed in 1927 but it had to be dropped in 1930 because of political opposition -"The

Great Northern Pacific Merger." It will also be discussed in detail later on.

Sometimes future developments prove that what appeared to be a minor innovation at the time constitutes a landmark of importance. Such an instance is found in the purchase of Great Northern's first diesel electric locomotive. The history of this new type of motive power began in 1924 with the construction of a small switcher by American Locomotive Co., General Electric Co. and Ingersoll-Rand Co. Great Northern was among the first railroads to purchase one; a 600 h.p. capacity machine, built by American Locomotive Co. It was acquired in 1926 for service in the flour mill and elevator district of Minneapolis where steam switchers were objectionable.

Coordinated air-rail service began in 1927 with a number of railways providing service by night and air lines by day. Great Northern was among the companies which entered into arrangements of this character for exchange of passengers at Minneapolis, using rail to the west and air service to the east of that city.

The rapid expansion of the economy of the United States and Canada continued through 1928-29. In the northwest, the first of those two years was the one of the greater activity. Among other reasons, the wheat crop was larger and the market for it was better. However, the demand for ore and lumber and other products of Great Northern states raised Great Northern's net railway operating income to $32,500,000 in 1929, notwithstanding an $800,000 drop in gross revenues from the 1928 peak of $126,750,000. (See Appendix "B" for statistical and financial

results of operations of Great Northern during Mr. Budd's administration.)

Many new records of operating efficiency were established on Great Northern during 1928-29. Most spectacular among these was its raising the average train load of ore movements from the Mesabi range to its Allouez Docks, Superior, Wisconsin, to a new high of 13,353 gross tons per train. The revenue weight carried through this huge total was 10,269 tons per eastward train to Lake Superior. This achievement represented the fulfillment of years of continuous improvement of motive power, cars and all of the varied physical facilities required in the mass production of transportation on a scale which was without parallel on any railroads except the coal carriers of southern West Virginia.

The success of the R-1-S locomotives (2-8-8-2 class) on the Kalispell Division, first introduced in 1925 and mentioned on a previous page, led to the construction of a larger and more powerful R-2 class producing 146,000 lbs. tractive effort. Ten of these monsters of the rails were built at Hilyard Shop, Spokane, Washington, in 1929 and placed in service on the Kalispell Division. Passenger motive power was also improved through the addition of the "S" class, 4-8-4 ("Northern" type) locomotives, which made its initial appearance on Great Northern in 1929. Six of the S-1 class, had 73" driving wheels and produced 67,000 lbs. tractive effort. These were first assigned between Havre, Montana, and Whitefish; the line across the Rockies. The S-2 class, which followed in 1930 was an identical machine in all respects except had larger, 80" diameter driving wheels, and consequent reduced tractive effort; 58,300 lbs. These engines were initially used between Spokane and Wenatchee, and between Havre, Montana, and Williston, North Dakota.

The "S" class locomotives were designed to meet the faster transcontinental schedules, with a longer and heavier train, that were planned for Great Northern's new standard bearer, that was appropriately named "The Empire Builder". It embodied all of the comforts and refinements of modern travel which ingenious car builders and passenger traffic managers were building into the new trains then going into service on many railroads. Completely equipped with new cars, all carrying names identified with the historical background of the railroad and its territory, except the diners named for eastern states, "The Empire Builder" was placed in service on a 63 hr. westbound and 61¼ hr. eastbound Chicago-Seattle schedule on June 10, 1929. In 1930, the time both ways was reduced by 2 hrs. "The Empire Builder" relegated the "Oriental" to secondary status and the depression soon led to the complete withdrawal of the latter as a feature train.

L. W.Hill retired as Chairman of Great Northern on October 10, 1929. He died in his 75th year in 1948.

Towards the end of 1929, a recession in business set in throughout the United States. It gathered momentum continuously. Eventually, the forces of deflation produced the complete economic stagnation which characterized 1932-33. Businesses such as railroads were peculiarly vulnerable to the problems of service contraction and expense control necessary to meet these reverses. Their difficulties were magnified by traffic contractions far exceeding those representative of previous periods of depression.

Every railroad was confronted with its own particular problems.

Those of the northwest which served great states given over to grain fields and ranches were exposed to the most severe contractions of traffic. The counties which they served suffered greviously from falling prices for their products and curtailed markets at any price.

Yet, the Great Northern remained one of the few railroads of America which can proudly assert that it has always paid every debt that it owed in cash on the day when it was due. This company soon found that its splendid property and strong organization was an even greater asset in times of adversity than in years of prosperity. The financial measurements of the depression up through 1932 are recorded in the statistical data of Appendix "B". Were that continued beyond 1932, recoveries from the low point of net railway operating income touched in that year would be seen. The deficit after fixed charges in 1933 and 1934 were not of large amount or proportion and never again since that year has such a financial contingency occurred. Let us hope it never will again, particularly now that the fixed charges of this company, due to long continuity of sound financial, as well as other, business policies, have reduced the annual interest burden to $8,000,000 or but 40% of the 1932 basis when it approached $20,000,000.

Wherever a great leader and administrator appears in any corporation, his principal associates will also be found to be men of superior ability and capacity. Mr. Budd would be the first to share with them the credit for the achievements which properly and necessarily, from the standpoint of the outside world, are associated only with the chief executive.

Great Northern's entire management team was "all-star"

character. Most important among the department heads are those in charge of operation and traffic. The company has always been recognized for the strength of its operating organization throughout its system and during the entire history of the company. Certainly this basic component attained extraordinarily high standards of performance during recent decades. These represent most of all the work of its Operating Vice President, Charles O. Jenks, himself the son of a Great Northern pioneer and associate of J. J. Hill. Jenks was appointed to this office at the end of Federal Control on March 31, 1920, when the railways were returned to private management. He continued in this position until his retirement in 1947. Mr. Jenks was ably assisted by Duncan J. Kerr during much of the period of Mr. Budd's administration, and thereafter until Kerr resigned to go to the Lehigh Valley in 1936. (e)

The traffic department of the Great Northern during the period of this narrative was in charge of Mr. W. P. Kenney, who succeeded Mr. Budd as President.

The problems which confronted all railroads in 1931 bore heavily on New York Central. One of its former officers, F. E. Williamson, was then President of the Burlington, having reached the latter office through the Operating Vice Presidency of Northern Pacific which he filled for three years, 1925-1928. Late in 1931, the Board of Directors of New York Central invited Mr. Williamson to return as President of that company, which he did on January 1, 1932.

The resulting vacancy in the Burlington was filled by the election of Ralph Budd to that post in December 1931. He left the Great Northern at the end of the year in order to assume his new duties at the

(e) Kerr's illness in 1939(and death in 1940)prevented his accepting an invitation to return as Great Northern's President after the death of W. P. Kenney in January 1939. This vacancy was not filled until September 1939 (by F. J. Gavin) awaiting the possibility of Mr. Kerr's recovery.

outset of the following one, 1932.

Three chapters will follow to outline separately the most important incidents in Mr. Budd's association with Great Northern; (1) the extensions into southern Oregon and northern California; (2) the construction of the Cascade Tunnel; and (3) the proposed Great Northern Pacific consolidation. Only the last failed of accomplishment. After these events are reviewed, the record of Ralph Budd's work, since 1932, is primarily registered in the subsequent progress of the Burlington.

The financial measure of the additions and improvements chargeable to capital accounts made to Great Northern during Mr. Budd's administration totaled $160,000,000. This impressive sum does not include the additional large amounts of money necessarily appropriated for most projects as the non-capitalizable portion of betterments which must be paid for out of operating expenses under the Interstate Commerce Commission's accounting instructions.

This eventful transition occurred when Mr. Budd was only fifty-two, for he had been appointed President of Great Northern at forty. At an age when even men of great capacity are just attaining positions of major responsibilities and opportunity, he was completing twelve momentous years in which he brought brilliant all-around leadership -- operation -- commercial -- financial -- public relations -- to one great railway.

Now he was moving on to begin a new and equally distinguished career with another and even larger property. Notwithstanding the handicaps of a decade of depression which lay ahead, he would develop the Burlington property and organization so intensively that when he would withdraw from its management 18 years later, that company had attained a place in the forefront of American railways measured by every test of efficiency

and earning power; notwithstanding the basic fact that its system lay in agricultural states where most of its large competitors had succumbed to bankruptcy.

Footnote: The year 1930 was a memorable one for Mr. Budd. At the invitation of the Russian Government he spent several months in that country studying the physical condition and operating methods of its existing system of railroads and analyzed projected extensions, notably the Turk-Sib (Turkestan-Siberian extension). His findings, conclusions and recommendations were submitted in a comprehensive report. He was accompanied by his son, John, for a part of the time he was in Russia. His extensive travels included a complete trip over the Trans-Siberian Railway.

CHAPTER X

ENTERING SOUTHERN OREGON AND NORTHERN CALIFORNIA

These proposed routes fulfilled the "Empire Builder's" final ambitions for the extension of the Great Northern and, in fact, were but the conclusion of the complete project which had brought Ralph Budd into the service of the Hill lines, in 1909. Under Mr. Budd's direction, the Great Northern reached Klamath Falls, Oregon, on May 12, 1928, and connected with the Western Pacific, at Bieber, California, on November 11, 1931.

The first and, for nearly forty years, the only north-south lines across Oregon, connecting Portland and the Columbia River valley with California, was the railroad completed by Southern Pacific in 1887. The Willamette valley provided an easy route for its first 125 miles between Eugene and Portland but the next 300 miles to the California boundary traversed a rugged, mountainous area where the east-west direction of drainage and the offshoots of the Cascades inevitably produced a profile and alignment of the track which made railway operation difficult, slow and expensive. The most serious handicap was the crossing of the Siskiyou mountains at the southern end of the state. The ascent to the summit at elevation 4,113 ft. required 3.3% grades and 14 degree curves.

One of the principal improvements which Edward H. Harriman projected for Southern Pacific was the 275 mile "Natron Cut-off" from Springfield Junction, near Eugene, Oregon, to Black Butte and Weed on the old line just below the California boundary. The new route would avoid the difficult country described in the preceding paragraph by locating

the railroad east of the Cascades in a high but comparatively straight and level valley lying between that massive chain of mountains and the smaller Walker Range, further east.

While the Cascades would have to be crossed twice and at higher altitudes than the one scaled in surmounting the Siskiyou, the ascent would be less difficult and the physical characteristics of the new railroad would represent marked improvement over the old one relegated to secondary services by this change. An additional advantage sought by Harriman through this new project was access to the immense timber reserves on the east slopes of the Cascades in Oregon. The largest forests remaining in the United States stood there. Harriman's death in 1909 and the subsequent anti-trust suits which terminated Union Pacific control of Southern Pacific in 1914 stopped the construction of latter's "Natron Cut-off."

No sooner were the Southern Pacific-Union Pacific affiliations dissolved than the government undertook to force Southern Pacific to divest itself of its wholly-owned and leased Central Pacific Railway Co. The latter holds the title to the main line of the historic "Overland Route" between Sacramento and Ogden and also other important Southern Pacific system mileage in California, together with the then projected "Natron Cut-off" in Oregon. The case was tried in a United States District Court which decided in favor of Southern Pacific in March 1917, but the Department of Justice appealed to the Supreme Court. Federal Control intervened to delay the proceedings so a decision was not rendered until May 1922. A verdict was rendered in favor of the government's

case and against the Southern Pacific. Meanwhile, the Transportation Act of 1920 had conferred power upon the Interstate Commerce Commission to authorize control of one railroad by another, notwithstanding the Sherman Anti-trust Law. Pursuant to this new authority, the Commission held, on February 6, 1923, that Southern Pacific's control of Central Pacific was in the public interest. The Department of Justice contested this action before the Circuit Court of Appeals, but in June 1923, this tribunal upheld the Commission's decision. In August 1923, the government announced that it would take no further action. With this vital problem behind it, Southern Pacific immediately resumed work on the completion of the Natron Cut-off in Oregon and the continuation of double tracking of the "Overland Route" eastward from Sacramento over the Sierras. Both of these were Central Pacific projects. The "Natron Cut-off", or "Cascade Route" as it became known after completion was ready for service in August 1926.(18)

This strategic extension by Southern Pacific in Oregon, together with the continued development of Great Northern under its vigorous new President, who perpetuated the great traditions of James J. Hill, led Mr. Budd to sponsor the extension of the Oregon Trunk Railway (19) southward for 150 miles from Bend into the "Basin" around Klamath Falls and Klamath Lake. Such a route would penetrate the vast Oregon forests

(18) Its feature train named "The Cascade Limited" in honor of the line, was inaugurated on April 17, 1927.

(19) It will be recalled that Oregon Trunk was wholly-owned by Spokane, Portland & Seattle Railway and the latter in turn was jointly owned by Great Northern and Northern Pacific.

which Southern Pacific considered its special domain. Moreover, a terminal at Klamath Falls would constitute an effective base from which to make a future advance into California.

The Transportation Act of 1920 required that extensions of railway mileage must be authorized by a "certificate of public convenience and necessity" issued by the Interstate Commerce Commission. While the Oregon project dates from 1924, and the application for the necessary approvals were submitted promptly, they were not obtained until 1926. The delay was inevitably due to protracted hearings in which the proposed extension of the Oregon Trunk Railway was spiritedly opposed by Southern Pacific and equally vigorously defended by its proponents of whom Mr. Budd was the most prominent and effective. His testimony, and frequent public addresses on the subject are summarized in a booklet issued by Great Northern during 1925, entitled "The Right Thing for Oregon." It is an intensely interesting statement both for its own contents and as a significant document relating to a major episode in the history of this railway.

The Interstate Commerce Commission decision directed the Oregon Trunk to secure, and the Southern Pacific to grant, trackage rights where this would avoid unnecessary duplication of construction. After further controversy and delay, this was arranged. Great Northern gained the right to use the new Cascade line of Southern Pacific from the present station of Chemult, but then called Paunina, into Klamath Falls, 75 miles south. This reduced construction by Oregon Trunk to the 68 miles between Bend and Chemult which in turn was facilitated for a short distance out of the northern terminus by the purchase and

rebuilding of a logging railroad that served the Shevlin-Hixon Lumber Co.'s mill in that city.

Before Oregon Trunk began this construction, Northern Pacific decided to withdraw from participation in the work. Possibly this action was in consideration of advantageous traffic arrangements offered it by Southern Pacific to open up through routes out of Oregon to the east. This made tonnage available to Northern Pacific via Portland that had previously been controlled for the long haul by the originating carrier, the Southern Pacific. Other traffic relations between S. P. and N. P. at this time were strengthened.

Great Northern, while perhaps momentarily disconcerted by this withdrawal of its former partner from the Oregon extensions, nevertheless decided to go ahead with the construction plans unchanged. It thereupon built the track from Bend to Chemult and operated the route into Klamath Falls as a Great Northern branch even though separated from its owned mileage by long distances across which Spokane, Portland & Seattle and Oregon Trunk Railways served as a "bridge."

The disposition of competitive railway construction in Oregon ordered by the Interstate Commerce Commission also included requirements relating to Southern Pacific's application to acquire the Oregon, California and Eastern Railway extending eastward into the forests surrounding the Klamath Basin. This little logging road was known as the "Strahorn Line", that being the name of its builder. This problem was finally settled by sale of a half interest each in the Oregon, California and Eastern to Great Northern and Southern Pacific.

Once the prolonged and difficult legal and corporate preliminar-

ies were concluded, construction proceeded rapidly between Bend and Chemult. As previously noted, Great Northern ran its first train into Klamath Falls on May 12, 1928.

While Great Northern was building into Klamath Falls in 1927, control of Western Pacific Railroad (20) was purchased by Arthur Curtiss James of New York. He was the son of one of James J. Hill's associates, D. Willis James, and inherited a fortune based principally upon the Phelps Dodge Corp. (copper). Mr. James was said to be the largest individual holder of railway securities during the late '20s. The sale of his holdings of El Paso & Southwestern Railway (Tucumcari, New Mexico - El Paso, Texas - Tucson, Arizona) to Southern Pacific Company in 1924 had made him the latter's principal individual stockholder. He was also said to occupy this enviable status in both Great Northern and Northern Pacific. His approximately equal ownership of the shares of both probably arose out of retention of the holdings received by his father through the dissolution of the Northern Securities Company in 1904. This relationship was a factor in "The Great Northern Pacific consolidation proposal" discussed in a subsequent chapter. It should also be noted that Arthur Curtiss James served on the Board of Directors of Great Northern, Burlington and Colorado & Southern Railways.

In 1927 Mr. James liquidated enough of his Southern Pacific holdings (although retaining sufficient to continue to be its principal stockholder) to purchase a controlling interest in Western Pacific. This was acquired largely from or through the Equitable Trust Co. of New York,

(20) The last transcontinental, running between Salt Lake City and Oakland, California, was completed in 1911 as a promotion of George Gould.

a financial institution identified with the Rockefeller family and soon after that merged into the Chase National Bank.

The relationship between the Equitable Trust Co. and Western Pacific Railroad developed out of the reorganization of the latter following the collapse of the Gould transcontinental railway promotions. These had been financed in part through the purchase by the Rockefellers of large blocks of bonds issued for the extension and development of the constituent Gould lines. The Rockefeller family was then active in railroads (21) and coal as well as in oil.

Arthur Curtiss James quickly placed his principal personal railroad adviser and administrator, Thomas M. Schumacher, in charge of Western Pacific, as Chairman of its Board of Directors, succeeding Alvin W. Krech of the Equitable Trust Co. of New York.

With James, who probably relied on Ralph Budd for advice no less than on T. M. Schumacher, in control of Western Pacific, the time would soon come to extend Great Northern into California to a connection with the former company. In February 1929, announcement was made of the decision to do so. Great Northern would build 88 miles southward from Klamath Falls to Bieber, California; and Western Pacific would construct 112 miles northwardly from its main line at Keddie, or Paxton, to that projected junction, fifty miles east of Mount Shasta. Bieber is in the valley of the Pit River, a tributary of the Sacramento. The Pit, however, is notable as being, along with the Feather, Klamath, Fraser and the Columbia, the

(21) Western Maryland was among the Gould lines which passed to Rockefeller direction in this way. It will be recalled that C. R. Gray became President of Western Maryland soon after leaving Great Northern, at the end of 1913.

only rivers which cut through the main mountain range of the Cascades or Sierras to have their headwaters east of them.

Before construction would commence in the summer of 1930, Interstate Commerce Commission approval was required for the Great Northern-Western Pacific extension to Bieber. Hearings on their applications were held in Oregon and California to meet the convenience of interested parties appearing as advocates or protestants. These proved to be the most bitterly contested sessions in the experience of that regulatory body. Southern Pacific marshalled strong forces against the "invasion" of its territory. Western Pacific and Great Northern were equally determined to share in traffic which they asserted was "monopolized" by their historic rival. Finally, the Commission, itself, had to take steps to restrain the zeal of the opposing factions in organizing public support for their respective interests.

During the course of this episode, Ralph Budd was one of the most effective strategists and witnesses for his side. The case ended with a decision authorizing the construction. It began at once during the summer of 1930 and was vigorously prosecuted notwithstanding the extremely difficult work encountered, particularly by Western Pacific, and the continuously declining state of business which reacted adversely upon the capacity of all railroads to finance costly new work. Only the personal means of Arthur Curtiss James enabled Western Pacific to carry out its part of the project.

Finally, the lines met at Bieber and service officially began on November 11, 1931; another historic day in the annals of the Great Northern. The traffic value of the new route, not alone for the

impressive tonnages of forest products traffic originating in this area, but also for through long haul business has made this development an important factor in the subsequent growth of revenues registered by both companies. Great Northern's California extension abundantly fulfilled every expectation of it except one; the passenger carrying function. Original suggestions of running a section of Great Northern's "Empire Builder" from St. Paul via Spokane, Bend and Bieber to the shores of San Francisco Bay did not materialize. The protracted depression of the '30s made it inadvisable to consummate this feature of the original proposal. No equipment was available to add additional passenger routes during World War II when traffic could be had. Since then the declining trend of passenger patronage has prevented establishment of this service.

Passenger service via Great Northern-Western Pacific's "inside gateway" from the Columbia to the Sacramento valleys would traverse a route of majestic scenery. The line lies alongside the Deschutes River for a longer distance than any other American railway occupies a single canyon. There follows in succession the New River Gorge, the lava fields south of Bend, vast forests and the shores of Klamath Lake. South of Beiber, there is the Pit River, Mt. Lassen, America's only active volcano, and towering Mt. Shasta; then Lake Almanor and finally the Feather River Canyon. This route has been seen by but few travellers. The advertising had been prepared to announce the inauguration of "Empire Builder" train service over it in May 1932, but the depression cancelled those plans. Great Northern evidenced its intentions by building a passenger station at Klamath Falls which has never been used for that

purpose. However, the prospect of this competition led to the removal of the Shasta arbitrary" of from $18.00 to $24.00 on round trip tickets which were issued for use on a northern line in one direction and a central one in the other, with Southern Pacific's "Shasta Route" as the connecting link.

CHAPTER XI

CASCADE TUNNEL

One of the sources of information used in the preparation of this report was "The Story of the Great Northern Railway Company -- and James J. Hill", an address delivered at New York on January 5, 1939, by Duncan J. Kerr, then President of the Lehigh Valley Railroad Company, and until his resignation in 1936, Assistant to Vice President - Operation, Great Northern Railway.

The importance of the Cascade Tunnel is authoritatively outlined by quoting from Mr. Kerr's address as follows:

> "One of the greatest things to make the Great Northern a dependable railroad was the decision to build the 7.79 mile new tunnel through the Cascades. The story of this development is printed as an appendix to this article.
>
> "One of the most interesting things on the Great Northern has been the continuous improvement of the grade line, the effect of which -- coupled with the very excellent distribution of power -- has resulted in a tremendous reduction in helper locomotive mileage. In 1937 the freight helper mileage was only 135,000 miles, a percentage of only 1.3%, which will be further reduced. In the same year, in passenger helper mileage the total was only 10,400 miles, a percentage of only 0.15%.
>
> "The continuous improvement of the railroad and the very effective selection of power has resulted in movement of 5,100 ton trains over the Cascade Range and trains of 5,700 tons over the Rocky Mountains. On the east end of the line from Minot to St.Paul, it is possible to handle trains between 6,000 and 7,000 tons."

The foregoing reference by Mr. Kerr states that the story of the Cascade Tunnel appears as an appendix to his Newcomen paper. It is entitled "Preliminary Studies and Results of Improving Cascade Crossing" and is reprinted from Vol. 96, 1932, of Transactions of American Society of Civil Engineers. The article is reproduced in full.

"The Great Northern Railway, while not the most recently built transcontinental line, was only opened through to the Pacific Coast in January, 1893. It was in December, 1889, that John F. Stevens, explored the Marias Pass in the Rocky Mountains and thus opened up a short and low summit route for a line not far south of the Canadian border. Mr. Stevens did not have the satisfaction of staying to complete the location survey over the Rockies because his success there resulted in the late James J. Hill, sending him to the Cascade Range to determine the route of the Great Northern Railway across that barrier.

"In 1890, there was little information available about the Cascade Mountain passes in Northern Washington, and the slopes were heavily timbered. The route to the sea by way of the Fraser River in British Columbia and by way of the Columbia River along the boundary between Washington and Oregon had been known to white men for nearly a hundred years. The Northern Pacific transcontinental line, followed the Valley of the Yakima River from its confluence with the Columbia, near Pasco, Wash., and crossed the Cascade Range through the Stampede Tunnel to the head-waters of Green River, and thence down the Green River Valley to the Pacific Coast.

"Mr. Hill, as he had done across Dakota and Montana, wanted the line across the State of Washington to open up new territory, and Mr. Stevens proceeded to make a thorough examination of the Cascade Range between the Northern Pacific crossing and the Canadian boundary, a distance 'as the crow flies' of 125 miles.

"The result of Mr. Stevens' work was the selection of a pass which connected the head-waters of Nason Creek, a tributary of the Wenatchee River, with Tye River, a tributary of the Skykomish River. The Wenatchee River joins the Columbia River near Wenatchee, Wash., while the Skykomish flows into the Snohomish which enters the sea at Everett, Wash. The route, therefore, was fixed from Spokane, Wash., via Wenatchee, the new pass (since known as Stevens Pass), and Everett; thence, 35 miles along the seashore, to Seattle, Wash.

"The pass had an elevation of 4057 ft. The approach from the east was through the narrow Tumwater Canyon of the Wenatchee River and on the west side the slopes fell away so rapidly as to necessitate considerable development to obtain a reasonable grade line. Mr. Stevens selected 2.2% as the maximum grade of the permanent line which was to be located down hill on each side from the portals of a projected tunnel, 2.7 miles long. The summit was to be at the east portal of this tunnel at an elevation of 3381 ft.

"The Great Northern Railway Company had no land grant west of Minnesota, and it was necessary to develop traffic quickly to justify the construction of the extension. The opening of the through line could not be delayed awaiting the completion of a

tunnel nearly three miles long and, therefore a switchback route with 4% and 3.5% grades were located over the mountain across the open pass and connecting with the permanent line near the portals. This switchback route served to handle the through traffic of the Railway Company from January, 1893 until December, 1900, when the 2.7-mile Cascade Tunnel was completed. As a result the summit elevation was reduced from 4057 to 3381 ft. and all grades heavier than 2.2% were eliminated.

"There was little evidence of snowslide trouble on the heavily timbered slopes along which the line located by Mr.Stevens lay, but the destruction of timber above the railroad by fire soon altered the situation. Snowslides of increasing extent developed and the need of protection became apparent as early as 1903. Nearly every year thereafter it was found necessary to extend the snowshed protection. The record of snowfall between Leavenworth, Wash. and Skykomish (that part of the line above elevation 1000) is of great interest. Its annual total varies from a minimum of 30 feet to a maximum of 55 feet at the summit and decreases as the elevations of the line recede to 1000 feet.

"The sections of the line exposed to snowslide menace were rather limited and consisted of two districts - one on each slope. On the east slope the trouble was confined to the line through the Tumwater Canyon between Leavenworth and Winton, Wash., a distance of 13 miles; on the west slope the trouble zone extended from the west portal of the old tunnel to Scenic, Wash., a distance of 12 miles. The rapidity with which this menace developed and extended is shown best in Table 1 which gives the number of linear feet of track protected at the end of each year.

"The earlier snowsheds constructed before timber and labor costs had advanced as they have in recent years, were built for about $70 per lin. ft. for single-track and $83 per lin. ft. for double-track sheds. Those constructed with concrete back-walls and timber roofs cost $175 per lin. ft. of double-track shed. Many of the roof timbers were 24 in. by 12 in. by 42 ft., and such timbers are now high in price and increasingly difficult to obtain. At present prices, a double-track concrete back-wall shed, with a timber roof, costs almost $210 per lin. ft.

" TABLE 1.- Linear Feet of Line Protected at the Close of Each Year

Year	Tumwater Canyon Leavenworth to Winton	Cascade Mountain Crossing, Merritt to Scenic	
	Sheds	Sheds	Tunnels
1903	-	3 894	15 595
1905	-	4 833	15 595
1907	-	7 044	15 595
1909	-	7 638	15 595
1911	1 429	14 766	15 595
1913	2 022	25 877	15 595
1915	2 022	26 221	16 816
1917	8 401	32 033	19 332
1919	8 401	32 412	19 332
1921	8 401	32 420	19 332
1923	8 401	32 313	19 332
1925	8 401	32 322	19 332

"The increasing cost of replacement and the constantly increasing length of line requiring protection caused considerable thought to be given to the finding of a route that would avoid the snowslide areas entirely. Studies were made from time to time by the late A. H. Hogeland, and by O. S. Bowen. A most complete study of the problem was made by Mr. E.J. Beard in 1917, which not only compared the relative economies of a long tunnel line with the existing line from the standpoint of the cost of maintenance and construction of snowsheds, but also from the standpoint of the transportation savings from the shorter, lower summit andeasier grade line, coupled with electrification.

"The conclusions reached by Mr.Beard in 1917 are summarized,as follows:

'That the present line in Tumwater Canyon, Leavenworth to near Winton, and from Merritt to Skykomish, be abandoned, substituting therefor changes in line by which all snowsheds are avoided, providing either a 1.4% or a 1% ruling grade and involving either a 14½ or a 17¼-mile tunnel, as chosen, and estimated to cost, including the changes, electrification, Leavenworth to Delta, necessary equipment and 100-lb. rails, $25 000 000 or $27 000 000.

'This, because the present line, if retained, will have to be electrified some day, when the cost, plus the

great expense that must be incurred account of snowsheds, existing and additional, would be $21 000 000, an investment that would make the property for years less profitable than it is at present; per contra the undertaking first above will, upon completion, increase net corporate income over that with the present line, electrified, about $350 000 per year, and the advantageous difference will increase each year.

'That neither the present line, steam operated or electrified, nor the undertaking first above should be double-tracked, because the surplus train capacity of either is enough for the increase in traffic of so many years in the future that no money whatever should be spent for, or in anticipation of, double-tracking.

'The present snowsheds, with the minimum of additions that circumstances will permit - to be built of timber - be maintained at the least practicable cost until the undertaking first above is completed.

'That every effort be made and consistent expense be incurred to complete the undertaking first above in from 4½ to 5 years instead of the estimated 6½ to 7½ years, thereby reducing the estimates above by from $1 500 000 to $2 000 000.'

"Unfortunately, the intervention of the World War forced the profect into the background and at the conclusion of the war neither the traffic nor the financial condition warranted the consideration of a large project. The full effect of the Panama Canal on transcontinental rail traffic was only felt as ship tonnage became plentiful in 1919 and 1920.

"Discussion of the project was revived in 1921, and new estimates were made from that time until 1925. These were based largely on the 14-mile tunnel line recommended by Mr. Beard. By that time costs had changed materially and it was evident that the project would involve an expenditure in excess of $30 000 000. Such an outlay could not be justified economically at that time and, having reached the conclusion that a long tunnel would not be built, the Operating Department of the Railway Company began the improvement of operation over the existing line.

"In earlier days trains were moved eastbound from Skykomish by coal-burning locomotives with the result that the atmosphere in the old tunnel (which was on a 1.69% grade against eastbound traffic) was intolerable. In 1909, a hydro-electric development was made in the Tumwater Canyon, a short distance above Leavenworth, and plans were begun for electrifying the tunnel.

"The Tumwater Plant consisted of three 2 500-kw. units and power was transmitted to the tunnel at 33 000-volts, 3-phase, 25 cycles. The overhead trolley installation consisted of two 4-0 wires, carrying 6 600 volts, and extended about 3½ miles from Cascade Tunnel Station through the tunnel to Tye, Wash. Four 3-phase locomotives were purchased which had constant speed of 15 miles per hour, that being the only running speed available. The plan of operation was to have a train of about 2 000 tons leave Skykomish with a steam road engine and two steam pushers. At Tye (the west portal of the old tunnel), the train was cut in two and, with the road engine, was taken through to Cascade Tunnel Station (the east portal of the old tunnel) by electric locomotives.

"The first move made in 1925 to improve operation was to rearrange the electric locomotives so that the traction motors could be connected in cascade giving the locomotive when so connected a speed of 7.5 miles per hour instead of 15 miles per hour. This change permitted taking passenger trains through the tunnel at 15 miles per hour as before and freight trains in one section at 7.5 miles per hour. In this way the full power available at Tumwater (the only source) was used, and the tractive effort of all four locomotives were made useful for freight trains.

"The success of this change prompted the Company to consider extending the electrification down the west slope to Skykomish, with the idea of using electric pushers throughout. The plan was to obtain two electric locomotives which, with steam engine working, would move a train from Skykomish to Tye on a 2.2% grade and which could haul the train and the steam road engine (not working) from Tye to the Cascade Tunnel through the old tunnel on the 1.69% grade.

"The limited supply of power available at the Railway Company's Tumwater Plant and the need of variable-speed locomotives to work with steam road engines resulted in the selection of the motor generator type of locomotive with 11 000-volt, single-phase, 25-cycle trolley, and 600-volt, direct-current traction motors. Two such double-cab locomotives (each having a 1 500-kw motor generator set) were ordered in 1925, and work had already been started on the electrification of the old line, when serious consideration was given again to the long tunnel plan.

"The success of the operation of freight trains in one section through the old tunnel, the improvements in steam operation (which had permitted running freight trains through from Seattle and Everett to Wenatchee in less than the 16-hour crew limit), and the failure of the through freight traffic to show a material increase, made it apparent that savings in transportation expense alone could not justify any long tunnel and that if such a project were to be

warranted economically it must be the shortest tunnel which would permit the abandonment of all the line on the west slope subject to the snowslide menace.

"A study made by Frederick Mears, showed that this could be accomplished by a tunnel 7¾ miles long, having its east portal at Berne, Wash., and its west portal at Scenic. In contrast to the 14 or 17-mile tunnels recommended by Mr. Beard, this plan did not eliminate the 2.2% grade, but left in use the five miles of such grade against westbound traffic between Merritt, Wash., and Berne and eleven miles against eastbound traffic between Skykomish and Scenic.

"Mr. Stevens was called upon to go over the ground that was so familiar to him and as a result of an exhaustive study in the summer of 1925, he urged the immediate approval of the 8-mile tunnel line as the only project that could be justified. He pointed out that there was much unwarranted prejudice against pusher districts and that with electrification the former objection to sections of 2.2% grade was largely eliminated, especially when such grades were comparatively short. Accordingly, the Board of Directors of the Railway Company reached the conclusion in November, 1925, that the 7.79-mile tunnel should be built.

"As a distinct and separate project on the east side of the mountains, a new line (the Chumstick Line) was projected from Peshastin (near Leavenworth) to Winton, Wash., a distance of 17 miles. It followed the open Chumstick Valley, eliminated all 2.2% grades east of Merritt, and provided a line with 3° maximum curvature, entirely free from the snowslide menace to which the old line in the Tumwater Canyon was exposed.

"In addition to the major improvement made by the construction of the Chumstick Line on the east slope, numerous short sections of the old line between the west and of the Chumstick Line at Winton and the east portal of the new tunnel at Berne, were improved in alignment and grade.

"When the decision to build the new tunnel was reached in November, 1925, the age of the existing snowsheds made it extremely important, if heavy renewals were to be avoided, that the new route be made ready for use before the snowslide season of 1928-29. To avoid delay, the firm of A. Guthrie & Co.,Inc. of St. Paul, Minn., was instructed to proceed with the work on a fixed fee basis - a plan which later was extended to cover the construction of the Chumstick Line.

"The need of an adequate supply of power for driving of the new tunnel made it advisable to turn over the Company's power station at Tumwater to the Puget Sound Power and Light Company and to

contract with that Company for power to be supplied from its widespread system. Having such power available brought with it the decision to electrify the entire district from Wenatchee to Skykomish (75 miles).

"These four pieces of work (1) the 7.79-mile Cascade Tunnel; (2) the Chumstick Line; (3) line revisions between Winton and Berne; and (4) the electrification from Wenatchee to Skykomish, constituted a complete program for the improvement of the Cascade crossing.

"The first, in addition to the improved alignment and lower summit obtained, permitted the abandonment of all the line on the west slope subject to snowslides; the second, which also improved alignment and grade, resulted in the discontinuance of operation over all that part of the line on the east slope subject to slides; the third resulted in a marked improvement in grade and curvature; and the fourth was a necessary step following the decision to build the long tunnel and to avoid too frequent locomotive changing.

"The completion of the program has put the Cascade crossing on an equal footing with the remainder of the main line in character, freedom from interruption, and freight-train tonnage that may be handled.

"A comparison of the old and new line from the east end of the Chumstick revision, at Peshastin, to the west end of the tunnel revision at Scenic, is given in Table 2.

"The electrification program, together with the change in line, grade, and rise and fall indicated in Table 2, has permitted the operation of 5 000-ton freight trains eastbound out of Skykomish, using a three-cab road locomotive and a two-cab helper. These helpers are operated generally between Skykomish and Merritt - the foot of the 2.2% grade on the east slope - thus avoiding any stop at the summit at Berne. Westbound, in ordinary operation, the three-cab locomotive takes a 3 500-ton train from Wenatchee to Merritt, where a one or two-cab helper, whichever may be available, is used to Berne and remains in the train on the down-hill slope to Skykomish. As compared with the steam operation prior to any electrification on the slope west of the old tunnel, the train tonnage eastbound has been increased from 2 400 to 5 000. The average time for a freight train between Skykomish and Berne has been reduced 3½ hours and the gross ton-miles per train hour between Skykomish and Wenatchee have been increased from 11 520 to 70 000. The traffic on this part of the line is prevailingly eastward, substantially in the proportion of 5 000 to 3 000 tons.

"TABLE 2. - Comparison of Old and New Lines

	Old Line	New line	Favorable to new line
Length, in miles	49.32	40.90	8.88
Length of tangent track, in miles	26.86	27.66	0.80
Length of curved track, in miles	22.92	13.24	9.68
Total rise eastbound, in feet	1 353.70	898.92	454.78
Total rise westbound, in feet	2 342.15	1 887.37	454.78
Summit elevation, in feet	3 382.00	2 881.00	501.00
Length of snowsheds, in feet	40 153.00	841.00	39 312.00
Length of tunnels, in feet	19 620.50	48 600.40	28 979.90*
Maximum degree of curvature	10° 00'	10° 00'	-
Total degree of curvature	5 617° 54'	2 059° 06'	3 558° 28'

* Unfavorable to the new line

"The various steps in the improvement of the railroad between Wenatchee and Skykomish have so overlapped that it is impossible to divide the savings resulting from the entire project into the part due to electrification and the part due to the improved alignment, lower summit, shorter mileage, etc. These savings in the aggregate are not more than sufficient to pay interest on the entire investment. The Railway Company must look for the justification of the project to the benefit which the sytem as a whole has received through the elimination of a weak link in its transportation chain, with consequent increased traffic resulting from service that is absolutely dependable, quicker, and, in the case of passenger travel, extremely comfortable and pleasant."

Such a great event as the opening of the Cascade Tunnel deserved the public attention of the nation which was assured through appropriate ceremonies arranged at the site in the state of Washington on Saturday, January 12, 1929. For the first time, a railroad used a nation-wide "hook-up" of 38 radio broadcasting stations throughout

the country, to transmit details of the event to an audience estimated to number possibly 15,000,000 persons. (22) The program included addresses by President-elect Herbert Hoover, in Washington, General W. W. Atterbury, President, Pennsylvania Railroad Company in Philadelphia, and J.B. Campbell of the Interstate Commerce Commission in Washington, as well as one by Mr. Budd himself speaking at the east portal of the tunnel at Berne, Washington. Madame Ernestine Schumann-Heink sang musical numbers from San Francisco, and George Oleson's orchestra played popular selections in the New York studio of the broadcasting company. Mr. Budd presided at the tunnel site, and Graham McNammee, radio announcer, was "master of ceremonies" there. C. O. Jenks, Vice President-Operation of the Great Northern threw the switch permitting the first train to operate through the tunnel.

This monumental improvement and the related electrification and re-line/locations required a total investment of $25,000,000. This was the largest single betterment ever carried out by Great Northern. By constructing this longest tunnel in the western hemisphere and sixth longest in the world, Great Northern eliminated the single weak link in its otherwise superior transcontinental route. (f)

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(22) The success of this radio broadcast led Mr. Budd to arrange immediately for a series of 23 weekly broadcasts throughout Great Northern territory to acquaint the residents of its states with the activities of that railroad. It was estimated that these attracted audiences averaging 2,000,000 persons. Another first for Great Northern and Ralph Budd!

(f) "The Wall Street Journal"of May 13, 1955, carries the following dispatch over a St. Paul date line:

> "The Great Northern Railway will discontinue electrified train operations on its 73-mile stretch of main line track through the Cascade Mountains in Washington, John M. Budd, President, announced after a directors' meeting."

CHAPTER XII

PROPOSED GREAT NORTHERN PACIFIC CONSOLIDATION

The 1893 receivership of Northern Pacific and its reorganization in 1896 brought that railway into a "community of interest" with Great Northern through the stockholdings which James J. Hill acquired in the other company through this proceeding. A previous plan of recapitalization of Northern Pacific, proposed in 1895, would have given Great Northern a half interest in the former's stock, and a majority of its Board of Directors in consideration of a guarantee of funded debt of that neighboring line and then prospective affiliate. Public protests against this consolidation led to its abandonment of the plan to accomplish it.

Between 1901 and 1904, the Northern Securities Company owned substantially all of the stock of both Great Northern and Northern Pacific. This was the practical equivalent of a consolidation. Actual corporate merger would probably have followed a continuation of this arrangement.

Congress directed the unification of the railways of the United States into a limited number of systems through the Transportation Act of 1920. That law specified the general terms and conditions which the Interstate Commerce Commission should apply, in granting the approval required to validate consolidations. Likewise the Commission was directed to prepare a plan which would represent fulfillment of these Congressional directions.

While the provisions of the Transportation Act of 1920 have had the practical effect of preventing consolidations rather than of

facilitating them, during the decade of the '20s, that law produced many individual system and regional or national proposals for railway mergers. The subject became a major factor of public interest in the railway question.

A tentative plan of consolidation was issued by the Interstate Commerce Commission in 1922. It was largely based upon detailed studies made the year before by an eminent transportation economist, Prof.William Z. Ripley of Harvard University. Prof. Ripley recommended that Burlington and Northern Pacific be grouped into one system and that Great Northern and the Milwaukee in another. Some smaller companies were included with each group. The status of Spokane, Portland & Seattle was not clearly defined; presumably it was to remain under joint control. Colorado & Southern was to be removed from Burlington control and allocated elsewhere.

Any plan of consolidation that would upset the historic relations within the Hill lines was vigorously opposed by their component corporations and the financial interests identified with them. Various alternative suggestions were made which finally culminated, in 1927, in an official plan of merger of Great Northern and Northern Pacific in the "Great Northern Pacific Railway." It would continue and unify the historic control of the affiliated Burlington, Spokane Portland & Seattle and Colorado & Southern systems.

The plan for accomplishing this objective and its internal and external advantages are clearly explained by Ralph Budd in an article appearing in the "Railway Age" of February 26, 1927. Unification was expected to permit a reduction of at least $10,000,000 in operating

expenses coincident with improvements in service and property. The traditional community of interest between the Hill lines would be maintained and their earning power and credit strengthened. Analysis of competitive factors indicated that relatively little competition would be sacrificed at points then having the service of more than one railroad.

The proposal was attacked by the Chicago, Milwaukee, St. Paul and Minneapolis & St. Louis Railroads as well as by state commissions, local trade associations and labor unions which almost invariable oppose important railroad consolidations. Hearings and arguments and other complicated procedural formalities consumed nearly three years.

Meanwhile, in December 1929, the Interstate Commerce Commission published its "Final" consolidation plan embodying the official recommendations of that body expressed in accordance with the directions of Congress in 1920. The Commission had repeatedly requested to be relieved of this obligation but its petition went unheeded. The systems proposed in that official recommendation grouped Great Northern, Northern Pacific and Spokane Portland & Seattle together but separated the Burlington from its present owners and built up a system around it and its affiliated Colorado & Southern Lines through the addition of the Missouri-Kansas-Texas Railroad.

The I. C. C. decision in the Great Northern Pacific case was made public in February 1930. It followed the Commission's "final plan" of December 1929 by authorizing the consolidation of Great Northern and Northern Pacific upon the condition that they would divest themselves of control of the Burlington and, through it, of Colorado & Southern.

The oncoming depression caused a steady shrinkage of railway credit and security prices. These adverse factors made it impossible for the Great Northern and Northern Pacific to liquidate their holdings of Burlington stock without serious loss, even had they been willing to do so as a condition to gaining the advantage of merger of their properties and operations between St. Paul and the Pacific coast.

The states served by these railways were always sensitive politically to public questions relating to railways. The economic conditions of 1930-31 intensified those characteristics which were inherently opposed to consolidation. Objectors feared that service frequency and employment would be curtailed through elimination of duplicating schedules and facilities . A growing wave of opposition, which found ready political support in Washington, led the Interstate Commerce Commission in October 1930 to grant a petition to reopen the case for further consideration. A conference held in New York in January 1931 between the Great Northern, Northern Pacific and Burlington and their legal and financial advisers resulted in a decision to defer the proposed merger. Soon after that it was formally withdrawn.

Ralph Budd had been the strongest single force in initiating the "Great Northern Pacific" consolidation and carrying the burden of advancing the plan through the many stages through which it passed during those four years while it was under active consideration. Failure of the project was in nowise due to him. Had this plan succeeded it would have constituted a landmark in railway development which might well have pointed the way for other executives and their companies to follow to their great benefit and that of the nation.

A great and successful railway merger coming at that particular time could have prevented the frightful deflation of railway capitalization and security values which followed soon after. A "Great Northern Pacific merger" would have been a major factor in arresting the economic collapse of 1931-1932 which was so greatly aggravated by the railway problem. Such a constructive event as a"G. N.P." merger could have converted those years into ones of recovery instead of deepening depression, especially if the example of these western railways might have shown the way, as it doubtless would have done, for "Four Party Consolidation" in the east -- another constructive project which narrowly missed of successful consummation between 1930-1932.

CHAPTER XIII

THE BURLINGTON (1849-1931)

The Burlington of 1955 is an 8900 mile railway system not including its affiliated Colorado & Southern-Fort Worth & Denver system which operates 1800 miles. When the former was purchased by J. J. Hill in 1901, it owned 7700 miles of well developed lines. The price of $200.00 per share paid for 96% of its $110,000,000 capital stock attests the earning power and physical condition of the property. Its funded debt was then $147,000,000.* The outstanding securities, therefore, represented a capitalization of only $29,000 per mile compared with the national average of $49,000 per mile reported for all railways in that period.

This great railroad having had its origin in 1849, had passed its 52nd year of corporate life before J.J. Hill became identified with its management. Ralph Budd was elected its president thirty years later. It is, therefore, apparent that the narrative of formation of the Burlington brings an entirely new group of men to the readers attention. The familiar names of the preceding chapters will, therefore, be missing from this one until its end. New men will appear on the scene. The legacy they left in the location and development of the company is sufficient evidence of their abilities.

Illinois was admitted to the Union as a state in 1818. The early development of its southern half was well advanced while the northern part remained a wilderness. Fort Dearborn was erected in 1803 to protect the route between the Mississippi River and the Great Lakes which used the Chicago and the Illinois Rivers as connecting links. This was the path

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* The conservatism of Boston financial management is evidenced by the Burlington having been one of the first two railroads in America to establish sinking funds as a matter of policy, early in their corporate life. Sinking funds did not become general railroad practice until during and after the depressions

(continued on P-114)

of the explorers and missionaries; Joliet, Pere Marquette and La Salle. The portage between these two streams was of short distance over prairie lands. Improved transportation along this route was soon sought through the Illinois-Michigan Canal which was placed under construction in the 1820's. The growth of the community located at this strategic crossroads of travel near the southern end of Lake Michigan was incorporated as Chicago in 1833.

The principal economic activity in northern Illinois at that time was the lead mines around Galena, on the Mississippi River at the extreme northwestern corner of the state. A railroad was projected between them; the Galena & Chicago Union. While incorporated in 1836, the panic of 1837 and the many difficulties which confronted the building of the first railroads delayed construction until 1848. On October 25 of that year, "The Pioneer" made history as the first locomotive to run in the city of Chicago. The Galena road reached the Des Plaines River (Maywood) on December 15, 1848 and Turner Junction (now West Chicago) 30 miles west of the terminus, in the spring of 1849. Here the road turned north to Elgin, 12 miles distant. From Turner Junction the main line was extended 105 miles further west, through Dixon to Fulton, on the Mississippi River which it reached in 1855.

Aurora was a thriving town in the fertile Fox River valley, 12 miles south of Turner Junction. A group of its enterprising businessmen determined to secure the commercial benefits of railway transportation to Chicago by building a line to connect with the Galena & Chicago Union Railroad. A charter was obtained on February 12, 1849 and the road completed on August 27, 1850. These two events mark the beginnings of the Burlington.

(Cont. from P-113) of the '30s. Then these appeared in all new issues of bonds sold after that or distributed pursuant to plans of reorganization of bankrupt roads. The other company to use sinking funds, beginning early in its history was the Pittsburgh,

(continued on P-115)

While the first railroads from the east, the Michigan Central and the Michigan Southern (later Lake Shore & Michigan Southern) (23) would not reach Chicago until May 21 and May 22, 1852, respectively, (just one day apart) railroad promotors were already active in Illinois to secure connections with mileage that would provide outlets to the Atlantic seaboard. The Aurora Branch Railroad was fortunate to gain in 1852 the cooperative interest of John Murray Forbes, the Boston capitalist who had just achieved the extension of the Michigan Central from Detroit to Chicago. Forbes was interested in gaining friendly western connections for his company and agreed to help in financing the Aurora Road. (24)

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(23) Both eventually became part of New York Central System (then New York Central & Hudson River Railroad.)

(24) Attention should be called in an M.I.T. thesis to the interesting fact that the biographer of John Murray Forbes was Professor Henry Greenleaf Pearson, head of the Department of English and History at the Massachusetts Institute of Technology during the 1920's. Prof. Pearson's work is entitled "An American Railroad Builder -- John Murray Forbes", published by Houghton, Mifflin & Co., Boston in 1911. On page 16, Pearson quotes in full the long paragraph by Emerson in "Letters and Social Aims", Boston 1876, to which Stewart Holbrook refers in his "Story of American Railroads", Crown Publishers, New York, 1947. Page 135 of the latter's work contains the following significant observation: "Forbes was probably the only railroad man whom Ralph Waldo Emerson could and did characterize as a man of 'remarkable force, modesty and all-around goodness.'" "'How little,' cried Emerson, referring to Forbes, 'how little this man suspects, with his sympathy for men and his respect for lettered and scientific people, that he is not likely, in any company to meet a man superior to himself.'" Further on, Holbrook asserts: "It is probably true, as contemporaries seem to have agreed that the force of John Murray Forbes' personality was such as to imbue the Chicago, Burlington & Quincy with a character and stability that distinguished it sharply from other railroads of that era. Forbes was one of the few men of the time who thought of the railroads in their public interest." Such estimates of Forbes apply with equal force to Ralph Budd. It is singularly appropriate that such a man as Ralph Budd should be in the direct line of corporate succession from John Murray Forbes.

(Cont. from P-114) Ft. Wayne & Chicago Railway Company, now a leased line to the Pennsylvania Railroad. Its sinking funds extinguished its funded debt and it is now the longest and most valuable piece of unmortgaged railroad in the United States.

Out of these simple beginnings, associations with the Aurora road and its successor, the Burlington, commenced and lasted until Forbes' death in 1898. During the intervening 47 years he had guided the finances of C. B.& Q. and its affiliates during those difficult periods in which his business skill and judgment determined the rate and extent of the railroad's growth and development. Forbes had been associated with John W.Brooks, a railroad civil engineer from Stow, Massachusetts, and James F. Joy, a Detroit lawyer but originally from Durham, New Hampshire, in his work on the Michigan Central. These two men continued to remain identified with Forbes in the formation of the Burlington.

The pressure of every important community to obtain railroads and the work of financiers and engineers in other cities whose business it became to build them combined to produce a rapidly growing network of lines in the middle west. Usually these were built by companies of small size and local scope but connections became related through a "community of interest" or otherwise consolidations proceeded rapidly as new mileage came into existence.

The Chicago, Burlington & Quincy was formed in this way.

Brooks was elected to the Board of the Aurora Branch Railroad in February 1852 and it immediately voted to build westward, 58 miles, to a junction with the main line of the Illinois Central projected through Mendota, in traversing the state between Galena, Freeport and Cairo. (25) The line started by the Aurora Branch road to Mendota was completed in October 1853. The name of the company, however, had been changed in June 1852 to Chicago & Aurora Railroad. While the Illinois Central had been the connection originally

(25) Chicago would be the terminus of a long Illinois Central branch to the northeast from Centralia. Both routes were opened in 1855.

sought at Mendota, the one that proved most important was the Central Military Tract Railroad Co. Through the financial assistance provided by John Murray Forbes, it completed that 79-mile line from Galesburg to Mendota on December 7, 1854. This represented a change in the plans of that company which had been chartered for the purpose of connecting Galesburg with the Chicago & Rock Island Railroad near La Salle, on the Illinois River.

On February 14, 1855, the Chicago and Aurora Railroad,while it ran only between Turner Junction and Mendota, received permission from the state legislature to change its name again. This time it chose to become known as "The Chicago, Burlington and Quincy Railroad Co." On July 9, 1856, the latter was consolidated with the Central Military Tract Railroad, retaining the former's name. In the following decade, two other significant mergers followed with lines which Forbes had assisted in financing, in order to extend the Aurora Co., later C. B. & Q., across Illinois to the Mississippi River. These were:

1. Peoria and Oquawka Railroad Company, acquired on June 24, 1864. It had completed a line from East Burlington, Illinois, (below the river from the originally designated terminus of Oquawka) to Galesburg in 1855; and between Peoria and Galesburg in 1857; (an eastern extension of this line beyond Peoria to the Indiana boundary, split off through a receivership and reorganization and is now the route of the Toledo, Peoria & Western Railroad between those points.)

2. Chicago and Quincy Railroad on July 30, 1865. This company was a successor to the Northern Cross Railroad, the oldest railroad company in the state (which had built the first rail mileage in the state, now embraced in the Wabash, between Jacksonville and Meredosia.)

The new C.B. & Q. continued to use the Galena & Chicago Union Railroad (which did not become C. & N. W. until merged into that company in 1864) from Turner Junction as the former's entrance to Chicago. The Burlington was also a tenant of the Galena's station in that city. The original structure was located at Canal Street, south of Kinzie. Its next, and somewhat larger one was at Wells and North Water Street. In 1855, however, the Burlington, Illinois Central, Michigan Central and the Galena Road joined together to build the St. Charles Air Line to connect the two proprietary railroads (C. B. & Q.- G. & C. U.) west of the Chicago River with the other two (I. C. and M. C.) on the lake front. This short, but highly important, link of trackage was completed in 1856. Thereupon the Galena Road and the Burlington, along with the Joliet & Chicago (26) transferred their passenger terminal to the Illinois Central depot (which had previously been used by Michigan Central for its entrance to Chicago was gained over Illinois Central). The G. & C. U.'s tenancy was of short duration but C.B.& Q. and Joliet & Chicago remained there until the first Chicago Union Station was opened in 1881. It was replaced by the second and present structure completed on the same site in 1925.

During the Civil War,* Burlington's dependence upon another railroad for its Chicago entrance was eliminated by completion of a 38-mile extension from Aurora to a connection with its affiliated St. Charles Air Line in that city. At the same time, the C. B. & Q. acquired substantial acreage in the vicinity of Union Station and adjacent sites along the Chicago River and the canal paralleling it. These properties were intended for future development of terminals and a stock yard. The former were shared with other

(26) The Joliet & Chicago Railroad was leased to C. & A. in January 1864.

* Completed May 20, 1864.

railroads with which it cooperated in the development of joint facilities. It became unnecessary for the railroad to provide its own stock yard by reason of the opening, on December 26, 1865, of the recently organized Chicago Union Stock Yards. (27) A Burlington train of stock was the first one to enter it. The consolidation of 1864 established the Burlington in a strong position in Illinois. It then had 400 miles of line, 98 locomotives, 60 passenger and 1735 freight cars. This railroad had been a leader in converting from wood to coal-burning motive power and had only 9 wood-burning engines left in service that year. The C. B. & Q. had also been experimenting with the development of sleeping cars as early as 1858; a year before George M. Pullman built the first one.

Dividends were begun in 1852 (on the Aurora Road) and have been paid in every year since with the exception of 1859-1860 and 1862. The end of the Civil War found the Burlington well established to begin its expansion west of the Mississippi River. It is, along with Great Northern and Southern Pacific, the only large, publicly owned railroad in the west which has not undergone a financial readjustment.

The subsequent period of growth focused attention first on the Hannibal and St. Joseph Railroad, one of America's most picturesque companies. John M. Clemens of Hannibal, the father of "Mark Twain" was identified with the promotion of this company. Abraham Lincoln traveled over its line. Being the first one to reach the Missouri River, it was also the rail link of the "Pony Express" during the latter's brief but dramatic period of service

(27) This enterprise was financed by Boston capital, including sources close to the Burlington. Eventually it would become wholly-owned by a prominent Boston financier, Frederick H. Prince.

which began on April 3, 1860. (28) The first Railway Post Office (or R. P. O.) car which permitted sorting mail in transit was operated over this railroad, initially, on July 28, 1862. The St. Joe road was also sufficiently exposed to secessionist sentiment to have suffered much destruction of its property by Confederate raiders out of southern Missouri during the early years of the Civil War. Eventually it was necessary to protect the line by a series of blockhouses manned by Federal troops who guarded the line.

The Hannibal & St. Joseph was incorporated February 16, 1847. Work was commenced in 1851 and completed across the state on February 13, 1859. (29)

On April 3, 1860, soon after its completion across the state, the H. & St.J. opened a 13-mile extension from Palmyra, 5 miles west of Hannibal, to West Quincy, on the Missouri side of the Mississippi opposite the larger city of the same name. A bridge provided direct physical link across the river there after November 9, 1868. Previously a branch had been built from Cameron Junction to North Kansas City and on July 4, 1869, the "St. Joe Road" continued this line into Kansas City by the completion of the first bridge over the Missouri River. *

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(28) At first once a week, and later twice a week, during 1860-61, the Pony Express carried letters over nearly 2,000 miles of wilderness. The plains were infested with hostile Indians and beyond lay mountains and deserts. The Pony Express was discontinued soon after the transcontinental telegraph line was completed on October 24, 1861.

(29) The second line across Missouri was the Pacific Railroad of Missouri (now Missouri Pacific) completed in 1865. Iowa was first crossed by rail upon completion of construction of the C. & N.W. from Clinton to Council Bluffs in 1867. C.R.I.& P. followed, between Davenport and Council Bluffs in June 1869. C. B. & Q. was third on January 1, 1870.

* This provided the first direct line from Kansas City to Chicago.

During all of this period, The Hannibal & St. Joe had been assisted by Boston capital provided through the cooperation of John Murray Forbes. The relations between this company and the Burlington became increasingly close until 1871 when Jay Gould and his railroad and financial allies obtained control of this Missouri road. However, the basic traffic relations with the Burlington were so close and essential to the St. Joe Company, as well as to the former, that these were eventually reestablished and made permanent by C. B. & Q. obtaining a controlling interest in the securities of this connection in May 1883. The properties of the then affiliated Hannibal & St. Joseph were leased to C. B.& Q. in 1900 and completely merged into the parent company on January 1, 1901. After that the subsidiary corporation passed out of existence.

The settlement of Iowa began to go forward on an increasingly large scale after the purchase of the Blackhawk Indian lands by the Federal government in 1833. Population increased so rapidly that in 1846, the territory became a state. This reference is a reminder of the first association of Ralph Budd's forebears with Iowa and Blackhawk County, which was reported in the opening chapter as having occurred in 1854.

The extension of the Burlington across Iowa begins with the incorporation of the Burlington & Missouri River Railroad, on January 15, 1852. It was completed across the state to East Plattsmouth, Iowa, on the Missouri River 17 miles below Council Bluffs, in November 1869. Service into Council Bluffs began on January 1, 1870. Forbes, Brooks, Joy and the Burlington Railroad all lent their assistance to this project which would be of such importance to the parent railroad company.

B. & M. R. introduced a new name, Charles Elliot Perkins,* who had come to that company in 1859, as a young man. He was destined to succeed Forbes as President in 1881 and serve in that capacity for 20 years, until 1901. It may be of interest to note that in 1864 in Milton, Massachusetts, Perkins married his cousin, Edith Forbes, a niece of John Murray Forbes.

Completion of the C. B. & Q's bridge across the Mississippi at Burlington, Iowa, on August 13, 1868, provided an all-rail route into Chicago. Access to Council Bluffs, Iowa, from East Plattsmouth (now Pacific Junction) was obtained over the Kansas City, St. Joseph & Council Bluffs Railroad, which had just been completed between those cities. Being a James F. Joy road, it was identified in interest with the B. & M. R. and like the latter was destined to become part of the Burlington system by stock purchase in 1880, lease in 1900 and complete merger in 1901. On December 31, 1872, the Chicago, Burlington & Quincy Railroad leased the Burlington & Missouri River Railroad and in 1875 purchased all of its publicly held securities. Integration of the system was proceeding steadily and systematically.

The extensions west of the Missouri were begun by the Burlington & Missouri River Railroad in Nebraska, incorporated in 1869. This was affiliated in interest with the C. B. & Q. through interlocking directorates and financial assistance. The Nebraska company's track entered the newly designated state capitol city of Lincoln in 1870 and Kearney Junction, with Union Pacific, in September 1872. The Omaha & Southwestern had been leased in 1871 to provide access to Omaha via Oreapolis. B. & M. R. reached Indianola, near the present city of McCook in 1880.

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* Both the Elliot and the Perkins families are prominent names in Boston. However, young Charles E. Perkins although of this New England ancestry was originally from Cincinnati.

In that same year the Missouri River bridge at Plattsmouth was completed. The parent Burlington company acquired the B. & M. R. in Nebraska by purchase in August 1881. The latter was completed into Denver on May 24, 1882. It is appropriate that the first rails rolled in the recently built steel works at Pueblo were used in this extension.

Other strategic connections were being extended north and south. Mendota, the original western terminus of the Chicago and Aurora Railroad, was connected with the Mississippi River at East Clinton and Fulton by a line through Denrock completed in 1877. In 1877, C. B.& Q. leased the St. Louis, Rock Island and Chicago, providing its present route from Sterling, Illinoia, via Denrock, Galesburg, Beardstown and East Alton to East St. Louis. This proved to be very strategically located mileage.

The growing importance of the northwest, which will be remembered from preceding chapters, led the Burlington to cooperate, but initially only as a minority stockholder, in the construction of the Chicago, Burlington & Northern Railroad, organized in 1885, to build from Fulton, the common northern terminus of three separate Burlington lines from Aurora via Oregon, Mendota and Galesburg, on to Savanna and then continue to follow the east bank of the Mississippi River throughout its full length as the western boundary of Wisconsin and on into St. Paul. The work was progressed with unusual vigor, permitting the line to be opened on October 24, 1886.

In 1892, the Burlington leased the Chicago and Iowa Railroad, owner of the connection between Aurora and Oregon, Illinois, which became an essential link in the new Chicago-St. Paul service. Seven years later,

in 1899, C. B. & Q. purchased both the Chicago, Burlington & Northern and the Chicago & Iowa Railroads and merged them into the parent system.

Other important extensions made by the Burlington during the '80s were secondary main lines across Nebraska from Wymore to Holdredge and thence to Cheyenne, Wyoming, and from Lincoln to Alliance, Nebraska, and on to New Castle, Wyoming. In 1894, the latter route was extended to its present connection with the Northern Pacific at Billings, Montana, and which Great Northern reached in 1908 by the extension of its Shelby-Great Falls branch. In 1900, this new Burlington mileage was connected with Denver through construction from Brush, Colorado, through Northport, Nebraska, and Guernsey to Alliance, Nebraska.

Burlington's entrance into St. Louis was obtained through purchase of stock control of the St. Louis Keokuk & Northwestern Railroad in 1887, lease on July 1, 1900 and complete acquisition to title of the property by the end of that year. This company had built along the west bank of the Mississippi from Hannibal to a connection with the Wabash at St. Peters, Missouri, which provided trackage rights into St. Louis. St. L. K. & N.W. was extended north from Hannibal to West Quincy in 1882 and built its own entrance into St. Louis in 1894.

Access to the important "tri-cities" of Rock Island, and Moline, Illinois, and Davenport, Iowa, was obtained in February 1901, when C. B. & Q. and the Chicago, Milwaukee and St. Paul acquired the Davenport, Rock Island & North Western for joint ownership and operation. Its fifty miles of line occupy a strategic location on the west bank of the Mississippi between Clinton and Davenport and there cross the river to reach Rock Island and Moline. Both ends of "The DRI" line connect with Burlington routes

and join them advantageously as well as provide access to the now great industries in the "Tri-Cities" - the present "farm machinery capital of the world."

Charles E. Perkins retired in February 1901. George B. Harris succeeded him as president but Perkins remained on the Board and handled the negotiations with Hill for the purchase of the road. The physical and corporate expansion of the Burlington continued under its new owners, Great Northern and Northern Pacific, and the improvement of property and equipment did likewise. Under Hill direction, C. B. & Q. concentrated its internal development upon projects designed to increase train load, raise efficiency and lower costs.

The largest single acquisition of mileage under the Hill regime was the acquisition of the Colorado & Southern Railway, and its affiliated Fort Worth & Denver City, Trinity and Brazos Valley, Wichita Valley and Colorado Midland Railways. This acquisition extended the Burlington system to Orin Junction, Wyoming, on the north and to Fort Worth, Dallas, Houston and Galveston on the south.

The Colorado & Southern Railway had its beginnings in construction of the Colorado Central Railroad from Denver to Golden, 15 miles, in 1870 and on to Cheyenne by 1877. The central and southern portions of the system were begun by separate companies working out of Denver and Fort Worth, respectively. John Evans, whose memory and achievements are perpetuated by the names of the citizens of Evanston, in Illinois and Wyoming, and is remembered as the founder and original benefactor of Northwestern University, organized the Denver, Texas & Fort Worth in 1881 to build to the Texas-New Mexico boundary. This goal was reached in 1888,

where it met the Fort Worth and Denver City Railway, which it already controlled. The latter built northwestwardly from Fort Worth, across the Texas Panhandle to the junction with the D. T. & Ft. W. Service began over the two companies on April 1, 1888 and from the outset they were operated as a single unified system. The traffic value of direct access to Texas attracted the interest of the Union Pacific which purchased the Denver, Texas & Fort Worth (including Ft. W. & D.C.) on April 1, 1890. Union Pacific promptly arranged for the extension of the Denver-Cheyenne line on northwards to a connection with the Wyoming mileage of Chicago & Northwestern at Orin Junction.

Union Pacific's control of this subsidiary was held through a subsidiary company, Union Pacific, Denver and Gulf Railway organized for that purpose. Union Pacific passed into receivership in 1893 and the Colorado and Texas affiliates were lost in the reorganization of the former. The properties of the former Denver Texas & Fort Worth were acquired by the Colorado & Southern, on December 29, 1898, ten days after the latter had been incorporated for that purpose. Control of Fort Worth & Denver City and two narrow gage lines, Denver, Leadville & Gunnison and Denver, South Park & Pacific, also passed to the new Colorado & Southern Railway. The latter was then an independent road and made some expansions of its own account, in 1905, by acquiring the Wichita Valley Railway and a 50% stock interest in Colorado Midland Railway extending over the Rockies to Rifle, Colorado.(30)

(30) The Rio Grande Junction, jointly owned by C. M. and D. & R. G. had provided a line for both to reach Grand Junction, Colorado. The mileage of Colorado Midland was gradually abandoned by C.& S. during the '20s and '30s, and is the largest railroad to have passed out of existence in this way.

The Colorado & Southern system also purchased control of Trinity & Brazos Valley in 1905 to obtain an extension from Fort Worth to Houston and via trackage to Galveston. Subsequently a half interest in this was sold to Rock Island. Hill and Burlington's president, George B. Harris, watched C. & S. with interest and entered negotiations to purchase control of it, probably in 1907. However, acquisition was not consummated until December 21, 1908. A majority of the capital stock was obtained at that time. Purchases over subsequent years have increased the parent company's holdings to more than 70% of the total stock now outstanding.

Hill visualized C. & S. providing a line, in conjunction with G. N. - N.P. - C. B. & Q. between Puget Sound, the Columbia River and Texas and the Gulf of Mexico. A more direct connection was, therefore, urgently needed between Denver and Billings than was provided by the Burlington's circuitous routes via Alliance, Nebraska, and Brush, Colorado. Therefore, Hill directed the Burlington to build a new railroad on easy grades and curves in relation to the mountainous country traversed northward from the terminus of C. & S. at Orin Junction, Wyoming, to Laurel, on the N.P. 15 miles west of Billings. (31) This new route, which traverses the picturesque Wind River Canyon and Big Horn Basin, was completed in 1914.

Subsequent extensions of the Colorado & Southern system extended its Ft.W. & D.C. from Fort Worth to Dallas via C.R.I. & P. trackage in 1925. Important C. & S. feeder lines were constructed in or adjacent to the Texas Panhandle between 1927-1932. This area was developing rapidly through

(31) Billings is also served by G.N's. line from Shelby and Great Falls and the Burlington from Lincoln and Alliance.

expanding production of oil, gas and wheat. In 1930, the Trinity and Brazos Valley emerged from a 14 year receivership as the Burlington-Rock Island Railroad. It now serves the two owner companies as a landlord, rather than an operating railroad, providing trackage for the former's trains.

Burlington extensions made east of the Missouri River, between the time of Mr. Hill's purchase of it for Great Northern and Northern Pacific in 1901 and the beginning of Mr. Budd's administration of this company in 1932, were relatively few in number and short in length but were, nevertheless, significant in traffic advantage. Service between St. Louis and Kansas City was improved in 1904 by the construction of a 63 mile link from Old Monroe, on the "Keokuk Road" 52 miles north of St. Louis, to Francis, Missouri, near Mexico, where a connection is made with the Alton Road's line across the state from Louisiana, Missouri, on the Mississippi River, to Kansas City. This was utilized primarily as a route for through passenger trains jointly operated by the Chicago & Alton and C. B. & Q. railroads. Both used their own mileage exclusively for freight service between Kansas City and St. Louis, notwithstanding the circuity of both in comparison with the shorter length of the joint route.

The Burlington's line into the southern Illinois coal fields, which had previously terminated at Centralia, was continued on to Herrin, Illinois, in Williamson County by purchase of a newly built line in 1908. Six years later, 1914, it was extended to Metropolis, Illinois, on the Ohio River, not far below Paducah, Kentucky through construction and trackage rights. The river was spanned there in 1916-1917 by a great bridge built by the

Paducah & Illinois Railroad and jointly owned by Burlington, Illinois Central and Nashville, Chattanooga & St. Louis railroads. This structure enabled the Burlington to become part of a new route into the southeast, after Gulf, Mobile & Northern (now Gulf,Mobile & Ohio) reached Paducah in 1926 via trackage rights over the N.C.& St.L from Jackson, Tennessee. Just prior to Mr. Budd's arrival on the Burlington, it had acquired an important minority interest in G. M. & N. E. P. Bracken, Executive Vice President, C. B. & Q. became a member of G.M. & N's. Board and Ralph Budd was elected to it, and also to the Executive Committee on January 21, 1932.

This outline carries the Burlington down to the end of 1931, when Ralph Budd succeeded F. E. Williamson. The property entrusted to the new manager's care had been soundly conceived and developed; its traffic sources and connections were generally strong and its financial condition and operating efficiency was sound. However, a deep and prolonged depression was sweeping over the country and the courage, ability and capacity of every railroad, not excepting the strongest, would be tried and tested under conditions of grueling traffic shrinkage before the recent peaks of 1929 were reestablished, and exceeded by the impact of war on the business of the following decade.

CHAPTER XIV

BUDD AND THE BURLINGTON
1932-1949

The first two years of Ralph Budd's association with the Burlington coincided with the depth of the depression. The problems confronting him were not the constructive and stimulating ones of expansion, development and improvement but the grueling ones of expense curtailment. Contraction of service and reduction of budgets for maintenance and betterments were essential to corporate survival. To be sure, such circumstances intensified efforts to advance efficiency, and many lessons in it were learned by all railroads through the adversities of the times. These laid the foundations for rapid recovery of earning power for many companies whenever traffic turned up -- even a little -- during the depression decade.

One of the initial events of 1932 was the negotiation by the railways, acting in concert, of a 10% wage "deduction" voluntarily accepted by the employees, after negotiations with their representatives. A definite time limit was established. It was extended until 1934 and then restorations were authorized in graduated steps which returned the wage bases to the old standards in 1935. A request in 1931 by the railroads for freight rate increases (Ex Parte 103) had been partially granted by the Interstate Commerce Commission upon condition that the additional revenues gained therefrom should be pooled for distribution among the most necessitous lines. Subsequently the I. C. C. agreed to the request of the carriers to permit these funds to be marshalled by a "Railroad Credit Corporation" organized December 14, 1931 for the purpose of lending money derived in this manner to carriers requiring

assistance, and many did, to avert receivership. C. B. & Q.'s 1932 report estimated advances by it to Railroad Credit Corporation of $1,702,000. These were repaid in later years.

A better known emergency fiscal agency, the Reconstruction Finance Corporation, was organized in January 1932 for the purpose of making secured loans, upon I. C.C. approval, to railroads for purposes similar to those advanced by Railroad Credit Corporation, and also for capital improvements and maintenance. The Burlington was never a borrower from either, but the Colorado & Southern and its affiliates were.

The pressure of adverse financial circumstances on all railroads, and the intensity was greatest in the middle west, where there was the larger relative amount of duplication of service and facilities, led to the railroad problem becoming a major national question. There was much public discussion of the idea of appointing a "railroad umpire" or "commissioner", after the manner in which Judge Landis served baseball and Will Hays did the "movies" to effectuate arrangements between the various companies which would produce operating economies by coordination; if not through outright consolidation. No national action was taken but the western railroads, acting as a regional group, established a plan for moderate action which it was hoped would accomplish constructive purposes. It is generally known that Sir Henry W. Thornton (32), who had resigned as President of the Canadian National Railways in June 1932, desired to be appointed to direct any organization of this nature that was established. Thornton saw Mr. Budd and executives of other important roads in respect to this

(32) Thornton was a native of Indiana and served on the Pennsylvania and Long Island Railroads before going to the Great Eastern of England in 1914 as its chief executive. He became President of Canadian National in 1922.

matter. There was desire in some quarters to persuade Mr. Walker D. Hines to serve in this capacity. His name has been previously mentioned as having been Director General, United States Railroad Administration in 1919-1920, after which he engaged in the practice of law in New York, with Great Northern numbered among his clients. Moreover, he was a Director of the Burlington. Finally, however, the position of "commissioner" of the western railways was delegated to Harry G. Taylor in December 1932. This post carried with it ex officio the chairmanship of the Western Association of Railway Executives. The new appointee, Mr. Taylor, had previously been manager of the Public Relations Section of the Car Service Division of the American Railway Association, Washington, D.C.

President Roosevelt, who was inaugurated on March 4, 1933, considered the railroad problem to be one of the most serious matters causing the deflationary spiral which then gripped the national economy. After considering various alternatives at several conferences, in which Mr. Walker D. Hines participated as one of the President's advisers, the new administration's railway policy was embodied in the Emergency Transportation Act of 1933, which was promptly presented to Congress and passed on June 9. It created the office of Federal Coordinator of Transportation which was charged with the duty of taking the initiative with the railroads in bringing about economies in service and facilities through coordination. Joseph B. Eastman, a member of the Interstate Commerce Commission was appointed Federal Coordinator of Transportation. Restrictive features in the legislation and other factors prevented any tangible accomplishments. The office was permitted to lapse at the end of its third year (June 1936).

Meanwhile, the Association of American Railways had been organized around the framework of the former American Railway Association, but with enlarged powers and responsibilities in order better to meet the conditions currently confronting the member lines. The Board of Directors of A. A.R. has been continuously comprised of the chief executives of the principal railroads. One directorate thereon appears by custom, to have been assigned to the "Hill Lines"; G.N.-N.P.- C.B.& Q. Their presidents rotate this office. Mr. Budd was a member of A.A.R.'s original Board of Directors and served in this capacity during at least one-third of the fifteen years after 1934 during which he filled the Burlington presidency. Previously he had been a Director of A. R. A. from time to time.

These and other important matters relating to national railway policy and the external affairs of his own and other companies required much of Mr. Budd's time and attention. His judgment and experience was also being increasingly sought in ever widening circles wherever railroad financial and public affairs were under consideration. However, his principal interests were always concentrated upon the development of the railroads entrusted to his care. The difficulties of the times did not lessen his ambitions for the betterment of the Burlington and its subsidiaries, they only intensified his determination and ingenuity to achieve them.

A study of the map of the Burlington will indicate the completeness of branch line development of the agricultural areas served by its main lines across Illinois, Iowa, Missouri, and Nebraska. This mileage pattern afforded great strength during the pre-automobile era when virtually all inter-city freight and passenger traffic moved by rail.

However, its unusually high proportion of these secondary and feeder lines made the system peculiarly vulnerable to the adverse competitive trends which had set in during the late '20s and were compounding the effects of the depression. One of the most pressing necessities confronting the new president was the modification of the physical plant and its service to meet these adverse traffic changes. They entailed major improvements and service betterments on principal routes and concurrent reductions of freight and passenger schedules on others; with abandonment of all trackage that was proving definitely unprofitable. The Burlington, under Mr. Budd's leadership, showed great foresight in these basic respects. It eliminated the weak and improved the strong parts of its mileage much more rapidly than its neighbors did, even though their operation by bankruptcy trustees facilitated such transitions.

While these internal rearrangements were in progress, related external ones were begun to strengthen relations over through routes at competitive gateways; particularly at Denver and Kansas City where C. B. & Q. would have an opportunity to share in the traffic development of California and Texas. Accordingly Ralph Budd viewed with special satisfaction the opening of the Dotsero Cut-off on June 15, 1934, which connected the Denver & Rio Grande Western Railroad with the Denver & Salt Lake Railway and at last placed Denver on "the main line" through permitting the use of the Moffat Tunnel, completed in 1928, by through trains. Burlington has been the principal beneficiary of the subsequent rehabilitation and development of the Denver & Rio Grande Western which was

intensified during the period of Trusteeship of that railroad (1935-1947).(33)

Study of the detailed records represented by individual matters set forth in the annual reports and spread through the pages of the "Railway Age" show the course of progress on the Burlington during Ralph Budd's administration.

The difficult year of 1932 witnessed an important step in raising equipment maintenance standards and reducing the cost of this work. All heavy car repairs were concentrated at Havelock Shop, near Lincoln, Nebraska. Locomotive work was similarly assigned to West Burlington and Denver. The latter relatively modern shop also served Colorado & Southern. Galesburg Yard was revised and improved and equipped with car retarders, the second installation west of the Mississippi. (34) This permitted more classifications to be made more economically and quickly and so improved blocking of cars in freight trains and scheduling each more effectively in relation to its connections. The end result was reduced train mileage and terminal time concurrently with performance being materially improved.

Air conditioning is an interesting story itself. Its beginnings are found on the Baltimore & Ohio in 1929-1930 and, therefore, is one of the few modern developments which moved from east to west, rather than in the other direction. However, Burlington was among the first western lines to make this improvement to its cars. Thirty-five were equipped with

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(33) C.B.& Q. Assistant Engineer of Maintenance of Way, A. E. Perlman, was "loaned" to the Trustees of the Rio Grande, in 1936, to assist in planning and organizing that work but remained to carry it out and advance on through successive steps to the Executive Vice Presidency of the reorganized D. & R. G. W. and finally, out of recognition of his abilities displayed there, to become New York Central's President in June 1954.

(34) The first car retarder installation west of the Mississippi was for Texas & Pacific's Lancaster Yard, Fort Worth, in 1928.

this apparatus in 1934 and 110 more followed in the next year. After that progress was accelerated until all recently built equipment for long haul passenger service was improved in this way.

There is a close correlation between safety and efficiency. Ralph Budd is equally interested in both. Burlington's safety performance in 1934, his third year with the road, brought it the Harriman gold medal of the American Museum of Safety; symbol of the best performance among the large railroads. It is significant to observe that the "Railway Age" account of this event reports C. B. & Q.'s Superintendent of Safety at that time was Harry C. Murphy. The latter would succeed Mr. Budd as President, 14 years later.

Mr. Budd made the principal address at the annual meeting of the Association of American Railroad Superintendents held in Chicago in June 1935. His timely subject was "Regulators Should Stress Economy." The sound philosophy flowing through his remarks might well be repeated to the superintendents every year. In that paper, he outlined his views on consolidation and coordination; endorsing both means of obtaining the basic objectives which he hoped all operating officers would continually seek. A little later that year he expanded his philosophy on consolidation more specifically, when in speaking before the Kansas City Chamber of Commerce on November 13, 1935, he recommended that the railroads of the United States should be unified into not more than 20 systems.

Probably the greatest single achievement identified with Mr. Budd's administration of the Burlington is the introduction of diesel motive power and light weight streamlined passenger trains. This is a subject of sufficient importance to require an entire chapter to set it

forth adequately. That will follow. At this point, however, it should be mentioned that one of the problems of 1935, and one of the few instances of incipient labor trouble on the Burlington during Mr. Budd's administration occurred late in 1935 when the Brotherhood of Locomotive Firemen & Enginemen threatened to strike unless one of their men was stationed along with the engineman in the cab of the dieselized Zephyrs. Since there was no regular work for these employees to perform in the operation of this new type of motive power, these trains were being run with only the engineer in the diesel cab. There was ample precedent for this in the multiple unit trains running in the electrified suburban services of the Illinois Central, New Haven, New York Central, Pennsylvania, Long Island and Lackawanna Railroads. However, particularly in 1935, when unemployment was one of the nation's principal problems, there was obvious sensitivity on the matter of eliminating the second employee from the locomotive cab. In addition, it was a subject about which the public might not understand the railroad point of view, overlooking the fact that a second man is even less necessary to run a diesel locomotive over a block signaled railroad than an automobile or motor truck which must guide its own course on a highway. Therefore, the Burlington reluctantly acdeded and placed a "fireman" on the dieselized Zephyrs. The measure of economy of this new motive power would have been further increased had it not been necessary to do this. Other diesel users at that time had not attempted to operate with one man, but had the Burlington policy remained unchanged, it might have set a precedent in this respect.

The increased speeds at which the dieselized Zephyrs operated have required continuous work, within the limits of proper budgetary allowances,

for improvement of the basic physical characteristics of profile and alignment. Curvature of 3° (1910' radius), with 5"-6" of super-elevation, did not impose speed restrictions when motive power and track standards held passenger trains to a maximum of 70 m.p.h., the usual limit for steam performance. Diesels could readily operate at 100 m.p.h. and even faster. However, since the kinetic energy in moving bodies varies as the square of the speed it is apparent that a 70 m.p.h. restriction in a 100 m.p.h. line is the equivalent of slowing down to a virtual stop of 70 m.p.h. track. (70 squared being 4,900 and 100 squared being 10,000, it therefore requires more force to accelerate from 70 to 100 m.p.h. than from 1 m.p.h. to 70 m.p.h.)Few railroads had curves of less than 3°, except where the longer radius ones could be used without adding to construction expense. 1° curves (5,730' radius) are required for 100 mile speeds around them. Ralph Budd provided many of this standard and better for C. B. & Q.

In order to raise the standards of the primary main lines to the highest ones consistent with the investment permitted by traffic density, Budd introduced on the Burlington a policy, similar to the one he followed on Great Northern, of working progressively and systematically towards the elimination of conditions which handicapped operations, either in respect to time or expense of movement. In this way not only were the physical characteristics of grades, curves and distance improved, but the engineering standards of track and bridge construction and maintenance and all other components of the railroad underwent continuous betterment.

One of the first, and principal, changes of line was undertaken

suddenly and involuntarily when in the latter part of May and the first of June 1935, a flood of the Republican River destroyed long sections of line in Nebraska between Benkelman, McCook and Superior. The same torrential rains causing this destruction flooded other areas in eastern Colorado and washed out Burlington trackage in several places there. The damage west of Oxford Junction occurred on the main Chicago-Denver route, over which 16 hour Zephyr service was being planned for the next year. The restoration relocated it wherever the original profile and alignment was not representative of the standards desired for future operations. By an interesting coincidence, this misfortune befell the Burlington just as a newly employed Assistant Engineer of Maintenance of Way, A. E. Perlman, formerly Roadmaster, Northern Pacific, but just completing a brief period of special service with the Reconstruction Finance Corporation's Railroad Division, was reporting for duty. Mr. Budd directed that Perlman be assigned to rebuilding the damaged property in the Republican River valley in Nebraska. The detailed record of improvements of this nature are too extensive for incorporation in a brief report such as this, so reference to other individual projects must be omitted except of the "Centennial Cutoff" (in honor of C.B. & Q.'s 100th birthday in 1949) authorized during Mr. Budd's administration but not completed until late 1952. It eliminated the unsatisfactory old line between Brookfield, Cameron Junction and Birmingham, Missouri. In view of the importance of this project, it will be the subject of a later chapter.

The dimensions and design, hence weight, of rail determines its structural qualities. The greater its ability, i.e., stiffness, to resist bending moment and shear, the better the riding qualities of the track

comprised of it and the easier and more economical the maintenance will be, (assuming, of course, that the rail is supported by an adequate number of stout well ballasted ties.) Ralph Budd's engineering background has always given him a deep interest in the technical aspects of rail and track. His knowledge and understanding of them are reflected in this foundation of the railroads which bear the stamp of his leadership.

New standards of rail, increasing their weight and other characteristics, usually originate on the heaviest density lines and spread on to the ones having relatively less traffic. It was, therefore, only during the middle and late '20s that the railroads of the central west began to give up 90# and 100# rail as their standard and move forward to the next heavier section, 110#. (The heaviest sections, 127#, 130# and 136# were little used outside of the east and the coal roads of the Pocahontas region.) Burlington had only 568 miles of 110# rail in service when Mr. Budd came to it on January 1, 1932. That section had not proved entirely satisfactory. Structural inadequacies in its design were eliminated by an improved one which represented a section of 112# weight. The Burlington adopted it as standard in 1933. Mr. Budd considered the development of this new rail of such importance that the single page of illustrations in the 1933 annual report, which on one side features the original Zephyr then under construction, gives the other side over to a cross sectional drawing of this new type of rail. To the average reader, the train was dramatic and the rail, probably prosaic and dull - but to Ralph Budd, their significance was equally closely related in the improvement of the railroad, Hence, they were featured together in the

annual statement to the security holders. Relaying of Burlington's principal main tracks with 112# rail proceeded rapidly after 1933. Evidencing the trend of improvement, the inside back cover of the 1944 report shows a similar drawing for the 129# section of the "torsion resistant" ("TR)") type of rail under the appropriate caption "The Shape of Things to Come."

Modern motive power and equipment are of prime importance to successful railroad operation. The Great Northern chapters relate some significant features of improvements made in locomotives and cars. The Burlington, under Budd, made rapid progress in these respects, too. Some significant acquisitions of new designs of steam power, for freight and passenger and dual service occurred during the period under review. Likewise, previously acquired motive power was modernized; notably the large Texas 2-10-4 type engines.However, these matters are not detailed herein since steam locomotives were so soon to be supplanted by the diesels. The record of passenger car additions appears in a subsequent chapter. Freight car acquisitions were proceeding currently to keep Burlington's ownership abreast of traffic requirements and the average age of units within the proper limits set by experience in economical replacement.

As evidence of the adequacy of Burlington's car ownership freight car fleet, it is a "per diem credit" road, on balance; i.e., it receives more from rentals for its freight cars used by other railroads than it pays to them. The latter statement, of course, does not relate to so-called "mileage cars", principally refrigerator and tank cars, usually owned by private car lines, and compensated on a mileage rather than a per diem basis of rental. However, C.B. & Q.'s ownership of the cars of the Burlington Refrigerator Express, leased to and operated by Fruit Growers

Express Co., provides it with adequate numbers in relation to the requirements of the traffic using such equipment. It might be noted at this point, since it was not mentioned in the proper place that Great Northern similarly owns, through Western Fruit Express, cars of this type sufficient for its needs. These, too, are leased to and operated by "F. G. E. X. " and compensated on a mileage rather than a per diem basis.

The principal improvement accomplished in 1936 was the elimination of a five mile single track gap in an otherwise continuously double tracked line from Chicago to Red Oaks, Iowa, 443 miles. To add to its difficulty, this limitation occurred on "Whitebreast Hill" near Albion, Iowa, where the one track ascended a 1.3% eastward grade (in the direction of heavy traffic.) The ruling grade eastward on all of the remainder of the route between Omaha and Chicago was 0.66%. The new double track line was built to standards of 0.66% grades and thirty minute curves, of which there were only three. The grading for this improvement was completely mechanized. A force of only 100 men were all that were required to operate the equipment used to move over 1,100,000 cubic yards of dirt and rock.

In conformance with his usual practice, Mr. Budd required that complete sub-soil surveys be made in advance of planning the work so that none but desirable material would be used for making fills. Embankments were built up in layers of 6"-12" of material, which were compacted by sheepsfoot and other types of rollers, after being sprinkled. Complete facilities for subgrade drainage were laid under all fills. This method of construction completely avoided the necessity of making allowances for shrinkage of fills and permitted maximum speed operations over the

line almost from the outset. Likewise track laid on fills made in this manner required little resurfacing. This method became standard practice for all earthwork required on the Burlington for change or extension of lines.

The opening of the Dotsero Cut-off of the Denver & Rio Grande in 1934 and the inauguration of the Denver Zephyrs in 1936 led to increased train density and train speeds over the Burlington's line to Denver. In order to improve safety and flexibility of train movement and reduce delays resulting from meeting and passing trains on a single track lines, the longest stretch of centralized traffic control (cTc) installed up to that time was placed in service between Denver and Akron, Colorado, 112 miles, in 1937. Subsequently, this would be extended eastward progressively so that all single track mileage on the main line on to Red Oak, Iowa, beyond which double track is continuous, was protected by cTc. cTc followed wherever train density justified on other routes.

Related improvements to the signal system outside of cTc territory was progressing continuously, particularly the transition from semaphore to color light signals and the substitution of power for manual control of interlocking plants. Small interlockings at isolated crossings and junctions were made automatic, or the latter type of protection was installed where none was provided before and consequently safety stops were necessary. A notable important improvement of this general character was the installation of one of the early all-relay type interlockers at Hastings, Nebraska, in 1938, to control a complex track layout three miles in length. Several interlockers of the conventional type previously used would otherwise have been required for

this purpose.

The story of additions to the fleet of Burlington Zephyrs is reserved for the next chapter but this one should record a notable addition to Burlington's fleet of conventional steam-powered trains.(35) On June 10, 1939, acting in collaboration with the Denver & Rio Grande and Western Pacific Railroads, the Burlington established the "Exposition Flyer", operating over the 2,532 mile distance via these three lines between Chicago and Oakland. The schedule was 57 hours westbound and 60 hours eastbound. The magnificent scenery of the two western connections, and Burlington's own reputation for service, together with the tourist travel to the San Francisco Exposition, made the train a popular one from the outset. Therefore, while it had been initially installed on a temporary seasonal schedule, it was made a permanent one on August 27, 1939.

During this period there were intensified competition for perishable traffic and to attract industrial development. Burlington either individually in some places or in cooperation with other lines elsewhere took aggressive steps to protect its interest in these respects where necessity required and opportunity permitted.

Preparations for American participation in World War II began in 1940, although this conflict was not entered until precipitated by events of December 7, 1941. On May 28, 1940, President Roosevelt appointed Mr. Budd Commissioner in charge of Transportation to serve on the National Advisory Committee to the Council of National Defense.

(35) In 1949, Mr. Budd's last Burlington year, it would be succeeded by the famous "California Zephyr", which soon claimed the distinction of being America's best known and most popular train.

His principal official responsibilities in this important position were to alert the railways to the tasks ahead in the event of war. However, his most important but unofficial duties were to restrain that considerable element of "New Dealers" within the administration who looked forward to such an occurrence to provide an opportunity to place the railroads again under Federal Control, and this time it would be permanent. The latter found great statistical assurance for their ambitions in the contraction of railway service, traffic, equipment and facilities. They were certain that the war induced expansion of production and travel would quickly overburden railway capacity to the point of serious congestion and consequent collapse of service standards. Mr. Budd, on the contrary insisted, that if not burdened with controls, the railways could expand their operations to such an extent that they could haul whatever the mines, mills, farms and factories of the nation could produce. Railroad performance in the war years proved Mr. Budd correct.

Shortly after the outbreak of the war, through a Proclamation dated December 23, 1941, President Roosevelt established the Office of Defense Transportation and appointed the Honorable Joseph B. Eastman, a member of the Interstate Commerce Commission as its Director. This permitted Mr. Budd to resign his position in Washington, as member of the Advisory Committee to the Council of National Defense at the end of the year and return to give full time to the Burlington, which would more than ever need his judgment and direction during the difficult war years which lay ahead. While fulfilling these duties in Washington, he

continued to direct the affairs of the Burlington in Chicago, commuting between these two cities each week for 19 months.

The Burlington, along with many other railroads, admirably met the severe tests of wartime overloads of traffic. It was not a period in which important additions and betterments could be made. The problem was entirely one of making the most of the property and equipment that was available and continuously using the ingenuity of purchasing and executive representatives to enlarge the authorization of maintenance material and such limited numbers of new freight cars and locomotives as might be allocated to this line.

Under their own management and free from Federal Controls, other than the bearable ones of Office of Defense Transportation and the various authorities of production and supply, the railroads, while continuously heavily loaded with traffic, were never congested, except within limited local areas which were quickly cleared through their own cooperative efforts. Finally the conflict came to a close in 1945. Burlington rendered distinguished service during those four difficult war years.

There was a brief period of Federal Control, occasioned by labor troubles at the outset of 1944, when the Brotherhood of Locomotive Firemen and Enginemen and the Order of Railroad Conductors refused to accept the disposition made by the appropriate Federal authorities of a long drawn out wage dispute. This led to a brief seizure of the railways, December 27, 1943 - January 18, 1944, by the Secretary of War. Ralph Budd was temporarily placed in uniform as a Colonel while serving as the principal regional authority in the central west during this episode.*

* Another brief period of Federal Control, in 1948, followed a national wage movement in which the terms proposed by a President's Emergency Board were not accepted by certain of the railway labor organizations. This occurrence placed Mr. Budd in uniform, again, as a Colonel on active duty.

One of the principal improvements completed by Burlington during the war period was the modernization and enlargement of its yard near Lincoln, Nebraska. It was equipped with car retarder control of cars moving off of the hump onto the classification tracks. This new facility was opened for service in 1944. During the same year, C. B. & Q. began equipping some of its routes and trains with two-way radio.

After "V-J" Day, dieselization of all services; freight, passenger and yard, had priority of access to budgets and capital. (36) Related facilities for servicing and repair of diesels were included in the program. Burlington has achieved notable success in securing high diesel maintenance standards at low unit costs. The former steam locomotive repair shops at West Burlington and Denver, which had previously been in a transition to diesel work, were more adequately adapted to their new functions. These two main shops were assisted by a completely new and well designed and equipped diesel servicing station and light repair facility at Clyde, adjacent to the Hawthorne freight yard in Cicero, Chicago, Illinois.

Freight equipment ranked second only to diesel locomotives in the aggregate amount of capital expenditures made for it in post-war years. More passenger train cars, Budd built of stainless steel, by the shotweld method of construction, were added to the already substantial fleet. Experience with this type of car dating back to 1934-35-36, proved them to be unusually economical to maintain, due to complete freedom from corrosion and exceptionally sturdy design.

(36) As of January 1, 1954, C. B. & Q.'s ownership of diesel locomotives totaled 570 units with 807,000 total horsepower.

The Burlington was identified with several consolidation proposals during Mr. Budd's administration. None of them entailed major additions to the system but both were keenly contested, and as is usually the case in matters of this character heard before the Interstate Commerce Commission, the opponents of the merger proposals were awarded the decision.

The first instance dates back to 1934. The Honorable Jesse H. Jones, Chairman of the Reconstruction Finance Corporation, having been urged to take some constructive action to prevent the threatened collapse of the Minneapolis & St. Louis Railway, which was barely able to meet its payrolls, sought the advice of Mr. Budd in reference to the sale of that property to some one of the neighboring lines. Subsequent inquiry by Mr. Budd and others indicated that no one railroad would be a receptive purchaser of the Minneapolis & St. Louis but that sections of its mileage would be useful additions to a number of systems and a "multiple consolidation" was a possibility. The line might be bought by a group of railroads which would then acquire sections of it. In this way, substantially all of the routes of the M. & St.L. could be preserved and some of them would be used more intensively than under independent operation.

Mr. Jones thought well of the idea and requested Mr. Budd to develop the subject more fully. This led to conferences between the chief executives of all the railroads concerned with Mr. Jones in November 1934, and again in 1935. Out of these eventually developed a specific plan to accomplish the objectives sought. Details were developed and a definite plan presented to the Interstate Commerce Commission. Hearings

began in the spring of 1936.

At the outset of 1935, L. C. Sprague was appointed Receiver of the Minneapolis & St. Louis. Its condition soon improved materially; partly due to better management and partly due to improved business in the territory. The railroad organized spirited and effective opposition to the consolidation plan. This led to sharply contested and long drawn out hearings and arguments. Finally a negative decision from the Interstate Commerce Commission, in 1938, led to abandonment of the idea.

In June 1939, Burlington's subsidiary, Colorado & Southern, filed an application with the Interstate Commerce Commission for authority to lease the wholly owned Texas lines and unify their operation. This was so bitterly opposed by local interests in the hearings before that body that the proposal was dropped a year later.

Another event of this type relates to the proposed acquisition by Burlington and Santa Fe of the line acquired by G. M. & O. through its purchase of the Alton Railroad in 1945, extending from Rock Creek Junction, Kansas City, Missouri, to a connection with the Burlington at Francis, (Mexico) Missouri. These two prospective purchasers proposed to rehabilitate the route and bring its track and facilities to the high standards characteristic of their important lines. G. M. & O. would be given trackage rights over the property it was selling. The application for this purchase was filed with the I. C.C. in March 1946. It, too, was bitterly opposed, in this instance by several of the other western lines entering St. Louis. The Commission decided against the Burlington, Santa Fe and G. M. & O. in July 1948. The line has, therefore, remained in the possession of the latter, but Burlington acquired trackage rights over it in

order to shorten the distance of its freight haul between Kansas City and St. Louis. The joint passenger service once operated via Alton-Burlington between those cities has been discontinued.

One uncontested acquisition was made in 1949 of a small but strategically located industrial switching line, the Illinois Northern. It serves the great McCormick Works of the International Harvester Co. in Chicago, from which the stock therein was purchased. Santa Fe bought 51% of the shares; Burlington 25% and Pennsylvania and New York Central 12% each. Illinois Northern is a valuable feeder of the Burlington and its other proprietors.

Ralph Budd's early work on the Great Northern in developing motor transit affiliates for the coordination of rail-highway service served as a background and precedent for him to develop the Burlington Transportation Co. into a useful and profitable adjunct of the railroad. A controlling interest in the latter's passenger routes and equipment was sold in 1944 but the truck lines have been retained.

Mr. Budd's predecessors on Burlington and Great Northern had established strong precedents of sound financial policy which he reinforced with his similar beliefs and actions. The only serious fiscal problems confronting the system during his administration related to the Colorado & Southern group of companies. These had incurred large indebtednesses to the Reconstruction Finance Corporation. C. & S. was unable to earn its fixed charges during the difficult years of the '30s. During 1941, it was obliged to arrange with its creditors for a voluntary readjustment of its capitalization by converting certain fixed interest obligations into contingent debt in consideration of the pledge of the debtor to use a

substantial portion of future surplus earning power for debt reduction. The proposal was accepted. The improved income of subsequent years has enabled the Colorado & Southern system companies to reduce their mortgage debt from $56,000,000 in 1941 to $17,000,000 in 1952. The latter was represented by first mortgage 4-3/8% thirty year bonds of the Fort Worth & Denver Railway sold to the public in that year to refund all debt of the system held by the public, except equipment obligations. In addition to the mortgage on the property of the issuing company, these Ft.W. & D. bonds are secured, collaterally, by the pledge of all of the mortgage debt of the parent company, The Colorado & Southern Railway.

When Ralph Budd assumed the presidency of the Burlington, its funded debt was $220,000,000. By the time of his retirement this had shrunk to $152,000,000. Equipment trust obligations were outstanding at the end of 1949 in the amount of $30,000,000, compared with none in 1929 or 1932. However, this is a moderate sum in relation to the magnitude of Burlington's post-war equipment program. The principal financial event within the corporate affairs of the Burlington during the period under review was the refunding of $85,000,000 C.B. & Q. Illinois Division 3-1/2 and 4% bonds due 1949 but called for redemption on January 1, 1945. Bonds issued under the Burlington's First and Refunding Mortgage were used to refinance that indebtedness and also other callable debt carrying coupon rates of 4% or higher. These beneficial changes have reduced Burlington's annual fixed charges from over $9,000,000 in Mr. Budd's first year with the company to under $6,000,000 in his last one, notwithstanding the great improvement in the property that had occurred meanwhile, which inevitably required very large expenditures. (37)

(37) See Appendix "D" for statistics of financial and other measurements of Burlington operations.

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Christopher Wren, the architect of St. Paul's Cathedral in London, when asked where was his monument, replied "Look about you."

If one would see Mr. Budd's monument, look at the Burlington and the Great Northern and their affiliates!

CHAPTER XV

DIESELS AND ZEPHYRS

Ralph Budd did as much or more than any other man to introduce diesel locomotives and streamlines passenger trains on the American railways and make both standard practice. He will probably be better remembered for this achievement than any of the many other ones accomplished during his career.

Diesel locomotive development began with small switchers first produced in 1924-25. It will be recalled that Great Northern, during Mr. Budd's administration, purchased one of 600 h.p. capacity in 1926. He gained further direct personal experience with diesel engines as reliable prime movers for the economical production of electricity when several were installed at the site of the Cascade Tunnel construction, 1926-1928, to protect the continuity of work in the event of slides interrupting the transmission lines carrying current from nearby hydro-powered central stations. This led him to visualize diesel engines, if they could be made smaller and lighter per h.p. of output, being placed in "power cars" to produce current to run trains.

In 1932, Ralph Budd's first Burlington year, passenger traffic on that and other railroads was melting under the combined force of the depression and diversion to automobiles. The shrinkage in that service between 1929-1932 was two-thirds of the recent business; freight losses by comparison were of the order of 50%. Ralph Budd was one of the several of the more courageous and progressive executives who believed that the down trend in passenger traffic and revenues could be reversed. This

change of trend, however, would require improvements in passenger train service that would necessitate building their cars of new alloy metals which would provide increased strength with reduced weight, and would use electric motive power driven with current supplied from a self-contained mobile diesel engine driven power plant. The new equipment would also have to be designed for travel, comfort and pleasure on high speed, long distance runs.

At that same time, the Edward G. Budd Mfg. Co. of Philadelphia, was also endeavoring to build small high speed railroad passenger trains. This work began in 1932 with the attempted adaptation to American railway service of the Michelin pneumatic tired gasoline motor driven rail car recently developed in France. Three Budd-Michelin two car trains were produced in 1932-33. Their car bodies had the now familiar exterior of stainless steel fabricated by the Budd "shotweld" process but the width of the fluting on the sides was twice that later found to present the more attractive appearance.

Ralph Budd went to see his Philadelphia namesake, but no relative (See Page 9 of Chapter I) in the late summer of 1932 to discuss the possibility of building one of three cars. This was considered the maximum length and capacity that could be driven at high speed by any reliable internal combustion engine then available that would conform to the size and weight restrictions imposed by the power car of such a train.

This train, that later would become Burlington's "Pioneer Zephyr", was placed under contract with the Budd Co. on June 17,1933. A 600 h.p. spark ignition distallate burning power plant built by The Winton Engine

and Electro-Motive Divisions of General Motors Corporation was specified. Wind tunnel tests were conducted by the Massachusetts Institute of Technology to establish the most effective design for reducing air resistance by streamlining.

During 1933, Mr. Ralph Budd and Mr. H. L. Hamilton, the chief executive officer of the "Electro-Motive Corporation" which he had sold to General Motors Corporation late in 1930 (38) had many conferences about the motive power for the "Pioneer Zephyr". The former had, as previously noted, become interested in the possibility of using a diesel engine to drive the generator of the self-contained electric locomotive designed for road service. The latter is much more exacting than the switching assignments on which this type of power had been applied since 1924.

The General Motors exhibition of diesel engines at the Chicago "Century of Progress World's Fair" in 1933 further stimulated Mr. Budd's interest in diesel engines at a most timely juncture. Hence, when H. L. Hamilton reported to Mr. Budd, in October 1933, that General Motors Corp., through C. F. Ketterings work, had finally developed a 600 h.p. (compression-ignition) diesel engine that could be successfully used in the streamlined train then under construction for the Burlington, the latter's president instantly decided to substitute it for the (spark-ignition) distallate burning one previously ordered, even though this action would delay completion of the train.

Burlington's 600 h.p. dieselized "Pioneer Zephyr" was completed on April 18, 1934 and made its historic "dawn to dusk" non-stop run from

(38) G.M. had previously bought Winton Engine Co. so decided to buy its best customer, E.M.C., too. The Winton purchase brought G.W. Codrington into G.M's. family. He subsequently became prominently identified with diesel engine development.

from Denver into Chicago's "Century of Progress" exposition of May 26, 1934, averaging 78 m.p.h. for 1,015 miles. Its 13 hr. 5 min. running time was just half of the 26 hr. regular schedule of the "Aristocrat", Burlington's best and fastest Chicago-Denver train. This grueling test proved that Boss Kettering's new, two-cycle, high speed diesel engine, had adequate stamina, capacity and reliability for fast main line passenger service.

After making its historic non-stop dawn to dusk Denver to Chicago run, the original "Zephyr" unit went on an exhibition tour throughout the United States. On November 11, 1934, it was placed in regular service between Lincoln-Omaha-St. Joseph and Kansas City as "The Pioneer Zephyr", making a daily round trip in replacement of two steam powered trains. Traffic soon proved too much for the train's capacity so a fourth car was added.

The enthusiastic reception given the "Pioneer Zephyr" led to two more 3-car trains of similar type being ordered for service between Chicago-St. Paul and Minneapolis. These "Twin Zephyrs" for Twin Cities service made their initial revenue run between Chicago-Minneapolis and St. Paul on April 21, 1935. The schedule was on 6-1/2 hours between Chicago and St. Paul and 7 hours between Chicago and Minneapolis. Heavy patronage required this service to be increased on June 2, each train making a daily round trip. Since then, the "Twin Zephyrs" have each operated on this basis, running the highest annual mileage continuously attained by any railroad equipment, making a daily turn around.

The third of the new schedules and the fourth train was placed in service as the "Mark Twain Zephyr" between St. Louis and Burlington, Iowa

on October 28, 1935. It remained on this run until February 2, 1953 when it was reassigned in connection with the "Pioneer Zephyr" to provide service between Galesburg and St. Joseph.

During 1934-1935 the four trains of this type accumulated a total of 641,000 service miles. Their operating costs were less than half that of conventional trains of the same capacity. Moreover, much additional traffic was attracted by them. The millionth Zephyr mile was registered in May 1936. Even with the round trips which the Chicago-Twin Cities "Zephyrs" made by the early summer of 1935, they proved inadequate for the traffic which had more than doubled. Over 5,000 people were turned away during the two vacation months of July and August. In order to meet the demands of patronage, two additional 7-car trains of this type were ordered. These were placed in service between Chicago and the Twin Cities on December 18, 1936.

The heighths of the power unit and the passenger cars of the four original "Zephyr" trains ("Pioneer", "Mark Twain" and two "Twins") were below standard dimensions and so were car lengths. For example, passenger car floors were 43" above the top of rail compared with the usual 51", a reduction of 8". The maximum heighth of the power car was 12' 1", while heighths of the maximum capacity steam power ranged from 15'-16'. The roof of the "Zephyr's" passenger cars was 11' 2" compared with the usual 14' 6" of that period (and 13' 6" now). The width of these first "Zephyr" cars, however, was only a few inches less than the 10' conventionally used.

Union Pacific's first streamliners were also built to reduced heighths, widths and lengths. The first streamlined train which used

the conventional car floor heighths, car lengths and roof heighths, (the latter, however, representing the present 13' 6" standards compared to the 14' 6" used up to that time) was the equipment for the Milwaukee's "Hiawatha", placed in service in May 1935. It was hauled by a new 4-4-4 type of oil burning steam locomotive, which necessarily had a 14' 4" heighth. Therefore, cars for its train could have the usual 51" car floor heighths, since the roof could be 13' 6" and still remain in balance with the locomotive. However, a 13' 6" roof was 1 ft. below former dimensions. This change was permitted by the elimination of the clerestory, which had previously been required for purposes of ventilation but would be obviated by air conditioning which had now become standard practice. The greater popularity of the full dimensioned "Hiawatha" cars in comparison with the sub-dimension ones of the early "Zephyrs" (and U.P. streamliners, too) accelerated the ordering of the two new "Twin Zephyrs" for Twin Cities service in competition with the new "Hiawatha". These "Zephyr" cars, and those which followed for the Denver trains were built to the new standard car heighths and the established standards for floor heighths and former interior widths. This new equipment was placed in service on both runs in October-November 1936.

On November 8, 1936, the twin "Denver Zephyrs" made their initial run on a schedule of less than 16 hours. Previously one of the two new trains repeated the "dawn to dusk" run from Denver to Chicago in 12 hours, 12 minutes and 27 seconds. This was about 55 minutes faster than the original"Zephyr" record made in 1934.

These two 12 car Denver trains included coach as well as Pullman accommodations. This is now the oldest streamlined train with Pullman

accommodations still in service, yet it is in excellent condition and its popularity is undiminished. During the 18-1/2 years of life, the two "Denver Zephyrs" have traveled farther than any person or other mechanism.

Many additional light weight cars, E.G. Budd built of stainless steel, were ordered for use in the "Zephyr" trains until America's participation in World War II halted passenger car production. By that time, however, "Zephyr" service included the "Twin Zephyrs" between Chicago-Minneapolis and St. Paul, the "Denver Zephyrs" between Chicago and Denver, the "Silver Streak Zephyr" between Kansas City and Lincoln, the "General Pershing" and "Pioneer Zephyr" between Kansas City and St. Louis, the "Mark Twain Zephyr" between Burlington and St. Louis, and the "Texas Zephyrs" between Denver and Dallas. The "Sam Houston Zephyr", together with the Rock Island's "Texas Rocket" provided double daily streamlined passenger service over the Burlington-Rock Island Railroad between Ft. Worth, Dallas and Houston.

In 1945, the Burlington became the first American railroad to use the "vista dome" car. This innovation, which added a "third dimension" to travel, was initially proposed by C. R. Osborn, Vice President and General Manager of Electro-Motive Division of General Motors Corporation, earlier that year through a "mock up" full scale wooden model. It represented an idea developed by him during the course of a ride taken a short time before through Glenwood Canyon of the Colorado River, in the caboose of a Denver & Rio Grande Western freight train. (39) Mr. Budd and the Burlington were the first to test this proposal in actual service. Later

(39) An appropriate monument located in Glenwood Canyon and dedicated in 1950 commemorates the place where the latest addition to present travel interest and pleasure had its birth in the fertile imagination of Mr. Osborn.

that year, the Burlington's Silver Dome" was created by rebuilding a light weight coach using an ingenious seating arrangement on the lower level which avoided the use of a depressed center. After the popularity of the "dome" with passengers had been proved, the depressed center was incorporated into the cars subsequently built new to this "vista dome" design. This first Burlington "vista dome", converted in 1945, preceded by two years General Motors' famous "Train of Tomorrow" which incorporated the "vista dome" into the several basic types of equipment required in passenger train service. These spectacularly beautiful new cars provided maximum travel pleasure and comfort. (40) (41)

Use of light weight stainless steel passenger equipment was not confined to main line "Zephyrs." The Burlington became one of the first railroads to operate modern air conditioned equipment in suburban service and assign diesel locomotives to these trains. (42) The superior quality of C. B.& Q. suburban service is evidenced by its popularity with its

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(40) The "shake-down" run of the "Train of Tomorrow" was made one Saturday in the middle of May 1947, between Hammond, Indiana, and Wallace Junction, Indiana, over the Monon Railway. The initial run introducing the train to representatives of the press from all over the country occurred ten days later and was also over the Monon between Chicago and French Lick Springs, Indiana. My father was president of that railway at the time and I rode this magnificent new train on both of these notable initial runs.

(41) After several years of demonstration runs throughout the country, the "Train of Tomorrow" was sold to Union Pacific. It is now in service on that system between Portland and Seattle.

(42) The train density of suburban traffic has long required the addition of a (middle) third track to Aurora, 38 miles. It is equipped with cTc for two way operation by signal indication. Burlington is fortunate, however, that its commuter service uses a single main line and is not diffused over several routes.

patrons and their willingness to accept moderate fare increases without opposition.

Through orders placed in 1949 and deliveries in 1950, the Burlington became the first railroad to follow the example of the Long Island in the use of two level passenger equipment to increase both seating and carrying capacity on crowded commutation trains operating to car limits. Entrance to these cars is in the center. Roof heighth above the rail is necessarily increased over conventional dimensions and car lengths are extended to 85'.* The lower level accommodates 96 passengers with the usual seating arrangement. A depressed floor is not used between the trucks. Also the floor of the upper level is not continuous across the car since this would give insufficient headroom in the aisle. The floor is divided on the two sides of the upper deck to extend only over the two rows of seats on the lower one. In order to provide aisleways the upper level has rows of single seats only, alongside the windows. These accommodate 56 persons. There the upper level can encroach on headroom since the passengers below are seated. The lower level aisle has the full interior heighth of the car as headroom. The total seating capacity of a single gallery car is 152 persons.

The C. B. & Q. "gallery cars"were built by the Budd C_o. of stainless steel. These permit the Burlington to reduce the number of suburban type cars handled in the Chicago Union Station, thereby lowering the charges payable to this terminal company and, in addition, provide many more seats, with an equal number of cars and trains during rush hours. The notable popularity of the gallery car led the Burlington to place two additional orders for them and aroused the interest of other railroads

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* Roof is 15' 8'' above rail.

in this development. One car was loaned, last fall, to the Southern Pacific for trial runs in its San Francisco suburban service. The general design of the Burlington's gallery cars is followed in the new ones of similar construction and arrangement, being delivered by the St. Louis Car Co. to the Chicago & North Western for the latter's suburban service.

In the post-war years, Burlington cooperated with the two owner lines, G.N. and N.P. in placing orders for the former's share, based on a mileage pro rata of 17 sets of new equipment for transcontinental trains. In addition, C. B. & Q. ordered cars for two new trains of its own. The first schedule to be furnished with new cars was the "Empire Builder", operating, as is well known from preceding pages, between Chicago and Seattle via St. Paul and the Great Northern, and with a Portland connection using the Spokane, Portland & Seattle. Five sets were required for this train. The change-over was made on February 22, 1947. The "Empire Builder" then became the first daily streamlined transcontinental train providing both coach and Pullman accommodations. New equipment was similarly, but later, provided for the "North Coast Limited" run in conjunction with Northern Pacific to the Pacific northwest. These initial orders did not contain vista dome cars but the latter have since either been added, in the case of N. P., or are on order, for G.N. for their respective trains. All cars for exclusive operation on the Burlington or the "California Zephyr" jointly operated with D. & R. G.W. and W.P. are Budd-built of stainless steel but the G.N.-N.P. trains, for which C. B. & Q. supplies its mileage pro rata of cars, are constructed by other builders of cor-ten

steel and hence have painted exteriors conforming to the color schemes of the respective connections beyond St. Paul. *

After many years of waiting, Zephyr service was extended to the Golden Gate on March 20, 1949. This was just five months before Mr. Budd's retirement and was the last passenger service improvement with which he was identified (unless we may except the "gallery cars", which were, as stated, ordered in 1949 and delivered in 1950.) The "California Zephyr" started as an 11-car train, with five of them of "vista dome" design. This is more than are assigned to any other train and was occasioned by the magnificent scenery of the Colorado Rockies and the Feather River Canyon. This new train proved popular from the outset. Even in non-tourist seasons it operates normally at or close to full capacity. It established the Burlington and its connections as a competitively successful California passenger route.

By ordering a seventh set of "California Zephyr" equipment, it later proved possible to increase the utilization of these cars and put them on the "AK-SAR-BEN" the overnight Chicago-Omaha-Lincoln train, which was renamed the "AK-SAR-BEN Zephyr."

The "Centennial Cut-off" (so named because it was authorized and commenced in Burlington's centennial year of 1949, which was Mr. Budd's last year with the C.B. & Q.) will be the subject of the next chapter. It permitted a major improvement in Burlington's passenger service and gave the Burlington second rank (to Santa Fe in first place), among the rail passenger carriers between Chicago and Kansas City. The new Kansas City service permitted by this change of line allowed similar improvement in train schedules and equipment between St. Joseph and Chicago

* Vista dome cars for G.N. are being built by Budd Co. of stainless steel. However, their exteriors may be painted to match other "Empire Builder" cars.

by the use of through cars cut in and out of the "American Royal Zephyr" at Brookfield, Missouri, and connections there with daylight"Zephyr" service to that other terminal.

The"Zephyrs" and related physical and service improvements have also advanced and strengthened the position of the Burlington as a passenger carrier between Chicago and the Twin Cities, Chicago-Omaha/-Denver and Fort Worth-Houston-Dallas. Burlington's concurrent improvement in the proportion of freight service, which it performs in its territory, has been assisted by the growing popularity of its passenger schedules.

On February 2, 1953, the Burlington revitalized its Chicago-Kansas City passenger business with daylight and overnight schedules which represented a five hour reduction in time (of the faster pair of trains) and assigned stainless steel equipment for the daylight "Vista-Dome Kansas City Zephyr." Some of the same cars, including a vista dome coach and also light weight sleepers are used on the overnight "American Royal Zephyr" , (Chicago-St. Joseph-Kansas City.)

The "Pioneer Zephyr" after 21 years of service on all parts of the Burlington System is now used to provide local service between Galesburg and St. Joseph connecting with the "Kansas City Zephyr" at Brookfield to provide a fast daylight service between Chicago and St. Joseph. The 20 year old "Mark Twain Zephyr" is used on the other side of this Galesburg-St. Joseph service.

In December 1947 the vista-dome "Twin Zephyrs" became available for the Chicago-Twin Cities runs. This was the first regularly scheduled vista-dome service to be operated by any railroad and proved an extremely useful patronage builder. The new "Twin Zephyrs" provided additional

seat space in the same number of cars since on short hauls, dome seats can be considered as revenue seats. A shorter train is required for the same capacity thereby reducing the terminal charges that are calculated on a car basis. These two new trains freed the older "Twin Zephyrs" for reassignment as the "Nebraska Zephyr" between Chicago-Omaha-Lincoln.

The last Zephyr placed in service before the war was the "Texas Zephyr". This train operates between Denver-Ft.Worth and Dallas and provides connections for Houston. It reduced the Denver-Dallas running time from 26 hours to 18. A "Zephyr-Rocket" is also operated jointly by Burlington-Rock Island between the Twin Cities and St. Louis. The junction between them is at Burlington, Iowa. However, this train is not yet fully equipped with light weight streamlined sleeping cars.

All of the "Zephyrs" that have been built are still in service on the Burlington system,except for one which was destroyed in a collision with a gasoline truck near Teague, Texas on the Burlington-Rock Island.(43)

The initial "Zephyrs" and streamliners, built in 1934-35, housed the diesel engine and related electric transmission apparatus in a "power car" which was an integral part of an articulated train. The idea of a separate locomotive that would be available for flexible assignment as an

(43) The only 3 car articulated 660 h.p. stainless steel train built by the Budd Company and not ordered for the Burlington was one for the Boston & Maine, completed in 1935. This train originally went into service as the "Flying Yankee" making a daily round trip between Boston and Bangor (jointly with Maine Central) and another round trip between Boston and Portland over B.& M. only. The northbound trip of this schedule was routed via Portsmouth, New Hampshire, and the Eastern Division. All others used the normal route via Dover, New Hampshire. The "Flying Yankee" has been quite successful on the Boston and Maine and on most of its runs it has been inadequate for the traffic handled. It was later reassigned to make a round trip daily between White River Junction,New Hampshire, and Boston via the Cheshire Branch and was then known as the "Cheshire."At the end of April 1952, the train became the "Minute Man" between Boston and Troy. On April 24, 1955, it was taken off this run and again used between Boston and Portland. The present name for the schedules it operates is "The Businessman."

independent unit of road motive power for hauling passenger trains comprised of conventional equipment followed soon after. The initial machines of this type were produced in 1935, by "EMD". The first was for its own purposes of test and demonstration. A second and third followed soon after for the Baltimore & Ohio and Santa Fe Railroads, respectively. The Burlington signed its first contracts for road diesel locomotives, as distinguished from "power cars", in 1936. Four 1,800 h.p. and two 1,200 h.p. units were ordered. C.B.& Q. bought 8 E.M.D. switchers in 1937.

After 1937, Burlington made progressively extensive substitution of diesel for steam switching power. The record indicates that its first diesel switchers were ordered in 1931 from Whitcomb Locomotive Co., later a subsidiary of Baldwin Locomotive Works, located at Rochelle, Illinois, a city on the C. B. & Q.

Diesel locomotives were proved to be commercially practicable for freight service by October 1940. The initial orders for this type of power were placed at that time by Great Northern and by Santa Fe (the latter representing the recommendations of F. G. Gurley, formerly Assistant Vice President - Operation of the Burlington, but who, during 1939 had become Vice President - Executive Department of the Santa Fe). Burlington's first order for freight diesels followed a little more than a year after that. These units first hauled C. B. & Q. trains in 1942.

From that time forward, dieselization of the Burlington has proceeded as rapidly as transportation, maintenance and financial factors have permitted this new power to be most effectively and economically integrated into system operations.

Footnote:

C.B.& Q. Diesel Operations 1954
(as a percent of total)

Freight	93.0%
Passenger	99.8
Yard Switching - Freight	86.8%
Yard Switching - Passenger	91.7%

CHAPTER XVI

A NEW ENTRANCE INTO KANSAS CITY

In the area bounded by Chicago, the Twin Cities, Omaha, Kansas City and St. Louis there is the largest proportionate amount of duplicating railroad service and facilities to be found anywhere. Seven single ownership routes (44) run between Chicago and Omaha and Chicago and Kansas City and six extend between Chicago and St. Paul-Minneapolis. The principal mass of the Burlington's mileage and traffic lies within this intensively competitive area. The importance of superior service is obvious. In order to provide this economically, railroads must be well developed to move long freight and passenger trains at sustained high speeds.

The developments which have been described in preceding chapters placed the Burlington in a very favorable position between Chicago and the Twin Cities and between Chicago and Omaha but it was at a distinct disadvantage at Kansas City, due to the adverse physical characteristics of the relative distances, grades and curves on the historic "Hannibal and St. Joe route" across northern Missouri. The growing importance of Kansas City as a gateway to the southwest and into which it had no mileage of its own from that point emphasized the importance of the Burlington correcting this disadvantage.

Ralph Budd's keen awareness of the operating and traffic factors inherent in the problem led him to give it prompt attention soon after going to the Burlington. A better line into Kansas City became one of

(44) As distinguished from multiple ownership routes such as Kansas City to Chicago via Missouri Pacific - St. Louis - Litchfield and Madison-Benld-Chicago & North Western

the principal objectives of his administration. A broad variety of projects were studied. Some of these represented exclusive Burlington improvements, others were considered in collaboration with neighboring companies confronted with similar difficulties, which might permit some of their respective interests to be pooled in joint construction. One such instance was the Rock Island, which also faced the necessity of reducing tonnage and speed restricting grades and curves across southern Iowa and northern Missouri. After 1936, Rock Island's Chief Operating Officer (until 1942, and thereafter Chief Executive Officer until he became President in 1948) was another Burlington man, J. D. Farrington. It may be assumed to have been a normal procedure for Messrs. Budd and Farrington to review their common problem with the idea of finding a solution through construction of as much joint mileage as might advantageously fit into their respective systems. This would materially reduce the original construction and subsequent operating charges for both. Nothing came of these possibilities but mention of them may be a matter of interest.

During the latter part of 1936 and the forepart of 1937, there was a spirited recovery in business throughout the country. While it was moving forward, railway security prices advanced. Many companies were able, during that brief period, to sell bonds advantageously. The outlook, momentarily was very encouraging. Unfortunately it proved short-lived and by the end of the year, rail traffic was plummeting to depression lows reached in the forepart of 1938 that were reminiscent of 1932-33. However, while these favorable conditions lasted in 1937, Ralph Budd endeavored to capitalize them to obtain Board approval to sell an issue of bonds at an

advantageous price to finance the reconstruction of the Burlington's route across Missouri from the Mississippi River into Kansas City. Delays, possibly awaiting the approval of the owner lines, G.N. - N.P., which were less familiar with the subject than Mr. Budd, and possibly less enthusiastic for it, resulted in the loss of the favorable bond market. A factor of interest not on the record but, nevertheless, important to this narrative was the cooperative interest in the project evidenced by the Honorable Jesse H. Jones, Chairman, Reconstruction Finance Corporation, Washington. Mr. Jones was a warm friend and admirer of Mr. Budd and was aware of his ambitions for the Burlington and encouraged him in them.

When the market for new issues of railroad bonds collapsed before the Burlington could take advantage of it, Mr. Jones offered to make the Burlington a long term loan at 4% of an amount sufficient to cover the cost of this large improvement; probably $18,000,000 or more. There was a good deal of hesitation shown by some of the Burlington Directors over the propriety of the company borrowing from the R.F.C. for any purpose, however meritorious. Accordingly, Mr. Jones proposed that the improvement be financed by a loan for an intermediate term of years to be made by a group of banks to be headed by the First National of Chicago. In order to guard against any problem of funding this debt advantageously, R.F.C. offered to enter into a contract with the lenders agreeing to purchase their loan at par at any time up to maturity and in turn would grant the Burlington the right to tender 30-year 4% 1st and Refunding Mortgage Bonds at par to R.F.C. when any notes which might come into the latter's possession in this manner would fall due and the borrower did not find it convenient to pay the debt in cash at that time.

Notwithstanding the apparent attractiveness of such terms for financing the work, and the reasonable prices at which construction could have been placed under contract in the depression year of 1938, the uncertainties of such conditions prevented approval of the project by the Burlington Board. The 1937-38 attempt made by Mr.Budd to finance a new line across Missouri did not succeed.

World War II demonstrated the imperative necessity of Burlington proceeding with the improvement at the first future opportunity. One appeared to come in 1945-1946. The control of the bankrupt Alton, which had previously been held by the Baltimore & Ohio, was sold to G. M. & O. (Final I.C.C. confirmation of acquisition and its financial terms, however, did not occur until 1947.) It will be recalled from an earlier chapter that Burlington held a minority interest in Gulf, Mobile & Northern (which subsequently became Gulf, Mobile & Ohio) and that the Alton, which the latter purchased, provided the western end of the joint route (with C.B.& Q.) from St. Louis to Kansas City.

The junction between the Burlington portion to the east and the G.M. & O. to the west of it, was at Francis, Missouri, three miles east of Mexico, Missouri.

The Santa Fe is the principal southwestern carrier and St. Louis is the principal gateway to the southwest. Santa Fe had, therefore, long entertained latent ambitions to enter St. Louis. Once these had begun to materialize by actually commencing to acquire property to build a line north of the Missouri River, but this was just before World War I. Property for a freight house in St. Louis was also purchased. Federal Control stopped that project and it was never resumed. However, Santa Fe's

new President (1944) F. G.Gurley, a name previously mentioned herein, desired to link his railroad with St. Louis and at the outset of his administration.

At the time of G.M.& O's. acquisition of Alton, the former indicated a preference not to acquire the line from Mexico, Missouri, to (Rock Creek Junction) Kansas City. This was owned by a leased affiliate, the Kansas City, St. Louis & Chicago Railroad. Mr. Budd's former associations with Mr. Gurley and both of theirs with Mr. I. W. Tigrett, President, G.M.& O. possibly facilitated their joint proposal to G.M.& O. that Burlington and Santa Fe should jointly take over together the lease of the K. C.St.L. and C. Railroad. The new owners would then rehabilitate and intensively improve this somewhat underdeveloped route and grant G.M.& O. trackage rights over it. G. M. & O. would retain Alton's Kansas City properties.

In order to permit the Santa Fe to reach St. Louis, the Burlington offered the former trackage rights over the latter's line from Mexico to that destination. The Burlington, in consideration of this, was to receive similar privileges of use of the Santa Fe's Kansas City-Chicago main line between Bucklin, Missouri, (M.P. 354 from Chicago via C.B.& Q.) where it crossed the Burlington's "Hannibal & St. Joe route" and Sheffield, Missouri, the connection with the Kansas City Terminal Railway at the eastern limits of that city.

This plan, therefore, would bring the Santa Fe into St.Louis and provide the Burlington with a complete line of its own between St. Louis and Kansas City (subject to the 3 miles of G.M.& O. trackage, Francis-Mexico and the joint ownership with A.T.& S.F. between Mexico and Rock Creek Junction), and also avoid the use of its own Chicago-Kansas City route beyond Bucklin,

Missouri, which obviated the most serious operating restrictions.

The tri-partite application of the Burlington, Santa Fe and G.M. & O. to accomplish these, and minor related purposes was filed in June 1946. This proved to be another bitterly contested consolidation case and the opponents won when the I.C.C. decision was reached on July 6, 1948.

The Burlington still desired a more direct route to Kansas City from St. Louis, irrespective of the difficulties encountered on its Chicago line. Therefore, on December 22, 1948, it filed an application with the Commission seeking authority to acquire from the Gulf, Mobile & Ohio trackage rights for 158 miles between Francis (near Mexico, Missouri) and Kansas City for freight service only. These, together with the Burlington's own line from Francis to St. Louis via Old Monroe would shorten the Kansas City-St. Louis mileage by 66 miles, placing it on a parity with its competitors in respect to distances. This route had been used by the previously discontinued Alton Burlington-St. Louis-Kansas City passenger trains. It represented an improvement of C. B. & Q. St. Louis-Kansas City operations but it did not affect the Chicago-Kansas City mileage at all.

In order better to improve the Kansas City line, it was decided to make the four line changes, (1) construct a new line from Needles, just west of Brookfield, to a point just west of Forker; (2) convert the Carrollton Branch from a point just west of Forker to Tina into a high speed main line with heavier rail, better alignment and centralized traffic control; (3) construct a new railroad, the Kansas City and Brookfield Railroad, a wholly-owned Burlington subsidiary, between Tina Junction and Missouri City Junction; obtain trackage rights over the Wabash between Missouri City Junction and

Birmingham and from Birmingham to Kansas City, use the old joint Burlington-Wabash line via the "Hannibal & St. Joe Bridge" and the Goose Neck; and (4) rehabilitate a short piece of track between Laclede and Forker. The latter was previously used as a connection between the main line and the Carrollton Branch before the new one was constructed from Needles. (The reader's attention is called to a map, Appendix "E" which shows the location of this work.)

The new Centennial Cut-off was constructed at a cost of $16,000,000. The project was approved by the Board of Directors during 1949 while Mr. Budd was president. It was opened for freight service in September 1952 and for passenger service on February 2, 1953. It reduced the Burlington overall Kansas City mileage by 21 miles to 466 miles, making the Burlington the second shortest between Chicago and Kansas City. (A.T.& S.F. 451; C.R.I.& P 495.)

While the reduction in grades, curves and distances makes the Burlington a highly effective and economical route between Chicago and Kansas City, the imperfections remain in the old line between Brookfield and the Mississippi River, although these are less serious than the ones that have been eliminated. Important further improvement can be made, and doubtless will at some near future year, by the construction of a tangent line 48 miles in length between the stations of North River, near West Quincy, and Clarence, Missouri, on the line extending westward across the state. With this and some related "whittling" away at the remaining imperfections in the profile and alignment between Clarence and Brookfield, the physical characteristics of the Burlington between Kansas City and Chicago will be made equal to the best.

"Civil Engineering", the journal of American Society of Civil Engineers, summarized the construction of the"Centennial Cut-off" in its December 1950 issue as follows:

> "A major railroad project, currently under construction by the Chicago, Burlington & Quincy Railroad in western Missouri, will reduce the length of the railroad's main line between Chicago and Kansas City by approximately 21 miles. Shortening of the line, together with improvement of the grade and alignment, will reduce the present passenger train schedule between the two terminals from 12 to 8-1/2 hours and also result in the saving of considerable time in freight service.
>
> "The present main line, beginning at Kansas City, runs almost straight north to Cameron Junction and then east to Laclede. The new line follows a northeasterly direction from Birmingham, just north of Kansas City, to Laclede, saving some 21 miles. To effect this cutoff, the Burlington Railroad, by agreement with the Wabash Railroad, will use the latter's line a short distance east of Birmingham. Estimated to cost approximately $16,000,000, the project involves the construction of some 50 miles of entirely new line between Missouri City Junction and Tina Junction and and the improvement, amounting to almost complete reconstruction, of the existing branch line from Tina Junction to a point between Laclede and Brookfield. (See Appendix "E".)
>
> "The project follows rolling terrain. The western portion of the new line is characterized by fairly heavy grading with cuts up to 95 ft. and embrankments 45 ft. high. For this rocky portion of the project, 18 possible lines were surveyed and analyzed as to construction, economy, and gradient control before final adoption of the line chosen. Excavation of some 700,000 cu. yd. of rock is required in this area, with the project as a whole involving more than 7,000,000 cu. yd. of excavation.
>
> "The project includes a total of 45 bridges and grade-separation structures. Of these, 25 are of permanent steel and concrete construction. For overflow structures and at locations where there is uncertainty as to potential flow, creosoted timber trestle construction is provided, with the intention of subsequent replacement with permanent construction after requirements have been more fully established. Cost of the bridges and numerous culverts will be about $4,000,000.
>
> "Curvature on the new line is held to a minimum and the maximum gradient is 0.8 percent. With diesel power predominating on the railroad and complete conversion to diesel scheduled for the near future, this grade is considered quite satisfactory. For analysis of soils and control of embankment compaction, a well-equipped

laboratory has been set up by the railroad.

"The project is scheduled for completion in the fall of 1951, with rail traffic to be routed on the new line by January 1, 1952. H.R. Clarke, M. ASCE, is chief engineer of the Burlington Railroad, and Assistant Chief Engineer, H. A. Aalberg is in direct charge of the project.

"Material for this release was supplied by Josef Sorkin, M. ASCE, member of the firm of Howard, Needles, Tammen & Bergendoff, Kansas City, Mo., who represented ASCE at a recent special inspection of the cut-off project."

CHAPTER XVII

"RALPH BUDD NIGHT AT THE FAIR"
AUGUST 31, 1949

Mr. Budd's retirement from the Burlington was appropriately observed by a number of private and public ceremonies giving recognition to his distinguished career as a railway executive, his character and personality and his contribution to civic affairs as a public spirited citizen. The most important of these events brought the series of them to a climax on the night of August 31, 1949; immediately following the close of his last day of his eighteen year presidency of the Burlington. It effectively incorporated the Chicago Railroad Fair into the program arranged for that great occasion.

Major Lenox R. Lohr, President of the Chicago Museum of Science and Industry, was also the chief executive officer of the Railroad Fair. A mutuality of interests had long before drawn Mr. Budd and Major Lohr together. The former also served on the Board of the Museum which Major Lohr directed.

The 1949 season was the second, and last one, of the Railroad Fair. The chapter of Burlington history in this thesis contained references to Chicago's first railroad, the Galena & Chicago Union, later Chicago & Northwestern, which first began to serve the city in 1848. Burlington's predecessor, the 12 mile Aurora Branch Railroad, followed the next year using the tracks of the G. & C.U. for thirty miles from the connection at Turner Junction into Chicago. These significant dates and events are repeated as reminders of them in relation to the railroad

celebrations of 1948-49. The Chicago Railroad Fair of 1948, therefore, primarily honored the centenarian of that year, the Chicago & Northwestern. In 1949, the Chicago, Burlington & Quincy Railroad was similarly featured. However, all railroads were given equal recognition for the development of Chicago's first railroads gave birth to an era that far transcended even the importance of the lines most intimately identified with its beginnings.

Carroll R. Harding, President of the Pullman Company, was chairman of the committee of railway executives in charge of the arrangements for "Ralph Budd night at the (Chicago Railroad) Fair." The program included a banquet given in honor of Mr. Budd on the fair grounds at its popular "Harbor View Restaurant."

W. T. Faricy, President of the Association of American Railroads presided. Guests chosen for the privilege of a place at the head table included all of the railroad presidents who had been identified with Mr. Budd in his career. In addition, Mr.Budd's two sons, Robert W. * and John M.,were there. The latter was present in the dual capacity afforded by his family relationships and also his official status as the recently (May 15, 1949) appointed Vice President in charge of Operation of the Great Northern Railway (to which he had returned after two years as President of the Chicago & Eastern Illinois). The Mayor of Chicago, Honorable Martin H. Kennelly (and a great friend of the city's railway executives) was there.

Also seated at Mr. Budd's table were his successors on the Burlington and Great Northern, Harry C. Murphy (whose appointment as

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* President, Great Lakes Greyhound Bus Line, Detroit.

President would begin the next day) and Frank J. Gavin, respectively, and three other presidents of great railroads whose previous associations provided special bonds of friendship with Mr. Budd. These were John D. Farrington, President, Chicago, Rock Island & Pacific Railroad, Fred G. Gurley, President, Atchison, Topeka & Santa Fe Railway, and Frederic B. Whitman, President, Western Pacific Railroad.

Guests included the presidents of many of America's principal railroads in all sections of the country; directors and officers of the Burlington and other corporations and organizations with which Mr. Budd was identified, civic, business and financial leaders of Chicago and the "Burlington west"; and railroad officers of lesser rank and representatives of the press and the principal components of the railway supply industry. Most of those present were personal friends of the guest of honor. All were his warm admirers and welcomed this opportunity to give public expression of their high esteem.

A limited number of brief speeches fitting to the occasion followed the dinner. F. G. Gurley extended felicitations to Mr. Budd on behalf of all. John D. Farrington presented the guest of honor with an oil portrait of the latter as a token of esteem from friends both present and absent. This had recently been painted by the well known Chicago artist, Dr. John Doctoroff. (45) John M. Budd responded with expressions of appreciation on behalf of Mr. Ralph Budd and his family. (46)

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(45) The frontispiece of this thesis is a photograph of Mr. Budd standing alongside this portrait after its presentation by Mr. J. D. Farrington, President, C.R.I.& P. Mr. H. C. Murphy, would become President of the C.B.&Q. as of midnight that night

(46) This portrait, while a gift to Mr. Budd, is now hung in the quarters of the Traffic Club of Chicago.

Following the banquet, all present there followed Mr. Ralph Budd, and Major Lenox R. Lohr, to the grandstand of the Railroad Fair's pageant, "Wheels A'Rollin'". Its concluding scene was a reenactment of the arrival of the "Pioneer Zephyr" at the 1934 "Century of Progress" Exposition, following its historic dawn to dusk run on May 26, 1934. Mr. Budd, himself, rode in the train arriving on the scene, and there, as before in 1934, when he stepped off, as the first passenger to do so, he was greeted by Charles G. Dawes and Lenox R. Lohr, just as he had been on that memorable occasion 15 years before. At that earlier time, General Dawes was President of Chicago's (1933-34) "Century of Progress" Exposition and Major Lohr was its General Manager. (General Dawes will be even better remembered as Vice President of the United States during the administration of President Calvin Coolidge.)

Probably no other railroad president has received such a spontaneous and enthusiastic public expression of friendship from so many prominent men as Mr. Budd did on that memorable evening of August 31, 1949. (47) It was a unique tribute to his qualities as a man and his achievements as a railway executive! This was a fitting conclusion to a brilliantly successful career!!

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(47) While working at the Western Pacific Exhibit that night (turning its San Francisco cable car) I managed to secure "relief" for sufficient time to see a little of some of the events which I have described herein. I remember them as clearly as though they occurred very recently.

CHAPTER XVIII

CHAIRMAN CHICAGO TRANSIT AUTHORITY

The achievements which the extraordinary testimonial of August 31, 1949 epitomized entitled Ralph Budd to a generous measure of that particular kind of happiness and satisfaction which follows the leisure earned by a busy and useful life. Therefore, Mr. Budd, having passed his seventieth birthday, and in so doing having reached the age of mandatory retirement on the Burlington, which he himself had established as its policy, one, not acquainted with him, would have supposed that his years of administrative responsibilities and executive duties had come to an end. If he continued any direct interest in business, it would be wholly in advisory and policy making capacities usually through membership on Boards of Directors and be devoid of the official responsibilities of an executive. However, such a status would not have been in keeping with his wishes, habits and temperament.

At the close of business on August 31, 1949, a round of farewells, congratulations and good wishes from Burlington officers and employees brought this phase of his career to a happy ending. After the brief interlude of the delightful evening which has been described (in Chapter XVII), he began another, and equally arduous and difficult career on the following day; September 1, 1949.

It was then that he became the appointee of the Mayor of Chicago, Martin H. Kennelly (whose presence at the dinner the night before has been noted) as Chairman of the Board of Directors of the Chicago Transit Authority. The latter had been formed pursuant to the Metropolitan Transit Authority

Act approved by the General Assembly of the State of Illinois on April 12, 1945 and was accepted by the voters of Chicago on June 4, 1945. Meanwhile the City Council of Chicago passed an ordinance on April 23, 1945, granting the Chicago Transit Authority an exclusive franchise for fifty years. C.T.A's Board was comprised of seven members, four appointed by the Mayor of Chicago and three by the Governor of the State of Illinois.

The Chicago Surface Lines and its elevated Chicago Rapid Transit Company (48) were then (1945) in receivership; a common fate among privately owned and operated urban transportation facilities; other than bus lines. Through the sale of $105,000,000 serial maturity (1953-1978) Revenue Bonds, with coupon rates ranging from 3-1/4% for the shorter to 3-3/4% for the longest maturity, the Chicago Transit Authority obtained funds to purchase the Chicago Surface Lines for $75,000,000 and pay $12,162,500 for the Chicago Rapid Transit Company properties. The latter comprised the elevated railway's system. The proceeds of the bond sale remaining after these acquisitions were concluded were used for working capital and improvements.

Possession of the Surface Lines and Rapid Transit System was taken on October 1, 1947, and operations immediately passed under the control of the new owner, the Chicago Transit Authority. This public body had been formed in 1945 pursuant to the previously mentioned legislation enacted that year. Philip Harrington was appointed its first Chairman.

Philip Harrington was a native of Worcester, Massachusetts, but had spent his entire business and professional life in engineering and

(48) Subway operations were included in its service after the opening of the State Street subway in the early fall of 1943.

related work for the city of Chicago, initially for its Sanitary District, 1906-1935 within which he advanced to Chief Engineer. Upon conclusion of his services for it, Harrington became special traction engineer for the city of Chicago, was author of its "Comprehensive Transportation Plan" and was appointed its Commissioner of Subways, too, in 1940. Harrington died early in 1949. The prospective retirement of Ralph Budd as President of the Burlington on September 1 of that year made him the logical appointee for the vacant C.T.A. Chairmanship, provided he would accept.

The post-war problems of municipal rapid transit were numerous and deep seated. These included service, rates and fares, labor, politics, engineering, finance, operation, legal affairs and corporate matters and other factors, too, which were inextricably interwoven in a manner which was seldom capable of a solution satisfactory to any one or which would be likely to bring credit to those in responsible charge of such type of transportation systems. Many of Mr. Budd's friends were variously shocked, surprised and horrified to learn that a man of his great prestige and distinction would expose the record of his great career to the risks, difficulties and unpleasantnesses inherent in the new position which he was assuming. It was believed very sincerely by many that the Chairmanship of C.T.A. would hold no possibility of adding to the luster associated with his half century of railroad work and might even have the unhappy result of detracting somewhat from the former achievements.

The very challenge of the circumstances which made others warn Mr. Budd against becoming Chairman of C.T.A., only increased his interest

in the assignment and his determination to accept it as a public duty. In the subsequent five years with that organization, which ended with his retirement on June 15, 1954, Mr. Budd focused the full power of the great breadth of his experience, talent and judgment upon the manifold difficulties constantly arising in this new work. The record of Mr. Budd's administration of C.T.A. is another chronicle of distinguished success, which added to his stature and reputation, in addition to bringing marked progress; financial, service and engineering, to the municipal transportation system of America's second largest city. Mr. Budd performed an outstanding public service and quickly gained the same general recognition for his faithfulness, trust and competence as a public servant as he had previously earned as a railway engineer and executive.

Public transportation utilities are particularly vulnerable to inflationary trends upon wages and prices for they usually experience difficulties and delays in adjusting fares promptly to meet operating expenses rising in this manner. It has previously been noted that the debt of C.T.A. is revenue bonds, wholly dependent upon internal sources of income to meet obligations of interest and principal. The credit of the city and the state are not pledged for the payment of either. In order to make the funded debt of a public body, such as C.T.A. whose property cannot be pledged under a mortgage to secure the loan, salable, it necessarily had to be given control over the establishment of its own fares. This power, previously vested with state regulatory commissions, was set aside, in the instance of C.T.A., through provisions of its act of incorporation.

One of the most remarkable features of Mr. Budd's administration of C.T.A. was his courageous, businesslike and fair handling of the politically

thorny problem of fare increases, made promptly, in order to preserve the financial integrity of the enterprise, with special reference to its outstanding bonds. The very circumstances which his more cautious friends had thought might present pitfalls proved opportunities for Mr. Budd to demonstrate once again his mastery of business situations and methods. His handling of these matters won him praise and understanding in many new quarters. Similarly throughout this difficult period of transition in the traffic and operating economics of urban transportation, following the impact of the private automobile upon the mass producer of the service, C.T.A's Chairman showed the same resiliency and adaptability, not merely to meet change, but to be ahead of it, that had characterized his administration of two great railroads.

Under Ralph Budd's direction, Chicago Transit Authority shrank little used services and facilities, modernized those susceptible of effective development and proceeded vigorously to coordinate the plant, organization and operations of the "L" and the surface lines and utilize Chicago's new subway with increasing effectiveness. Extensions, additions and improvements were carried out where traffic would support such progress. One of the important property acquisitions negotiated by Mr. Budd was the purchase by C.T.A. of the property of the previously leased line providing the "L" and its tenant the "North Shore Line" with their joint route between Wilson Avenue, Chicago and Linden Avenue, Wilmette. These tracks were owned by the Chicago, Milwaukee, St. Paul and Pacific Railroad. This purchase did not affect operations but it rounded out properties used.

The most important extension of services, and one necessary

essential for unification of municipal transit, was the purchase on September 30, 1952 of the properties, equipment and franchises of the Chicago Motor Coach Co. The price paid was $16,500,000. These funds were provided by the sale of $23,000,000 4-1/2% Revenue Bonds due 1982. The balance was used for improvements.

Efficiency is measured by the effectiveness with which management and capital utilizes the productivity of labor. Usually the trend of publicly owned enterprises is unsatisfactory. When C.T.A. began operation of the Chicago traction systems, employment approximated 22,500 persons. It was over 21,000 when Mr. Budd took charge. By the end of 1952, improvements and rearrangements made by Mr. Budd permitted the "L" and surface lines to be operated with 16,200 employees. The Motor Coach Lines, acquired in 1952, added 1,300 to this, bringing the total C.T.Q. employment to 17,500.

Throughout his railroad career, Mr. Budd's work was basically characterized by modernization of property and equipment and training men to make the most effective use of both. His five years in C.T.A. followed identical policies and with similar results. Initial problems of financing new equipment interposed by restrictions in the bond indenture, which might have stymied a less ingenious and determined man, did not long delay Mr. Budd. Drawing on his railway financial experience, he arranged to create an Equipment Trust, limited to a maximum of $15,000,000 to be outstanding at any one time. Within three years, over $9,000,000 had been raised through the sale of these certificates to acquire 200 modern rapid transit cars for the elevated and subway lines, 551 motor buses, and 349

trolley buses. More equipment followed in 1953 and 1954.

Meanwhile much of the equipment then in use that was still satisfactory was rehabilitated and modernized. Older and indequate units were retired as rapidly as possible. Fixed property; track, elevated structures and repair facilities, except that scheduled for retirement, was put in good condition for economical maintenance and operation.

Relations with labor and the public were improved. Notwithstanding rearrangements in service and facilities which might normally be expected to create friction with both, Mr. Budd's qualities as a leader and administrator gained their friendship and cooperation. The degree of confidence and satisfaction which the City Hall and State Capitol manifested in C.T.A. was improved and strengthened by the business administration which Ralph Budd provided.

While the very success of Mr. Budd's five years with C.T.A. generated strong public pressures for him to continue in office, he had decided that it was advisable from various standpoints, this time not excluding the wishes of Mrs. Budd, to withdraw from active work before attaining his 75th birthday. Therefore, the continuing improvement in the internal affairs of C.T.A. having provided a favorable opportunity to withdraw from its Chairmanship, he secured the consent of the Mayor of Chicago to tender his resignation to become effective on June 15, 1954. This time, after only informal farewells to close friends, he left that afternoon via "The Empire Builder" for St. Paul en route to his home at Grey Eagle, Minnesota -- a place mentioned in the opening paragraph of Chapter I.

CHAPTER XIX

OTHER ACTIVITIES AND INTERESTS

While Mr. Budd had retired, he had not gone into retirement. He retains three important directorships; The Burlington and its affiliated Colorado & Southern System companies; the International Harvester Company and the Equitable Life Assurance Society of the United States, one of the principal insurance companies of America. (49) The Board meetings of these corporations require Mr. Budd to make one or more trips to Chicago each month and to go to New York with almost equal frequency. These visits provide Mr. Budd's friends with opportunities to keep in close touch with him and enable him to continue to keep informed of business affairs in the two principal centers of the nation. His transcontinental journeys for such purposes are frequently routed via St. Paul in order to see John Budd and his Great Northern friends there, and also to attend periodic meetings of the Trustees of Great Northern Iron Ore Properties, of which he is one. In the seasons of pleasant weather, he stops over at Grey Eagle.

Characteristic of many busy and successful men, he had widespread interests outside of the corporations with which he had official identity. These fall into the two basic subdivisions of those activities which are primarily related to one's principal occupation and those which lie outside ofit, although, in some cases having close functional identity.

Mr. Budd's judgment has long been sought outside of the railroads he administered. While President of the Great Northern, he served

(49) Ralph Budd's son, John M. Budd, serves on the Board of Directors of another great company of this character, The New York Life Insurance Company.

as a Director of the First National Bank of St. Paul from 1925-33. (50) Upon coming to Chicago, he soon became a Director of First National Bank of that city and continued that interesting affiliation until he relinquished it to his Burlington successor concurrently with his retirement from that railroad.

Railroad service must be nationwide in scope. Railroad corporations, even the largest serve only fractional parts of the United States. In order to coordinate their work in the manner necessary to permit freight and passenger services to be conducted without regard to corporate boundaries from the standpoint of the patron, many organizations are necessary to achieve these objectives. They include the Association of American Railways, the Western Association of Railway Executives, the Railway Express Agency, and others which might be named in large number. Other types of them are represented by many jointly owned switching and terminal companies. There are, also, technical and professional organizations within and without the railway industry. Mr. Budd lent his talents and judgment to these in generous measure throughout his long career.

(50) The First National Bank of St. Paul had long been identified with the fiscal affairs of "The Hill Roads". Scanning a list of its Directors appearing in recently published Centennial History, "The First Through a Century" (by F. P. Donovan, Jr., and C.F. Wright) indicates that James J. Hill was a Director from 1880 until his death. The names of several of the men mentioned in connection with Great Northern, Northern Pacific and Burlington in this thesis, and many identified with those roads but not mentioned herein are included among the Directors of the First of St. Paul in that volume. The name of Charles E.Flandrau, appears as a Director, 1891-1898. He was probably the father of Mr. W. Blair Flandrau, whom Grace Hodgson of St. Paul married, and whose name also is set forth in earlier pages as an author of a series of historical booklets relating to the Great Northern's territory. An interesting feature of this volume on the First of St. Paul is Chapter V, "The Hill Story." An illustration (page 49) shows James J. Hill's unpretentious office on the St. Paul levee in the 1860's.

During the course of his career, Mr. Budd served for terms of varying lengths, some times intermittently, as a Director of many of these organizations. He always gave generously of his time and attention through them to the important external matters with which each was identified. Mr. Budd has always been keenly aware of their relation to the progress of the entire railway industry and through it to the welfare of the companies which he administered.

He served as a Director, as well as an active member, of the American Society of Civil Engineers and the American Railway Engineering Association. He was also enrolled in the American Society of Mechanical Engineers and the Western Society of Engineers. Mr. Budd was Chairman of the Board of Trustees of the Public Administration Clearing House, and a Trustee of the James Jerome Hill Reference Library in St. Paul, Newberry Library in Chicago, Carleton College (Northfield, Minnesota) and (as previously noted) of the Museum of Science and Industry, Chicago. He also served on the Board for the Award of the Hoover Medal in Engineering. At one time he was active in Newcomen Society(for the study of the History of Engineering and Technology) and delivered several masterly addresses prepared for its meetings. One of these was presented at a banquet in the Somerset Hotel, Boston, in April 1949, where Mr. Budd spoke on the early history of the Burlington Railroad. It featured the work of John Murray Forbes and other prominent Bostonians and men of New England ancestry of the 19th century identified with that company. Another Newcomen address,presented fifteen or more years ago, outlined the history of location of the transcontinental rail routes across the Rocky mountains.

Mr. Budd's many contributions to engineering and public service

were formally recognized through awards to him of the Henderson Medal of the Franklin Institute of Pennsylvania, the Washington Award of the Western Society of Engineers and the John Fritz medal of the four principal national engineering societies.

"The Centennial of Engineering" which was held in Chicago, brought all of the nation's principal engineering societies there during September 1952. More than 30,000 scientists and engineers, and their families, came from all over the world to attend the series of meetings and conferences comprising that event. Major Lenox R. Lohr, President of Chicago's Museum of Science and Industry, gives Mr. Budd the principal measure of credit for bringing this centennial convocation to Chicago, notwithstanding the spirited competition of other cities to be chosen to have that honor.

Ralph Budd's achievements in the field of his principal activities and his unusually gracious personality and fine character made him in demand for social occasions with his many friends. While this side of his life and nature received a minimum share of time, that which was given it brought Mr. Budd and those who knew him well, equal measures of happiness. His name is therefore found on the membership rolls of the Chicago Club in Chicago and the Somerset and Minnesota Clubs of St. Paul. In addition, he is affiliated with the Commercial Club of Chicago, an exclusive organization, whose members number only men representative of the principal business, financial and professional leadership of the city.

During the course of Mr. Budd's career, he accepted two important temporary foreign assignments through which he made his experience and judgment available to railways in distant lands. His counsel was sought, in both instances, in respect to matters of physical development

and internal organization.

The first occurred during the summer of 1930 when the invitation came from the Russian Government. The first of its several "Five Year Plans" for the accelerated economic development of that country was then being proposed. Mr. Budd's study related to the expansion of the capacity of the Russian railways needed to keep them abreast of the enlarging productivity of the nation. Likewise he coordinated recommendations for modernization to be made concurrently with those required to cope with the greater volume of traffic, that was being anticipated.

A second commission of this nature began in January 1953, when Mr. Budd accepted the Chairmanship of a special railroad mission to Brazil formed by the Foreign Operations Administration of the United States upon the invitation of the government of that South American country. A staff of four technical specialists was selected by Mr. Budd to accompany him. Three were Burlington men, like himself. Mr. Budd and his associates spent three months inspecting the Brazilian railways and conferring with their officers. His report on the "Improvement of the Railways of Brazil" was submitted to F.O.A. and the Brazilian government in May 1953. It has recently been published in a volume of "Brazilian Technical Studies" issued by the Institute of Inter-American Affairs of the Foreign Operations Administration, Washington, D.C. (1955).

Mr. Budd wrote a complete resume of the problems confronting the Brazilian railways growing out of their unsatisfactory internal condition which was aggravated by the external competitive situation. This analysis was followed by specific recommendations outlining sound national transportation

policy and the changes in internal organization and improvements to fixed property and rolling stock that would, together, be required to develop a railway system adequate for the needs of the nation and properly representative of current technical progress.

Such varied activities made Mr. Budd a remarkably well rounded and evenly developed man and contributed to the effectiveness with which he fulfilled the many official responsibilities entrusted to his care.

CHAPTER XX

IN APPRECIATION

The life of Ralph Budd has been an inspiration to all who have known him well. It has been the purpose of this thesis to endeavor to make his career, his method of working and his character sufficiently clear through the preceding pages to enable others unacquainted with him to profit by his example. What qualities were outstanding in Mr. Budd and how did he exercise his talent for leadership and administration?

Character, integrity and dependability are the most obvious ones. Primarily, a great mind was essential to the intellectual capacity required for the breadth and depth of his knowledge and understanding and the faculties of judgment with which these attributes endowed him. Being a wise man, his personality was tempered with genuine humility. He had great respect for the other man and what the latter knew and could do. Mr. Budd was aware that one of the most important functions of a President is to draw upwards the experience and information of those in successively lower ranks and then synthesize and vitalize all of these intangible assets to make them a dynamic force in the progress of the entire organization.

While possessing thorough comprehension of the meaning of reports and statistics and the power of them to discipline operations, he recognized that such sources of information could prove inadequate and misleading if not reinforced by continuous intimate knowledge of the factors to which they related. Direct personal acquaintance with the most minute details of the properties which he administered and close personal

lines of communication with his own staff and evaluation of the capacities of the men in his organization were fundamental factors in his method of management.

Mr. Budd's interest in and understanding of human relationships made him at ease in any company. By preference he lived close to the railroad and the men who ran it and the people who used it. He preferred to gain information directly through observation and questions and was always ready to share his knowledge and opinions with others. Two way lines of communication were always open with him. Mr. Budd preferred to manage through suggestion, constructive influence and example rather than through direct orders and commands, although he had no hesitation in issuing these whenever the circumstances required or other methods proved inadequate. He believed in the delegation of authority but with strict accountability for results.

Possessed of a profound knowledge of the engineering, mechanical and economic fundamentals of railroad transportation, he clearly understood that reduced costs and improved service required production in units of maximum size; i.e., mass transportation in the true sense of the term but with speed and dependability integrated into the increased train load. Such factors made him a principal advocate of consolidation. Exceptional proficiency in the fields of engineering and finance made him acutely aware of the problems of capital procurement for continued intensive modernization of railway properties. While encouraged by the progress of railroads under his administration, he was never satisfied with it.

Mr. Budd could survey railway conditions in all functions and locations, comprehend the problem and make helpful, practical suggestions for correction. Accordingly, visits of "The Chief" were always welcomed and not

feared. Great military commanders possess a faculty, so necessary to success in battle, to comprehend complex situations with a "coup d'oeille" ("stroke of the eye") and develop quickly the movements that must be made to produce victory. Mr. Budd had this same ability when problems in transportation confronted him.

Such qualities in a man of modest, friendly personality, quiet voice and diplomatic manner of speaking, made him inherently a leader. A leader wins the confidence and quickens the spirit of his men while controlling the physical action of their bodies. Leadership is one of the rarest of human qualities; Mr. Budd possessed it in abundant measure. This is essential if the ideals and standards of the chief executive are to be represented in the manner and proficiency with which the work is done by those who actually perform it. The great differences between the best managements and the others is represented by this basic fact of whether the work and service reflect the policies desired by the highest echelon of management or merely represents that which the lowest one considers good enough.

J. G. Lyne, Editor of the "Railway Age" in reporting on events of August 31, 1949, which are well known to readers of this report, referred to Mr. Budd as "A Railroad Man's Railroad Man" and concluded with the following summary epitomizing the principles which guided Mr. Budd's management of his own life. This statement is quoted from the September 3, 1949, issue of "The Railway Age":

> "1. Attainment of the greatest possible proficiency at the assigned job and studying to qualify for a better one.

"2. A persistent search for facts, and knowledge of people, through conversation and discussion with all kinds of them - with an approach which is inquisitive rather than combative. The technical, economic, and human factors in business are equally important and no one of them can safely be neglected.

"3. Development, from contact, direct or indirect, with the masters of the business, of a consistent long term philosophy and relentness pursuit of the policy regardless of vicissitudes which vary from day to day.

"4. Cultivation of intellectual interests which are always larger than the specialized job upon which one is engaged - but not so wide as to be spread out too thinly. The study of history, especially the history of one's own business and region is useful to this end.

"5. Development of habits of orderly and rapid thought, action, integrity, and dependability. Men are valuable and receive advancement as frequently for what they are as for what they know or what they can accomplish."

Mr. Budd worked with quiet efficiency and precision. He kept problems "in hand"; they were never "on hand." Likewise this unassuming man was ever friendly but never familiar and was always considerate of other persons. He was "a good listener." Patience, a sense of humor and tact were also among Ralph Budd's assets.

All of the personal qualities summarized in this chapter, when added together with his achievements recorded in preceding ones, produced the outstanding railway executive of his day.

The study of Mr. Budd's work, required in order to write this thesis, has made me better acquainted with him and more appreciative of his accomplishments. In addition to the pleasure which I have derived in this way, no other subject which I might have chosen could have such a permanent beneficial influence upon my future life as the example and inspiration of Mr. Budd gained in the preparation of this thesis.

Appendix A
Sheet 1 of 3 sheets

PRINCIPAL MOUNTAIN CROSSINGS OF TRANSCONTINENTAL RAILWAYS

Mountain Range	Crossing at	Elevation (in feet)	Maximum Ascending Grade East	Maximum Ascending Grade West
	CANADIAN NATIONAL			
Rocky Mts. *	Yellow Head Pass, B.C. (a)	3712	0.7%	0.5%
	CANADIAN PACIFIC			
Rocky Mts. *	Stephen, B. C.	5338	2.2	1.0
Selkirk Mts.	Glacier, B. C.	3787	2.2	2.2
	GREAT NORTHERN			
Rocky Mts. *	Summit, Mont.	5213	1.8	1.0
Cascade Mts.	Cascade Tunnel, Wash.	2883	2.2	2.2
	NORTHERN PACIFIC			
Gallatin Mts.	Rozeman Pass, Muir, Mont.	5565	1.9	1.8
Rocky Mts. *	Mullan Pass, Blossburg, Mont.(b)	5566	1.4	2.2
Rocky Mts. *	Homestake Pass, Mont. (b)	6356	2.2	2.2
Mission Range	Corican Defile, Evaro, Mont. (c)	3907	2.2	2.2
Cascade Mts.	Stampede Tunnel, Wash.	2837	2.2	2.2
	CHICAGO, MILWAUKEE, ST.PAUL & PACIFIC			
Belt Mts.	Loweth, Mont.	5803	1.0	2.1
Rocky Mts. *	Pipestone Pass,Tunnel, Donald, Mont.	6347	1.7	2.0
Bitter Root Mts.	St. Paul Pass. Tunnel, Mont.	4170	1.7	1.7
Saddle Mts.	Boylston, Wash.	2462	1.6	2.2
Cascade Mts.	Snoqualmie Tunnel, Wash.	2564	1.7	0.7
	UNION PACIFIC			
	Overland Route			
Laramie Mts.	(Sherman, Wyo. (eastward track)	8014	0.8	1.5
	(Dale, Wyo. (westward track)	7864	0.8	0.8
* Continental Divide	Creston, Wyo.	7107	0.8	0.8
Wasatch Mts.	Altamont, Wyo.	7230	1.1	0.8
	Oregon Short Line Railroad			
Blue Mts.	Encina, Ore.	3966	1.5	2.2
" "	Telocaset, Ore.	3447	1.5	1.0
" "	Kamela, Ore.	4203	2.0	2.2
	Los Angeles & Salt Lake Railroad			
West Tintic Mts.	Boulter, Utah	5964	0.8	0.8
Needle Range	Crestline, Nev.	5993	2.1	1.0
Ivanpah Mts.	Cima, Calif.	4198	2.2	1.0
San Bernardino Mts.	Cajon Pass, Calif. (d)	3826	2.2	1.6
	DENVER & RIO GRANDE WESTERN			
Platte-Arkansas Divide	Palmer Lake,Colo.	7237	1.4	1.4
Rocky Mts. *	Moffat Tunnel, Tolland, Colo.	9238	2.0	2.0
* Rocky Mts.	Tennessee Pass, Colo.	10221	3.0	1.4
Wasatch Mts.	Soldier Summit, Utah	7440	2.0	2.4

Mountain Range	Crossing at	Elevation (in feet)	Maximum Ascending Grade East	Maximum Ascending Grade West
	WESTERN PACIFIC			
Goshute Mts.	Jasper, Nev.	5907	1.0%	1.0%
Sierra Nevada Mts.	Beckwith Pass, Chilcott, Calif.	5018	1.0	1.0
	ATCHISON, TOPEKA & SANTA FE			
Manzano Mts.	Mountainair, N.M. (e)	6491	1.3	0.6
Raton Mts.	State Line Colo., N.M. (e)			
	Westbound Tunnel	7588		4.0
	Eastbound Tunnel	7620	3.5	
Glorieta Mts.	Glorieta, N.M. (e)	7437	3.0	1.7
*Continental Divide	Campbell Pass, Gonzeles, N.M.	7240	0.6	0.6
Arizona Divide	Riordan, Ariz.	7310	1.8	1.4
Piute Mts.	Goffs, Calif.	2584	1.4	1.0
	To Los Angeles			
San Bernardino Mts.	Cajon Pass, Calif.	3821	2.2	1.6
	To San Francisco			
Tehachapi Mts.	Tehachapi, Calif. (f)	3966	2.5	2.5
	SOUTHERN PACIFIC "Overland Route"			
Independence Mts.	Moor, Nev.	6165	1.5	1.4
Sierra Nevada Mts.	Norden, Cal. Eastbound track	6885	2.5	
	Summit, Cal. Westbound track	7017		2.3
	"Golden State Route" east of El Paso			
Mesa de Gallio	Corona, N.M.	6724	1.0	1.0
	"Sunset Route" east of El Paso			
Davis Mts.	Paisano, Texas	5074	1.0	1.0
	"Sunset" and "Golden State Routes" west of El Paso			
*Continental Divide	Ladim, N.M.	4584	1.0	1.0
Dragoon Mts.	Dragoon, Arizona	4613	1.5	1.4
San Bernardino Mts.	Beaumont, Calif.	2559	2.0	2.0
	"Coast Line" - Los Angeles to San Francisco		North	South
Santa Lucia Range	Serrano, Calif.	1340	2.2	2.2
	"San Joaquin Valley Route" - Los Angeles-San Francisco			
Tehachapi Mts.	Tehachapi, Calif.	3966	2.5	2.5
	"Cascade Route" - San Francisco-Portland			
Cascade Mts.	Grass Lake, Calif.	5106	2.2	1.0
Cascade Mts.	Cascade Summit, Ore.	4843	0.9	1.8

* Continental Divide

(a) Canadian Northern and Grand Trunk Pacific Routes of Canadian National use same line over Continental Divide.

(b) Northern Pacific has two lines over the Rockies, freight trains are routed via the Helena, Montana, to utilize the lower altitude crossing of the Continental Divide at Mullan Pass Tunnel. Limited passenger

trains operate via Butte, crossing the Continental Divide at Homestake Pass.

(c) This summit is on direct route used by passenger trains between Paradise and DeSmet, Montana, 64 miles. A low grade line, via St. Regis, provides a route 93 miles in length with 0.4% ruling grades for freight trains.

(d) Trackage rights over Atchison, Topeka and Santa Fe Railway from Daggett, Calif. to Barstow, Calif.

(e) Mountainair, N. M., is on Transcontinental Short Line of Atchison, Topeka and Santa Fe, which is a wide detour to the south of the Raton and Glorieta Passes used by main line passenger trains. In general, through freight service is routed via the Transcontinental Short Line which extends from Dalies, N. M., via Amarillo, Texas, and Waynoka, Okla. to Newton Kansas. Limited passenger trains operate via main line through Albuquerque, N.M., LaJanta, Colo., and Dodge City, Kansas.

(f) Trackage rights over Southern Pacific Company from Mojave, Calif. to Kern Junction, Calif.

NOTE: Grades are expressed in per cent, i.e., 1% equals 1 ft.per 100 ft. distance. Grade resistance equals 20 lbs. per ton for each 1% of grade. Frictional resistance to car movement on straight level track varies from 3.5 to 7 lbs. per ton, depending upon several variable factors. Resistance due to curvature equals 1 lb. per ton per degree of curvature on curves up to 6 with increasing rates for sharper curves. The locomotive tractive effort required to haul trains over grades and around curves can be equated in terms of equivalent distance on level tangent track. One of the most significant comparisons that can be made is that of the equated distance of comparative routes.

Appendix B
Sheet 1 of 2 sheets

GREAT NORTHERN RAILWAY

CONDENSED INCOME ACCOUNT
1932-1921
(000 Omitted)

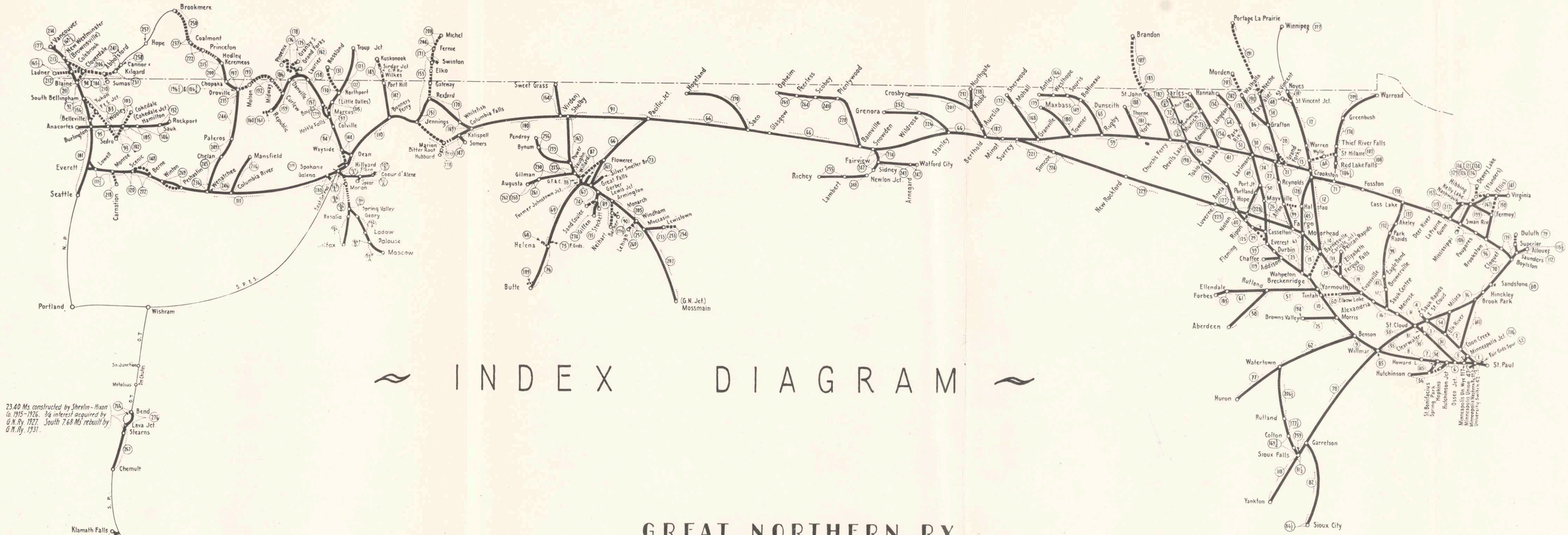
Year	Total Operating Revenues	Total Operating Expenses	Net Rev. from Ry. Operations	Railway Tax Accruals	Railway Operating Income		Equip-ment Rents	Joint Facility Rents	Net Ry. Operating Income
1932	$55,549	$45,656	$9,893	$6,697	$3,182	Dr.	$1,514	Dr.$377	$1,291
1931	77,087	55,286	21,801	7,179	14,612	Dr.	1,454	Dr. 489	12,669
1930	104,996	72,566	32,430	8,712	23,708	Dr.	1,348	Dr. 447	21,913
1929	125,933	82,863	43,070	9,201	33,852	Dr.	992	Dr. 402	32,458
1928	126,737	83,235	43,502	10,298	33,190	Dr.	1,518	Dr. 378	31,294
1927	117,904	78,355	39,549	9,046	30,503	Dr.	995	Dr. 306	29,202
1926	117,384	75,285	42,099	9,700	32,384	Dr.	809	Dr. 295	31,280
1925	114,925	75,827	39,098	9,802	29,288	Dr.	726	Dr. 286	28,276
1924	110,243	75,212	35,031	10,258	24,761	Dr.	305	Dr. 255	24,201
1923	120,078	86,751	33,327	9,113	24,193	Cr.	806	Dr. 268	24,731
1922	103,453	79,636	23,817	8,098	15,704	Cr.	1,799	Dr. 226	17,277
1921	101,317	80,497	20,820	8,291	12,481	Cr.	740	Dr. 354	12,867

Appendix B
Sheet 2 of 2 sheets

GREAT NORTHERN RAILWAY

CONDENSED INCOME ACCOUNT
1932-1921
(000 Omitted)

Year	Non-Operating Income	Gross Income	Deductions from Gross Income	Available for Interest	Interest on Funded and Unfunded Debt	Net Income
1932	$ 5,098	$ 6,389	$ 536	$5,853	$19,256	$13,403 def.
1931	12,111	24,780	558	24,222	18,896	5,326
1930	15,528	37,441	726	36,715	18,678	18,037
1929	12,026	44,484	553	43,931	18,262	25,669
1928	13,032	44,326	622	43,704	18,536	25,168
1927	12,838	42,040	605	41,435	18,450	22,985
1926	13,176	44,456	565	43,891	17,948	25,943
1925	11,428	39,704	522	39,182	17,747	21,435
1924	11,653	35,854	543	35,311	17,370	17,941
1923	5,085	29,816	416	29,400	16,561	12,839
1922	10,487	27,764	419	27,345	16,479	10,866
1921	31,731	44,598	1,218	43,380	14,909	28,471



23.40 Ms constructed by Shevlin-Hixon Co. 1915-1926. ¾ interest acquired by G.N.Ry. 1927. South 7.68 Ms rebuilt by G.N.Ry. 1931.

~ INDEX DIAGRAM ~

GREAT NORTHERN RY.

ORIGINAL TRACK LAYING RECORD

KEY TO GREAT NORTHERN RAILWAY

TRACK LAYING MAP

	1862	
1	St. Paul to Minneapolis	9.90
	1864	
2	Minneapolis to Elk River	28.60
	1866	
3	Elk River to East St. Cloud	36.40
	1847	
4	East St. Cloud To Sauk Rapids	2.14
5	Minneapolis Jct. to East Minmeapolis	0.70
6	East Minneapolis to 0.6 Ms. east of Lake Jct.	14.00
		16.84
	1868	
7	0.6 Ms. east of Lake Jct. to Howard Lake	29.00
	1869	
8	Howard Lake to Willmar	49.00
	1870	
9	Willmar to 0.6 Ms. west of Benson	31.00
	1871	
10	0.6 Ms. west of Benson to Breckenridge	81.12
	1872	
11	East St. Cloud to Melrose	35.00
12	4.9 Ms.N. of Barnesville to 2.3 Ms.S. of Warren	104.00
		139.00
	1875	
13	Crookston to 6.5 Ms.E. of Mallory	10.50
	1877	
14	4.9 Ms.N. of Barnesville to 1.4 Ms.N. of Barnesville	3.50
15	Breckenridge to Barnesville	29.00
		32.50
	1878	
16	Melrose to Alexandria	31.50
17	2.3 Ms.S. of Warren to St. Vincent	62.10

18	St. Vincent Jct. to boundary (Rebuilt 1902)	2.62
	1879	
19	Alexandria to Fergus Falls	45.01
20	Fergus Falls to 1.4 Ms. N. of Barnesville	32.26
21	65 Ms. E. of Mallory to 1 Mi.W. of Grand Forks	14.54
		91.81
	1880	
22	Barnesville to 0.4 Ms.W. of Reynolds	81.63
23	Breckenridge to Durbin	48.00
24	1 Mi.W. of Grand Forks to 2 Ms.W. of Ojata	12.00
25	Morris to Brown's Valley	46.68
26	Casselton to Mayville (acquired from N.P.)	43.33
		231.64
	1881	
27	0.4 Ms.W. of Reynolds to Grand Forks Jet.N.D.	16.00
28	Grand Forks to Grafton, N. D.	40.00
29	Durbin to Portland	53.10
30	2 Ms.W. of Ojata to 1.6 Ms. W. of Larimore	16.30
31	Osseo Jct. to 0.5 Ms.W. of Clearwater	50.57
32	Fergus Falls to Pelican Rapids (acquired from N.P)	21.65
33	Carlisle Jct. to Elizabeth	3.52
34	Minnetonka North Shore Line	5.93
		207.07
	1882	
35	0.5 Ms. W. of Clearwater to St.Cloud incl.N.Wye	12.50
36	East St.CLoud to Hinckley	66.43
37	Sauk Center to 0.54 Ms. E. of Browerville	25.47
38	Grafton to Int. Boundary, N.D.	40.94
39	Everest to Casselton	3.00
40	Ripon to Hope	29.50
41	1.6 Ms.W. of Larimore to 1 Mi. W. of Bartlett	39.80
		217.64
	1883	
42	Hamline to University Switch (Short Line)	3.35
43	0.54 Ms.E. of Browerville to Eagle Bend	10.97
44	Shirley to St. Hilaire	21.55
45	Moorhead Jct. To Halstad	34.09
46	1 Mi.W. of Bartlett to Devils Lake	20.26
47	University Switch to Minneapolis (Mpls Union Ry)	2.62
		92.84
	1884	
48	St.Vincent Jct. Switch to end of track via old depot	2.12
49	Portland to Larimore	30.90
50	Mayville to Portland Jct.	4.11
51	Park River Jct. to Park River	34.78
		71.91

1885

52	State Fair Grounds Spur. Minnesota (St.Paul)	0.64
53	St.Cloud to 4.79 Ms.E. of Rockville	14.12
		14.76

1886

54	Elk River to Milaca	31.80
55	4.79 Ms.E. of Rockville to 0.65 Ms.E. of Willmar Jct.	41.08
56	Hutchinson Jct. To Hutchinson	53.13
57	Aberdeen Line Jct. (Yarmouth) to Rutland	55.10
58	Rutland Jct. to Aberdeen	64.00
59	Devils Lake to 4.23 Ms.W. of Minot	121.16
		366.27

1887

60	Evansville to Tintah	32.03
61	Rutland to Ellendale	49.22
62	Benson to Watertown	91.62
63	Moorhead to Wahpeton	42.91
64	Park River to Langdon	39.10
65	Rugby Jct. to Bottineau	38.66
66	4.23 Ms.W. of Minot to S. side of Sum River	545.02
67	Johnstown Jct. to Jct. with Sand Coulee Br.	3.10
68	Red Mountain Br. Helena	1.47
69	Great Falls to Helena	96.56
		939.69

1888

70	Hinckley to West Superior	69.78
71	Crookston Jct. (Carman) to Fosston	44.69
72	Church's Ferry to St. John	55.21
73	Montana Silver + Lead smelting Cos. Branch	5.33
74	Great Falls to Sand Coulee	14.53
75	Fair Grounds Spur at Helena	0.85
76	Helena to Butte	72.78
77	Watertown to Huron (D.W. + P. Ry)	69.84
78	Willmar to Sioux Falls (W. : S. F. Ry)	146.91
79	Duluth Terminal Ry.	1.78
80	Kettle River Branch (Sandstone)	2.61
81	St. Cloud Mill Spur to Dam (off Osseo Line)	2.53
81½	Sioux Falls (S. F. Term R. R.)	3.00
		489.84

1889

82	Garretson to Sioux City (S.C.+ N.Ry.C)	96.00
83	South Bellingham (Fairhaven) to Sedro	25.71
84	Spokane to Colville (S.F.+N.Ry.)	88.15
84½	Sioux City (S.C.T. RR. +Whse. Co.)	1.28
		211.14

1890

85	0.65 Ms.E. of Willmar Jct. to Willmar Jct	0.65
86	Grafton to Cavalier	31.71
87	Great Falls to B.+M. Smelter	5.04
88	F.G. + C. Connection at Great Falls	1.26
89	Gerber (Allen) to Neihart	56.34
90	Monarch to Barker	10.69
91	Pacific Jct. to 98.92 Ms. W. of Pacific Jct.	98.92

92	South Bellingham (Fairhaven) to boundary	24.25
93	Sedro to 1.10 Ms.E. of Sedro (E. Skagit Div.)	1.10
94	New Westminster Southern Ry.	23.51
95	Anacortes to 28.07 Ms.E. of Anacortes	28.07
96	Cloquet to Paupores	24.38
97	Colville to Little Dalles	35.90
		358.93

1891

97½	Minneapolis Western Ry.	1.69
98	Eagle Bend to Park Rapids	54.52
99	Halstad to Alton	10.38
100	98.92 Ms.W. of Pacific Jct. to 256.4 Ms.W of Pacific Jct.	157.48
101	Seattle to F. + S. Jct	78.50
102	1.10 Ms.E. of Sedro to 3.11 Ms.E. of Sedro	2.01
103	3.11 Ms.E. of Sedro to Coal Mines	3.79
104	New Westminster Southern Ry	00.59
105	28.07 Ms.E. of Anacortes to Hamilton	6.07
106	Paupores to La Prairie	43.90
		358.93

1892

107	St.Hilaire to Thief River Falls	7.59
108	St.Hilaire to Red Lake Falls	10.13
109	MouMountain View Branch Butte	3.38
110	246.4 Ms.W. of Pacific Jct. to Jct. with U.P at Spokane	254.90
111	Jct.with U.P. at Spokane to point ½ mi.w.of Embro	244.32
111½	1 3/4 Ms.W. of Scenic to Jct. with E.M.C. Ry. at Lowell	59.13
112	Saunders to Allouez (Omaha Crossing)	5.33
113	La Prairie to Deer River (acquired D.+W.)	16.82
114	Part of line Mississippi - Dewey Lake Line	12.76
115	Little Dalles to Northport	6.40
115½	Allouez (D. + W. T. Co.)	0.92
		621.68

1893

116	North "Y" at Minneapolis Jct.	0.25
117	"Y" with Minneapolis Union Ry.	0.08
118	Sioux Falls to Yankton	58.34
119	Addison West Line	11.78
120	½ Mi.West of Embro to 1 3/4 Ms.W. of Scenic	6.98
121	Part of Mississippi - Dewey Lake Line	8.38
122	Northport to boundary	10.21
123	Boundary to Troup Jct.	55.42
		151.44

1894

124	Part of Mississippi - Dewey Lake Line	11.19

1895

125	Casselton to Fleming	4.35
126	Part of Mississippi - Dewey Lake Line	2.10
		6.45

1896

127	Hope to Aneta	28.07
128	Halstad to Crookston Jct.	32.23
129	Part of Mississippi - Dewey Lake Line	1.76
130	Northport to boundary	7.51
131	Boundary to Rossland	9.59
		79.06

1897

132	Park Rapids to Akeley	18.32
133	Cavalier to Walhalla	16.13
134	Langdon to Hannah	21.06
135	Lewis Jct. to Stockett	5.21
136	Part of Mississippi - Dewey Lake Line	13.45
		74.17

1898

137	Akeley to Cass Lake including W. Wye	30.69
138	Fosston to Deer River	98.59
139	Cloquet to Boylston including Cut off	27.53
		156.81

1899

140	Coon Creek to Kinckley	64.71
141	Hibbing to Virginia incl. track to Commodore Mine	18.78
142	Bonners Ferry to boundary	25.79
143	Boundary to Kuskonook	14.98
144	Dean (Colbert) to connection with S.F.+N. near Wayside	3.57
		127.83

1900

145	Spring Park to St. Bonifacius	8.22
146	Hamilton to Sauk	18.84
147	Kalispell to Somers - Tie Plant	10.32
148	Cascade Tunnel Line	3.52
		40.90

1901

149	Bottineau to Souris	12.72
150	Brookston to Ellis incl. "Y" at Ellis	46.49
151	Jennings to 17.35 Ms.N. of Jennings	17.35
152	Sauk to Rockport incl. "Y"	2.36
		78.92

1902

152-A	0+00, Devils Lake to 1268 + 39, Starkweather	24.02
153	Kelly Lake to Kinney - Hawkins Mine	10.42

154	Lakota to Edmore incl. "Y"	27.72
155	17.35 Ms.N. of Jennings to Swinton	77.90
156	Belleville to S.Bellingham (Fairhaven)	18.82
157	Marcus to Laurier, incl. "Y"	27.66
158	Laurier to Danville	14.40
159	Danville to Republic	8.37
160	Eureka Gulch Branch at Republic	8.37
161	Mtn. Lion, Lone Pine + Quiop Spurs	1.45
162	Grand Forks Jct. to Grand Forks B.C. incl.W"Y"	2.10
163	Willard to Shelby	97.93
164	Virden to Sweet Grass incl. Virden "Y"	36.54
165	Floweree to Great Falls	21.77
		401.00

1903

165½	Cloverdale to Ladner incl. "Y"	17.49
166	Souris to Westhope	16.41
167	Kelly Lake to Flanders, South Range Line	9.69
168	Granville to Mohall incl. W. "Y"	46.97
169	Columbia Falls to Whitefish incl. W. "Y".	8.75
169½	Part of New Westminster -Vancouver Line	4.93
169-A	Spokane to Coeur D'Alene (S.C.+ P..Ry.)	30.74
		134.98

1904

169 3/4	Colton to Sioux Falls (W. ¼ S. F. Ry)	20.50
170	Whitefish to Rexford	60.42
171	Swinton to Fernie	9.82
172	Mohall to Sherwood	14.85
173	Edmore to Munich	24.87
174	Thief River Falls to Greenbush	41.09
175	Granby Smelter Line incl. N."Y" at Columbia Jct.	4.74
176	Part of Copper Jct.-Phoenix Line incl. "Y"s + Sw.Bks.	22.86
177	Part of New Westminster - Vancouver Line	9.86
		209.01

1905

177-A	1246+62=1276+785 Starkweather to 2845+40, Rock Lake	29.71
177-B	2845 + 40, Rock Lake to 3534+40, Hansboro	13.05
177½	Rutland to Colton	19.78
178	Part of Copper Jct-Phoenix Line incl."Y"s + Sw Bks.	1.76
179	Westhope to Antler	12.76
180	Towner to Maxbass	46.12
181	York to Thorpe including "Y"	34.67
182	St.John to boundary	3.88
183	Boundary at St.John to 0.87 Ms.N	0.87
184	Munich to Sarles	20.54
185	Ellendale to Forbes	14.11
186	Curlew to boundary at Midway incl. "Y"	14.52
186½	Red Lake Falls, Connection to N.P.Ry.	1.70
186-A	Spokane to Moran	6.56
		220.03

1906

186-B	Moran to Rosalia	38.82
186-C	Spring Valley to Geary	10.73
186-D	Ladow to Palouse	6.98

186 3/4	East leg of "Y" and tail track at Oroville	0.67
187	Berthold to 1.93 Ms. N. of Aurelia incl. "Y"	15.17
188	Thorne to Dunscith	7.83
189	0.87 Ms. N. of boundary	68.59
190	Neche to boundary	0.64
191	Boundary at Neche to Portage La Prairie	77.02
192	Boundary at Midway to boundary E. of Molson	28.89
193	Boundary E. of Molson to 0.86 Ms. E. of Oroville	26.33
194	Browns Valley Extension	1.64
195	Aneta to 2.03 Ms.W. of Tokio	45.53
196	Schurmeier Jct. to Schurmeier incl. W. "Y"	4.52
		333.36

1907

196-A	Geary to Ladow	18.18
196-B	Rosalia to Colfax	30.37
196½	West leg of Oroville "Y"	0.33
197	0.86 Ms.E. of Oroville to Boundary at Chopaka	22.13
198	2.03 Ms. W. of Tokio to Devils Lake	12.14
199	Fermoy to Kelly Lake	23.38
200	Boundary at Chopaka to 1.39 Ms. W.of Keremeos	18.19
201	1.93 Ms.N. of Aurelia to Crosby	73.99
202	Walhalla to boundary	5.34
203	Boundary to Morden	15.25
204	Fernie to 3.26 Ms.N	3.26
205	Armington to 2.6 Ms. S. of Merino	32.21
206	Cloverdale to 1.38 Ms.E. of Cloverdale	1.38
206½	Watertown to Rutland	62.72
		318.87

1908

207-A	Palouse to Moscow	14.89
207-B	Coeur d'Alene on former Hayden Lake line	.98
207	26 Ms.S. of Merino to Mossman incl."Y"	162.32
208	3.26 Ms. N. of Fernie to Michel	17.72
209	Greenbush to Warroad	43.16
210	1.38 Ms.E. of Cloverdale to boundary at Sumas	27.88
		266.95

1909

211-A	Spear to Flora	6.48
211	Oliver Jct. to boundary	2.94
212	Boundary to Colebrook	11.32
213	Colebrook to Brownsville	9.73
214	Burrard inlet line, Vancouver	1.93
215	Keremeos to Princeton	40.92
216	Columbia River to Mansfield	60.62
217	Nashwauk to Gunn incl. "Y".	22.04
		155.98

1910

218	Monroe to Carnation	17.84

219	S.P.+S. Connection at Spokane	2.16
220	Bainville to Plentywood	53.20
221	Surrey to 3.5 Ms.E. of Simcoe (F.-S.line)	17.60

1911

222	Princeton to Coalmont (V.V.+E)	12.15
223	Vaughn to Sun RiverCrossing	8.36
224	3.5E. of Simcoe to 4.12 Ms.E. of Simcoe (F-S line)	0.62
225	0.26 Ms.E. of Nolan to 1.31 Ms.W. of Luverne (F-S line)	20.60
226	Stanley to Wildrose	50.75
227	Winnipeg Frt. Terminal to St.James Jct.(M.Ry.ofM)	6.05
		98.53

1912

228	Fargo to 0.26 Ms.E. of Nolan (F-S line)	40.10
229	1.31 Ms. Wof Luverne to 4.12 Ms.E. of Simcoe (F-S line)	146.26
230	Sun River Crossing to Gilman	31.92
232	Niobe to 2.54 Ms. North	2.54
231	Abbotsford to 7.82 Ms.East (V.V.+E.)	7.82
233	Moccasin to Lewistown, incl. "Y"	30.27
234	Station 619+00 S.of Snowden to Sta.213+00 S. of Dore (M.E.Ry)	7.69
235	1.52 Ms.S of Oroville to 332 Ms.S. of Oroville	1.80
236	2.57 MsN.of Wenatchee to 3,80 Ms.N.of Wenatchee	1.23
237	West of Coalmont (V.V.+E.)	0.21
		269.84

1913

238	2.54 Ms.N.of Niobe to Northgate incl."Y"	19.14
239	Power to Bynum incl. "Y" (G.F.+T.C.Ry)	42.97
240	Plentywood to Scobey	44.66
241	7.82 Ms.E. of Abbotsford to 12.86 Ms.E of Abbotsford	5.04
242	Snowden to Sidney (less No.234) incl. "Y" (M.E.Ry)	17.03
243	Fairview to Arnegrad incl. Fairview "Y" (M.E.Ry)	30.26
244	3.32 Ms.S.of Oroville to Pateros	75.49
245	3.80 Ms. N. of Wenatchee depot to Chelan River	34.18
246	H.B. on Pass.Trk at Wenatchee sta. 44+00 to sta. 1+35	0.81
		269.58

1914

247	Sta.1904+00 at Arnegard to 1507+35 at Wotford City(M.E.Ry.)	7.51
248	Newton Jct. 0+65 to Lambert 1160+10 (M.E.Ry)	21.99
249	Chelan River 1872+00 to Pateros 2953+00	20.46
250	West of Coalmont 2217+00 to Brookmere 868+67 (V.V.+E)	25.19
251	Legigh Mine Br.M.L. 2377+59.8 to 249+41	4.72
		79187

1915

No Track Laying

1916

252	Wildrose 2685+03 to Grenora 4602+00 (G.N.Ry)	36.33
253	Lewistown East to 1861+29 (G.N.Ry)	1.28
254	Lewistown East 1718+80 to 1861+29 (M.E.Ry)	2.71
255	Lambert 1161+10 to Rickey 2446+00 (M.E.Ry)	23.80
256	Bynum 682+93 to Pendroy 1143+58 (G.F.+T.Co.Ry)	8.72
257	At Hope B.C. (Y.V.+E.)	0.17
278	12.86 Ms.E. of Abbotsford 1297+70 to Cannor 1352 +55 (V.V.+E	1.04
		74.05

1917

259	Connecting Track at Sioux Falls (W.+S.F.Ry)	0.19
260	Branch line to Lehigh Mine No. 2.	2.36
		2.55

1918-1921

No Track Laying

1922

261	Gilman to Augusta Sta 2125+70 to Sta.2208+03	1.57

1923

No Track Laying

1924

262	Augusta Mont. Sta 2208-03 to Sta. 2226+54	0.35

1925

263	Augusta Mont Sta 2226+54 to Sta.2236+32	0.13
264	Scobey to Peerless Sta. 5304+90 to Sta.6359+43	20.03
		20.21

1926

265	Peerless to Opheim Sta.6359+43 to Sta 1987+69.4	28.74

1927

266	Connection at Bend Ore Sta.48+38.3 to Stal 19+11.9	0.36
267	Stearns to Chemult Ore.S a.67+807 to Sta.2108+99	46.30
267-A	Conn.Trk.bet.G.N.Ry.+S.C.+P.Ry at Spokane (made main trk, in 1943)	1.19
		46.85

1928

268	Depot at Klamath Falls south to Sta 143+72.7	3.29
269	Chumstick Revision from Peshastin to Winton	19.37
270	Jct. at Saco to Hogeland	77.44
271	Hambone to Sta 1241+60 at White Horse	23.30
		123.40
271½	Monarch to Barker (Reconstr. as a private line for St.Joseph Lead Co. G.N. owns .05 Mi. Conn. at Monarch	11.10

1929

272	New Cascade Tunnel Line from Berne to Scenic	10.29

1930

273	White Horse (Sta.1241+70) to Jct.at Lookout	10.19
274	Giffen Jct. near Stockett to Sta. 309+50.5 at Giffen	5.84
		16.03

1931

275	Jct. at Klamath Falls to Sta. 4899+73.7 at Bieber	91.58

1932

276	Bend to Lava Jct. Sta. 122+22.5 to 125+22.7	13.84

1933

No Track Laying

1934

277	Marion to Bitter Root (Acquired from S.L.Co.1942)	4.66

1935-1939

No Track Laying

1940

278	Bitter Root to Hubbard (Acquired from S.L.Co.1942	2.55

1941

279	Jct.At Kettle Falls to Sta. 1133+55.5 at Boyds	13.02
280	Jct.At Galend to Sta. 430+80 at East Galena	8.16
		21.18

1942 to 1953

No Track Laying

Appendix D
Sheet 1 of 6 sheets

CHICAGO, BURLINGTON & QUINCY RAILROAD
1929 - 1954
MILES OF ROAD OPERATED AND TOTAL PROPERTY INVESTMENT
($000's Omitted)

December 31st	Miles of Road Operated (Including Trackage Rights)	Trackage Rights	Miles of Road Operated (Excluding Trackage Rights)	Property Investment Including Material & Supplies and Cash	Property Investment per Mile of Road Operated (Excluding Trackage Rights)
1954	8,858	573	8,285	$919,395	$ 111
1953	8,867	567	8,300	892,423	107
1952	8,867	557	8,310	865,346	104
1951	8,834	540	8,294	834,110	101
1950	8,830	531	8,299	802,118	97
1949	8,873	545	8,328	777,263	93
1948	8,714	380	8,334	758,459	91
1947	8,867	542	8,325	733,576	88
1946	8,867	491	8,376	700,284	83
1945	8,863	486	8,377	678,138	81
1944	8,987	498	8,489	668,747	78
1943	9,024	506	8,518	668,230	78
1942	9,040	506	8,534	642,531	75
1941	9,101	507	8,594	637,945	74
1940	8,958	343	8,615	623,839	72
1939	8,948	306	8,642	621,441	72
1938	8,948	344	8,602	618,183	72
1937	8,970	347	8,623	613,965	71
1936	8,977	347	8,630	606,010	70
1935	9,028	347	8,681	607,440	70
1934	9,037	338	8,699	611,719	70
1933	9,184	340	8,844	618,345	70
1932	9,248	340	8,908	626,988	70
1931	9,307	329	8,978	633,221	71
1930	9,325	329	8,996	636,960	70
1929	9,367	329	9,038	633,114	70

Appendix D
Sheet 2 of 6 sheets

CHICAGO, BURLINGTON & QUINCY RAILROAD

OPERATING RESULTS
(000 Omitted)

Year	Total Operating Revenues	Total Operating Expenses	Net Rev. from Ry. Operations	Railway Tax Accruals	Uncoll. Railway Revenues	Railway Oper. Income	Equipment Rents	Joint Facility Rents	Net Ry. Operating Income
1954	$252,353	$190,334	$62,019	$28,989		$33,030	Dr. $3,318	Dr. $1,964	$27,749
1953	$278,414	$203,124	$75,290	$39,557	-	$35,733	Dr. $3,763	Dr. $2,090	$29,880
1952	270,348	193,436	76,912	39,690	-	37,222	Dr. 3,184	Dr. 2,294	31,744
1951	266,594	189,234	77,359	41,234	-	36,125	Dr. 4,066	Dr. 1,943	30,117
1950	245,248	161,965	83,283	39,773	-	43,510	Dr. 3,803	Dr. 1,900	37,807
1949	217,997	167,266	50,731	26,192	-	24,539	Dr. 3,086	Dr. 1,832	19,620
1948	241,364	167,888	73,476	35,912	-	37,564	Dr. 3,161	Dr. 1,665	32,737
1947	221,179	149,996	71,183	34,408	-	36,775	Dr. 3,049	Dr. 1,944	31,781
1946	195,926	139,251	56,675	25,694	-	30,981	Dr. 2,573	Dr. 1,417	26,991
1945	242,543	174,151	68,392	30,249	-	38,143	Dr. 1,598	Dr. 2,194	34,350
1944	240,637	145,854	94,783	57,191	-	37,592	Dr. 2,373	Dr. 3,144	32,075
1943	217,952	123,559	94,393	55,574	-	38,819	Dr. 1,172	Dr. 1,885	35,762
1942	165,289	99,416	65,873	26,193	-	39,681	Dr. 228	Dr. 2,279	37,174
1941	117,521	83,048	34,473	11,900	-	22,573	Dr. 1,313	Dr. 2,125	19,135
1940	97,631	71,854	25,777	8,698	-	17,080	Dr. 1,953	Dr. 2,044	13,083
1939	96,132	70,886	25,246	8,616	-	16,629	Dr. 2,227	Dr. 2,132	12,270
1938	93,070	67,087	25,983	9,062	-	16,921	Dr. 2,498	Dr. 2,016	12,407
1937	100,151	74,278	25,873	7,731	-	18,141	Dr. 2,738	Dr. 2,077	13,326
1936	98,082	71,243	26,839	8,411	-	18,428	Dr. 2,543	Dr. 2,437	13,449
1935	82,925	62,544	20,381	5,984	$23	14,374	Dr. 1,954	Dr. 2,192	10,228
1934	80,288	58,008	22,280	5,784	25	16,471	Dr. 1,679	Dr. 2,141	12,651
1933	78,497	54,362	24,135	6,919	20	17,196	Dr. 1,376	Dr. 2,329	13,491
1932	79,544	58,518	21,026	8,148	31	12,847	Dr. 1,224	Dr. 2,030	9,593
1931	111,219	77,466	33,753	9,955	24	23,774	Dr. 987	Dr. 2,280	20,507
1930	141,379	98,877	42,502	11,192	30	31,280	Dr. 1,088	Dr. 2,236	27,956
1929	162,410	111,566	50,844	12,025	27	38,792	Dr. 1,267	Dr. 2,167	35,358

CHICAGO, BURLINGTON & QUINCY RAILROAD

OTHER INCOME AND DISTRIBUTION OF GROSS INCOME
(000 Omitted)
(except on Net Income and Dividend Payments per share)

Year	Other Income	Gross Income less Misc.Deds.i.e. Bal. for Fix.Chgs.	Fixed Charges	Net Income	Div.Disbursement	Net Income pr. sh.	Div.Payment pr. sh.
1954	$2,368	$29,655	$6,643	$23,012	$12,813	$13.47	$7.50
1953	2,479	31,948	6,286	25,662	12,813	15.02	7.50
1952	2,288	33,775	5,774	28,001	12,813	16.39	7.50
1951	1,610	31,268	6,019	25,249	11,959	14.78	7.00
1950	2,370	40,039	6,277	33,762	11,959	19.76	7.00
1949	1,738	21,231	5,811	15,420	8,542	9.03	5.00
1948	1,289	33,890	5,808	28,082	11,959	16.44	7.00
1947	1,883	33,513	5,772	27,742	10,250	16.23	6.00
1946	2,334	29,325	6,110	23,103	10,250	13.52	6.00
1945	1,600	35,673	8,268	27,405	10,250	16.04	6.00
1944	1,514	33,387	8,740	24,647	5,125	14.43	3.00
1943	1,538	37,200	8,969	28,231	5,125	16.52	3.00
1942	1,376	38,447	9,800	28,647	5,125	16.77	3.00
1941	1,223	20,230	9,810	10,419	3,417	6.10	2.00
1940	1,071	14,051	9,658	4,393	3,417	2.57	2.00
1939	1,135	13,307	9,645	3,661	3,417	2.14	2.00
1938	1,096	13,406	9,763	3,642	3,417	2.13	2.00
1937	1,355	14,591	9,684	4,907	3,417	2.88	2.00
1936	1,294	14,653	9,495	5,157	6,834	3.02	4.00
1935	1,081	11,271	9,428	1,843	3,417	1.08	2.00
1934	1,254	13,869	9,414	4,455	5,126	2.61	3.00
1933	1,562	15,017	9,455	5,598	5,126	3.28	3.00
1932	1,363	10,912	9,409	1,503	5,126	0.88	3.00
1931	2,299	22,762	9,445	13,320	17,084	7.80	10.00
1930	3,225	31,428	9,447	21,980	25,626	12.86	15.00
1929	3,712	39,023	9,447	29,577	17,084	17.31	10.00

CHICAGO, BURLINGTON & QUINCY RAILROAD

OTHER INCOME AND DISTRIBUTION OF GROSS INCOME
(000 Omitted)
(except on dividend payments
and earned per share)

Year	Other Income	Gross Income less Misc. Deds. i.e. Bal. for Fix. Charges	Fixed Charges	Net Income	Dividend Payments	Earned per Share
1954	$2,368	$29,655	$ 6,643	$23,012	$12,813	$13.47
1953	$2,479	$31,948	$ 6,286	$25,662	$12,813	$15.02
1952	2,288	33,775	5,774	28,001	12,813	16.39
1951	1,610	31,268	6,019	25,249	11,959	14.78
1950	2,370	40,039	6,277	33,762	19,959	19.76
1949	1,738	21,231	5,811	15,420	8,542	9.03
1948	1,289	33,890	5,808	28,082	11,959	16.44
1947	1,883	33,513	5,772	27,742	10,250	16.23
1946	2,334	29,325	6,110	23,103	10,250	13.52
1945	1,600	35,673	8,268	27,405	10,250	16.04
1944	1,514	33,387	8,740	24,647	5,125	14.43
1943	1,538	37,200	8,969	28,231	5,125	16.52
1942	1,376	38,447	9,800	28,647	5,125	16.77
1941	1,223	20,230	9,810	10,419	3,417	6.10
1940	1,071	14,051	9,658	4,393	3,417	2.57
1939	1,135	13,307	9,645	3,661	3,417	2.14
1938	1,096	13,406	9,763	3,642	3,417	2.13
1937	1,355	14,591	9,684	4,907	3,417	2.88
1936	1,294	14,653	9,495	5,157	6,834	3.02
1935	1,081	11,271	9,428	1,843	3,417	1.08
1934	1,254	13,869	9,414	4,455	5,126	2.61
1933	1,562	15,017	9,455	5,598	5,126	3.28
1932	1,363	10,912	9,409	1,503	5,126	0.88
1931	2,299	22,762	9,445	13,320	17,084	7.80
1930	3,225	31,428	9,447	21,980	25,626	12.86
1929	3,712	39,023	9,447	29,577	17,084	17.31

Appendix D
Sheet 4 of 6 sheets

CHICAGO, BURLINGTON & QUINCY RAILROAD

OPERATING REVENUES
(000 Omitted)

Year	Freight	Passenger	Mail	Express	All Other	Total Operating Revenues
1954	$206,301	$18,917	$11,697	$ 3,491	$11,947	$ 252,353
1953	$230,611	$20,350	$11,057	$ 3,885	$12,511	$278,414
1952	223,231	20,173	10,883	3,986	12,074	270,347
1951	220,254	19,193	12,516	2,787	11,844	266,594
1950	199,933	17,680	14,870	2,897	9,868	245,248
1949	179,803	17,819	8,494	2,898	8,983	217,997
1948	199,341	20,199	7,872	4,363	9,589	241,364
1947	181,409	19,029	6,874	4,699	9,168	221,179
1946	148,897	27,897	5,529	4,894	8,709	195,926
1945	183,287	38,194	5,709	6,288	9,065	242,543
1944	180,453	40,141	5,729	5,296	9,018	240,637
1943	166,123	32,924	5,242	4,375	9,288	217,952
1942	131,771	19,100	4,607	3,058	6,753	165,289
1941	94,874	10,697	4,704	1,770	5,476	117,521
1940	78,198	8,964	4,306	1,574	4,589	97,631
1939	76,854	9,168	4,190	1,527	4,393	96,132
1938	74,135	9,141	4,088	1,483	4,223	93,070
1937	79,966	9,718	4,101	1,677	4,689	100,151
1936	79,717	8,217	4,034	1,760	4,354	98,082
1935	66,817	6,978	3,873	1,516	3,741	82,925
1934	64,815	6,749	3,685	1,604	3,435	80,288
1933	63,319	6,722	3,904	1,311	3,241	78,497
1932	63,183	7,311	4,008	1,595	3,447	79,544
1931	88,238	11,205	4,407	2,536	4,833	111,219
1930	111,157	15,360	4,737	3,502	6,623	141,379
1929	126,778	18,818	4,773	4,435	7,606	162,410

CHICAGO, BURLINGTON & QUINCY RAILROAD

Appendix D
Sheet 5 of 6 sheets

OPERATING EXPENSES
(000 Omitted)

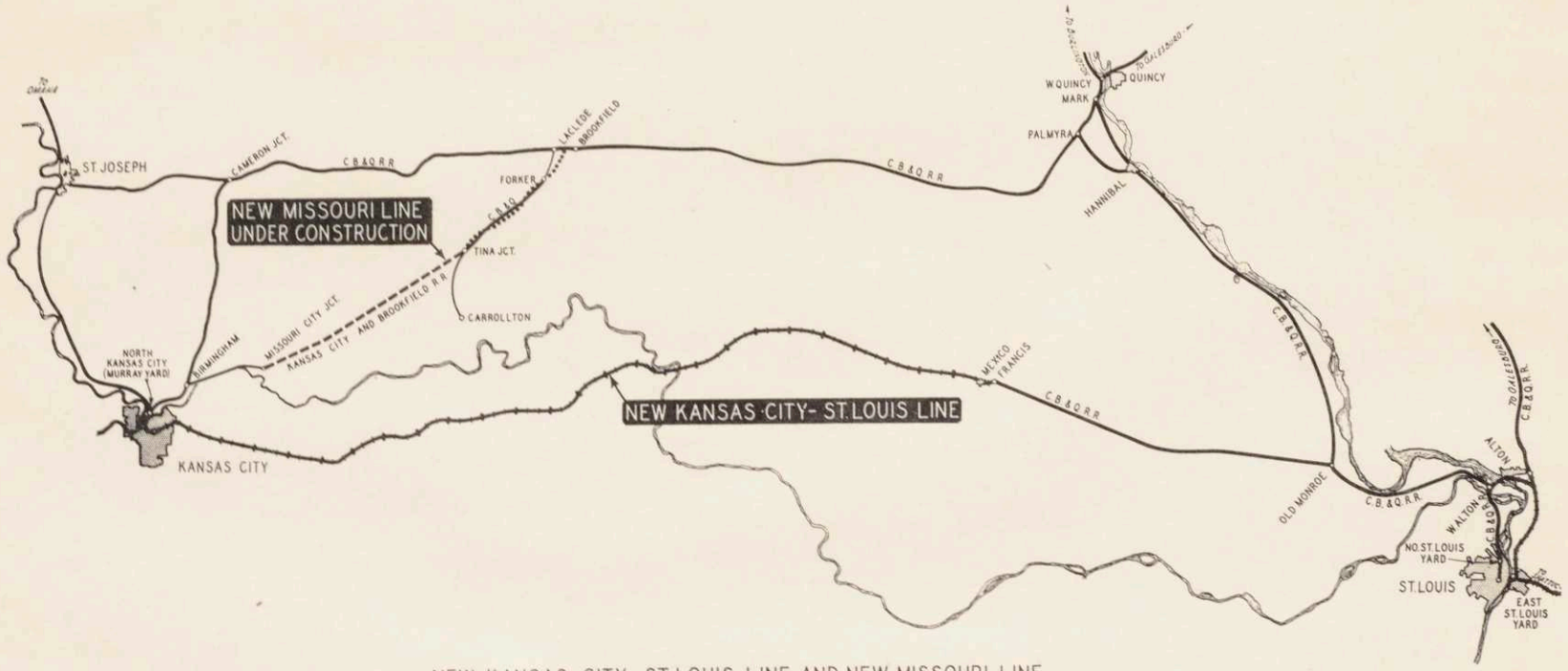
Year	Maintenance of Way & Structures	Maintenance of Equipment	Total Maintenance Expenses	Traffic	Transportation	Misc.	General	Total Operating Expenses
1954	$35,419	$43,181	$78,600	$6,099	$95,610	$3,352	$6,673	$190,334
1953	$49,072	$40,018	$89,090	$6,093	$97,999	$3,381	$6,562	$203,124
1952	42,108	40,840	82,948	5,663	95,078	3,450	6,297	193,436
1951	41,783	39,309	81,083	5,387	93,514	3,223	6,027	189,234
1950	33,787	34,038	67,825	4,943	80,956	2,948	5,294	161,965
1949	36,261	38,419	74,680	5,131	78,842	2,957	5,655	167,266
1948	37,260	34,365	71,625	4,692	83,366	2,892	5,311	167,888
1947	32,484	29,682	62,166	4,479	75,766	2,952	4,633	149,996
1946	31,412	27,661	59,073	4,049	68,614	3,103	4,412	139,251
1945	47,843	51,953	99,796	3,616	63,650	3,114	3,975	174,151
1944	40,175	33,791	73,966	3,451	61,654	2,999	3,785	145,854
1943	29,836	28,196	58,032	3,300	55,806	2,800	3,622	123,559
1942	21,025	24,106	45,131	3,010	46,267	2,094	2,914	99,416
1941	16,959	19,817	36,776	2,975	39,527	1,391	2,622	83,048
1940	13,353	16,784	30,137	2,915	35,277	1,184	2,540	71,854
1939	12,845	17,382	30,227	2,931	34,257	1,175	2,492	70,886
1938	11,654	15,410	27,064	2,859	33,620	1,163	2,531	67,087
1937	14,034	17,275	31,309	2,912	36,183	1,235	3,084	74,278
1936	12,798	16,820	29,618	2,817	34,550	997	3,646	71,243
1935	10,825	14,950	25,775	2,600	30,844	892	2,810	62,544
1934	9,860	12,431	22,291	2,528	28,565	742	4,082	58,008
1933	8,562	12,140	20,702	2,451	27,374	641	3,390	54,362
1932	9,576	13,342	22,918	2,536	28,953	659	3,532	58,518
1931	13,721	17,786	31,507	2,913	38,031	952	4,201	77,466
1930	20,312	22,553	42,865	3,457	46,923	1,444	4,425	98,877
1929	24,415	26,081	50,496	3,353	52,083	1,612	4,509	111,566

Appendix D
Sheet 6 of 6 sheets

CHICAGO, BURLINGTON & QUINCY RAILROAD

OPERATING STATISTICS

Year	(000) Revenue Tons	(000,000 Omitted) Revenue Ton Miles	(000 Omitted) Train Miles Freight	(000 Omitted) Train Miles Passenger	(000 Omitted) Locomotive Miles Freight	(000 Omitted) Locomotive Miles Passenger	(000,000 Omitted) Car Miles in Transportation Service Freight Loaded	Freight Empty	Total Freight	Passenger	(000 Omitted) Passenger Miles
1954	47,617	15,710	13,757	12,103	14,142	11,423	564	296	860	101	837,706
1953	50,236	16,825	14,436	12,445	14,375	11,488	598	304	902	91	902,636
1952	50,265	17,097	14,303	11,755	14,259	10,775	593	311	904	103	883,205
1951	53,345	18,625	14,863	11,823	15,650	10,899	630	312	942	103	826,128
1950	49,057	16,756	14,179	12,098	14,967	10,905	590	290	880	101	748,699
1949	45,882	15,250	13,924	12,423	14,695	10,987	549	304	853	99	757,891
1948	54,530	18,358	15,734	13,091	16,649	11,279	627	352	979	103	870,790
1947	56,892	19,274	16,948	13,364	18,250	11,366	647	357	1,004	102	955,746
1946	51,574	15,658	15,763	14,198	16,981	12,112	588	312	900	114	1,529,489
1945	56,142	18,821	16,806	15,471	18,311	13,536	644	308	952	131	2,116,701
1944	57,092	19,752	17,716	14,840	19,236	12,946	665	332	997	122	2,220,707
1943	55,896	18,960	17,916	14,371	19,528	12,430	624	331	955	114	1,822,197
1942	49,261	15,291	16,665	14,338	18,151	12,064	551	302	853	100	1,080,880
1941	38,121	11,339	15,401	14,182	16,488	11,602	490	270	760	95	640,033
1940	31,014	8,972	13,665	13,926	14,521	11,216	410	244	654	92	539,670
1939	29,420	8,417	13,480	14,076	14,387	11,438	390	231	621	91	544,510
1938	28,132	7,848	13,051	14,052	13,851	11,287	366	224	590	90	530,835
1937	32,661	9,423	15,608	14,434	16,783	11,715	433	256	689	90	587,409
1936	31,398	9,062	16,245	13,972	17,665	10,663	425	259	684	84	499,516
1935	25,455	7,522	14,403	13,464	15,516	10,283	355	232	587	80	424,789
1934	25,127	7,137	14,008	13,059	15,086	10,020	346	236	582	78	425,949
1933	23,945	6,599	12,692	13,310	13,421	10,203	309	210	579	76	387,065
1932	23,196	6,298	12,009	14,633	12,712	11,410	301	206	507	83	347,834
1931	31,815	8,889	13,125	15,981	13,937	12,810	393	261	654	97	472,742
1930	41,701	11,356	15,290	17,403	16,702	14,558	485	313	798	110	606,612
1929	46,820	12,874	17,246	17,968	18,909	15,420	557	336	893	114	719,017



NEW KANSAS CITY-ST.LOUIS LINE AND NEW MISSOURI LINE

"JAMES J. HILL'S PHILOSOPHY OF BUSINESS MANAGEMENT"
"by William J. Cunningham" *

"Reproduced in full from November 1941 edition
of Bulletin of the Business Historical Society, Inc.
Baker Library, Soldier's Field, Boston, Mass.
Henrietta M. Larson, Editor"

"In May 1914, a small group of friends of Harvard School of Business Administration and admirers of James J. Hill took the initiative in founding a Professorship of Transportation in his honor and to bear his name. The group consisted of Robert Bacon, George F. Baker, Howard Elliot, Arthur Curtiss James, Thomas W. Lamont, Robert T. Lincoln and J. P. Morgan."**

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* Editor's Note.
"The author has been the James J. Hill, Professor of Transportation since the establishment of the Chair in 1916 at the Graduate School of Business Administration, Harvard University. From 1894 until 1916 he was in railroad work, in the traffic, operating and executive departments of eastern railroads; last as President's Assistant, Boston and Maine Railroad. From 1910 until 1916, he was also Assistant Professor of Transportation at Harvard University. In 1918-19 he served as Assistant Director of Operations, United States Railroad Administration. H.M.L." (Note by S.H.B. Prof. Cunningham is also the author of American Railroads; Government Control and Reconstruction Policies. A. W. Shaw Co., Chicago, 1922.)

** "Robert Bacon, member of J. P. Morgan & Co.; Assistant Secretary of State and Secretary of State (January 27 - March 6, 1909); Ambassador to France, etc.
"George F. Baker of First National Bank of New York
"Arthur Curtiss James has been mentioned in the report.
"Howard Elliot. Starting with C. B. & Q., became Vice President. Succeeded Charles S. Mellen, who left presidency of Northern Pacific in 1903 to become President of the N.Y.N.H.& H. Elliot was also Mellen's successor on New Haven Railroad upon latter's resignation in 1913.
"Thomas W. Lamont, member of J. P. Morgan & Co.
"Robert Todd Lincoln, son of President Abraham Lincoln and then President of the Pullman Co.
"J. P. Morgan - the well known banker."

"Seventy-four persons contributed an aggregate of $125,000 and the endowment of the fellowship was announced by President Lowell at the 1915 commencement exercises with the statement that 'the Chair marks an epoch in the life of the school and by its recognition of transportation as a permanent object of systematic instruction in the life of the nation also.'

"Mr. Hill knew nothing about the activities of the group until the $125,000 had been subscribed and he was pleased when told about it. His interest in scientific instruction in transportation was so keen and he was so concerned about the adequacy of the endowment that he personally gave the University an equal sum to make the endowment $250,000.

"His eagerness to see early fruits from the endowment led him, when in New York on his way to Jekyl Island (near Brunswick, Georgia) for a brief vacation, to inquire of Mr. Lamont whom the University would be likely to appoint to the new chair and what would be the scope and nature of the transportation courses. When told that I (then assistant professor of transportation) might receive the appointment, Mr. Hill asked to see me, and he was so anxious to get quick action that he suggested that I start for Jekyl Island at once and see him there.

"I met Mr. Hill at Jekyl Island the next evening, but only for a minute or two. He asked me to meet him in library at ten the next morning. There I had my first conversation with him. In it he expounded his philosophy of transportation and expressed his ideas about the things that should be emphasized. I made no notes during the conversation, but when it was concluded at 1:45 P.M. I went immediately to my room and wrote the interview as I remembered it. Subsequently I asked him to read it and he said I had correctly recorded his ideas. This report of my interview follows.

"Mr. Hill gave me the two following mornings at Jekyl Island and asked me to go to St. Paul for a few weeks later. There, and on the line of the Great Northern Railway, I spent two months during which I saw Mr. Hill frequently and had an opportunity to observe how successfully his policies, as outlined in the first interview, were working on the railroad.

"To Mr. Hill more than any other individual should be credited the economic development of the Northwest. The frequently used title of "Empire Builder" had justification. His reputation as a railroad builder and manager is sufficient in itself to give him a more prominent place in American history, but he was much more than that. He was a vigorous and resourceful pioneer in the agricultural and industrial development of the states through which his railroad ran from the Great Lakes to the Pacific Coast. The Great Northern Railway was his personal creation and chief interest, although at one time he controlled also the Northern Pacific Railway, and the Burlington Railroad System. These three properties, together with a few subsidiaries, were known as the Hill Lines and his successful fight with another giant in the railroad industry -- Edward H. Harriman -- is one of the most stirring and dramatic incidents in railroad history.

The most striking evidence of his financial and managerial genius is found in the fact that, of all of the transcontinental railroads, the Great Northern is the only one that has not gone through the fires of receivership and reorganization.and (S.P. should be added to G.N. S.H.B.)

"Intelligent management of railroads must be based upon exact knowledge of facts. Guesswork will not do. There are too many railroad officials who guess, and far too few who know. On the Great Northern, a man who begins to guess, soon guesses himself out of a job.

"The fundamental statistics which reflect the degree of success or failure in railroad operation should be simple and concise. They should not be elaborate. Refinement in such statistics is apt to cloud the vital features.

"The intelligent units of revenue are the average receipts per ton-mile and the average receipts per passenger-mile. These units reflect the revenue-producing power of the traffic which is moved.

"The most satisfactory cost unit is operating expenses per train-mile. This unit includes all expenses, not only those connected with the actual train movement but also the cost of maintaining way, structures, and equipment, as well as the cost of the administrative machinery.

"The income, therefore, has its indices in the ton-mile and passenger-mile receipts, and the outgo has its index in the cost per train-mile.

"Obviously the desideratum is to secure the maximum units of revenue (ton-miles and passenger-miles) with the minimum units of expense (train-miles). Stated in other terms, the superintendent must be held responsible for securing the greatest trainload consistent with safety and good service.

"There is a tendency in railroading to neglect small things. One-hundredth of a cent added to the average revenue per ton-mile, or one-hundredth of a cent saved in the cost of producing a ton-mile, may seem to be a very small amount. It <u>is</u> a small amount when taken by itself. Yet it represents one cent for each ton hauled one hundred miles and, when it is applied to billions of ton-miles, it means savings of hundreds of thousands of dollars. A reduction of one-hundredth of a cent in the average cost of moving a ton of freight one mile on the Chicago & North Western Railway in the fiscal year 1915 would have increased the net revenue of the railway approximately $625,000.

"The effect of the train-load on the ton-mile cost is obvious. The greater part of freight train-mile costs are but slightly affected by small increases in train tonnage,particularly if the additional tonnage is secured in increasing the average load per car. Assuming a cost of $3.00 per train-mile and an average trainload of 500 tons of revenue freight, the cost per net ton-mile is 0.6 cents. If better supervision

increases the trainload 10 net tons, either by better car loading or fewer trains moving with less than their tonnage rating, the cost per net ton mile will fall to 0.59 cents, thus saving one-hundredth of a cent in the ton-mile cost and adding large sums to the aggregate to net revenue.

"Unless the executive officers, the general manager, the general superintendent, and the superintendents know what it is costing them to produce ton-miles, there can be no strict accountability for efficiency and the management fails in its prime duty to the stockholders. Each division of a railroad should be furnished with accurate information, compiled by the accounting department, showing its performance in ton-miles, train-miles, and costs, and each superintendent should be held responsible for economy in the operation of his division.

"Obviously, the cost of producing a ton-mile will vary within wide limits on different roads and on diffent divisions of any one road. The cost is the resultant of many factors, some of which are beyond the control of the superintendent. The division with dense traffic, with favorable grades, easy curvature, few bridges and tunnels, modern facilities and well-balanced traffic, should show a lower cost than a division less fortunately situated. The unit costs of the first division are not to be compared with those of the second division. Such a method would obviously be unfair. But it is fair and proper to compare the performance of any division in any month with the performance on the same division in the preceding month or in the same month of the preceding year. Differences, if not readily accounted for by factors known to the general officers, must be explained, and losses in efficiency corrected. The basic concrete figures, in simple form, are to come from the accounting department as promptly as they can be compiled, but the analysis of all factors and the supplementary data and explanations should come from the superintendent. In making such analysis he should be free to call upon the accounting department for full information and he should regard the accounting department as a friend rather than as an inquisitor.

"The burden of the detail, and the explanations, however, should rest upon the superintendent. This method encourages him to know. It is opposed to the common method of guessing.

"In the nature of the transportation business, with its many expenses common both to passenger and to freight traffic, it is plain that an absolutely accurate division of expenses between passenger and freight service is impracticable. Yet the difficulties are not insurmountable, and it is possible by the adoption of a uniform basis, consistently adhered to, to arrive at costs per passenger-mile and per ton-mile which may be used fairly for comparative purposes and which come within the definition of known facts. The Great Northern's method makes it possible fairly to compare each division with itself, each district with itself, and the system as a whole with itself, and to eliminate guesswork in explanations.

"The principle of knowing what things cost cannot be too strongly emphasized. It should be inculcated in the minds of all railroad officers

and as well in the minds of all understudies. The right mental attitude is highly important. A man who has not been started right is difficult to teach. If he learns a thing wrong, it is natural for him to continue to do the thing wrong, even when the error is pointed out. Consequently, the right ideas should be impressed upon a man when he is young and when he is forming his business character. Then, when he is advanced to a position of responsibility, he naturally does things right. The Great Northern policy is to take the men who are to become superintendents and give them an insight into the significance of cost statistics before they become superintendents. Such men spend some time in the accounting department so as to become familiar with and to appreciate the sources of information as well as the meaning and importance of the figures. The Great Northern accounting department is in charge of a man who was once a superintendent. His chief assistant and understudy has had similar training. The accounting department therefore is not lacking in its appreciation of operating difficulties, and the superintendents are brought up to regard that department as a part of their own organization, and its work as a valuable aid in producing satisfactory and economical results.

"There is toommuch of 'it can't be done' and of 'our conditions are totally different.' Difficulties and differences are recognized but they must not be allowed to block needed reforms in methods which continue to exist largely because they have existed a long time. The mental attitude means much in accomplishing results. Often, a change in personnel is the only means of bringing up standards. The official who was brought up wrong and who cannot see possibilities must make room for one who has started right and can surmount difficulties.

"In training young men in a university to become useful in railroad service, the courses should be based on sound fundamental principles. First establish a firm foundation of fact, then erect the superstructure of detail. It is easy to generalize and to give courses which are interesting, but they will be of little service, or they may even be harmful, unless the student is taught in the beginning to see things right. The correct viewpoint is attainable only by a painstaking and thorough analysis of the records of railroad performance. The work should be adjusted to actual conditions. The instruction should be inductive. The laws which govern modern transportation methods have their bases in fact, and the variations in these laws under varying sets of facts should be made clear by an analysis of actual conditions. The courses should require a minute analysis of all the factors which affect results, and the province of the instructor is to weigh these factors and to present them in their relative degrees of importance.

"To give point to the instruction and figures for railroads of similar physical traffic and geographic characteristics should be studied and compared, in an effort to arrive at the true explanation of important differences. Roads like the North Western and the Burlington may be compared with each other or with transcontinental lines, such as

the Northern Pacific, Great Northern, Union Pacific or Santa Fe. In the East, the New York Central and the Pennsylvania, the Norfolk & Western and Chesapeake & Ohio, or the New Haven and the Boston & Maine may be studied. It would be advisable to enlist the cooperation of the nearby New England railroads in furnishing facilities for laboratory work. Such work would furnish abundant material in which to search for truth and from which to gain an experience in analysis and perspective facts. That kind of training should fit a young man to perform useful service when the necessary practical experience has been acquired.

"Instruction from books is of relatively little practical value. Knowledge must come from an intelligent analysis of facts and an early appreciation of the importance of a knowledge of statistical indices."

Among the many addresses made by Mr. Budd which have been read in the preparation of this report (and all should be reprinted in a volume that will collect and perpetuate these papers for future generations) the one which he presented on August 28, 1929 to the National Association of Railroad and Utilities Commissioners at meeting in Glacier Park, Montana, is one of the most representative and probably the most appropriate to include in this thesis as its concluding item. It is quoted below:

"SIGNIFICANCE OF THE ROCKY MOUNTAINS
TO TRANSCONTINENTAL RAILWAYS

"I have presume upon your presence here in Glacier National Park to believe that temporarily at least you have an interest in this rugged mountain range, and shall, therefore, undertake to outline to some slight extent the significance of the Rocky Mountains in the promotion, construction, and operation of the transcontinental railways.

"From the time when it became evident that railways were to be the principal arteries of commerce on this continent, speculation became rife as to whether they could be built on practicable grades and curves across the Rocky Mountain range, and, if so, whether the tracks could be kept open in winter, especially in the northern latitudes. Before 1850 more than one railway route to the Pacific had definitely been proposed and advocated. From that time discussion grew constantly, until in 1853 the question had become one of such national import that Congress authorized and directed the War Department to explore the country between the Mississippi and the Pacific for the prompt determination of the feasibility of railway construction. The lower end of Lake Michigan (Chicago) was the focal point for all lines from the East; certain other points farther west were fixed in advance - some place near the mouth of the Platte on the Missouri (Council Bluffs), which was almost directly west of Chicago, was a natural gateway; the confluence of the Missouri and the Mississippi (near St. Louis), and of the Kaw and Missouri (Kansas City) were others; while the head of navigation of the Mississippi (St. Paul) was a fourth.

"Although the total railway mileage in the United States at that time was only 10,000, and that mostly east of the Allegheny Mountains, it was quite well known that continuous railway lines were feasible from the Atlantic seaboard to the Mississippi valley, crossing the Alleghenies by at least four fairly east routes; namely, through the Hudson and Mohawk valleys, now occupied by the New York Central; by the Juniata Fork of the Susquehanna and the Conemaugh, now followed by the Pennsylvania; along the Potomac

and Youghiogheny, now used by the Baltimore & Ohio; and along the James and New, where the Chesapeake & Ohio now is located. These routes had become well known because they were the ones by which the westward flow of population had moved into the Ohio and Mississippi valleys after the Revolutionary War.

"In passing it should be mentioned that the high courage of the leading citizens of the young republic in organizing to develop effectively these waterways and portages never seems to have received the reverence and respect from the later generations which it so richly deserves, probably because the railways quickly superseded those earlier forms of transportation, and the labor and expense of laying out and building obsolete facilities were soon forgotten. But I should like to mention the fact that under the leadership of George Washington the importance of communication between the Atlantic seaboard and the Mississippi valley for the maintenance of our national unity was fully appreciated even before the close of the Revolutionary War, and that he and others organized companies for improving the four outstanding routes, knowing that without free and full commercial intercourse between the original thirteen states and the Ohio and Mississippi valleys the Allegheny Mountains might become the westerly boundary of the new nation. The Great Lakes, together with the Ohio and the Mississippi rivers, constituted broad, natural avenues of transportation which would have caused any but the most ambitious and courageous leader to despair of successfully contending against them by means of river canals and portages over the mountains. New Orleans, at the mouth of the Mississippi, was then a foreign port, and through it the interior country was in easy touch with all the world. It is difficult now to appreciate the seriousness of the situation confronting those patriots and statesmen at that time, before railway transportation had come into existence.

"The routes referred to, developed as they were before the day of railways, were selected because they had been portage paths connecting the headwaters of important streams. Since the same topographical conditions, namely, low mountain passes and easy approaches thereto, were as essential for railway lines as for pack trails and wagon roads, the investigations made by the promoters and builders of canals, river improvements and portages served for the trunk line railways which were later to follow. In consequence of this no railway explorations in the sense of those in the Rocky and Cascade mountains were necessary east of the Mississippi river.

PACIFIC SURVEYS AUTHORIZED IN 1853

"In starting the work westward from the Mississippi valley, while it was well known that the Rocky Mountains would afford a much more formidable barrier than the Alleghenies because of their much greater height and breadth, and while it was vaguely known that

the Cascades and Sierra Nevadas, as well as the Coast Range, lying still farther west were precipitous and high, the engineers in charge of the Government's explorations understood that they must pursue the same general method which had been followed by Washington and his associates in the Alleghenies; that is, they must seek out and find easy approaches to the summits of the mountains in various placed by following up the westerly tributaries of the Mississippi, and from those sources get access through the lowest and most favorable mountain passes to the headwaters of westward-flowing streams, and so reach the Pacific.

"As I have stated, the need of quick and effective communication between the East and the West finally was officially recognized by Congress in 1853, when surveys were ordered to determine just what passes were feasible through the mountains, where they were, and how they could be reached. Four routes were outlined for investigation: The northern was to start at St. Paul, thence go westerly to Fort Union, at the mouth of the Yellowstone, follow from there up the Missouri, and cross from its headwaters to those of the Columbia, thence along that stream to Portland, Oregon, and northward to Puget Sound; the central route to be explored was westerly from St. Louis, passing near where Kansas City now is, and up the Arkansas river past Great Salt Lake, and finally down the Sacramento valley to San Francisco; next southerly was the so-called Thirty-fifth Parallel route, following up the Arkansas and Canadian rivers through Albuquerque and on to Los Angeles; the most southerly was to follow up the Red river, thence to El Paso on the Mexican boundary and close to that boundary all the way to San Diego, California.

"It is not too much to say that these official explorations for a railway to the Pacific were among the greatest contributions ever made towards the development of the country. Indeed, they did much more than aid in the development of the nation's resources - they revealed definitely and positively that railway lines could be built and operated at all seasons of the year the entire distance to the Pacific. A stability and an assurance of national unity and expanse were immediately given which had not before existed and could not be guaranteed until the question of railway practicability had been settled in the affirmative.

"Not all of the passes outlined in the instructions and reported upon by the exploring parties have been used, nor have those which have been used kept their relationship with the routes as explored. When transcontinental railways actually came to be built, the reconnaissance and locating engineers followed up the valleys of the major rivers and their main tributaries, thence across the most accessible mountain passes to similar tributaries of the river systems on the opposite side without any attempt to confine

the line to a given zone of latitude. The most southerly route, that through El Paso, is to-day the Southern Pacific's Sunset line. The Santa Fe follows a combination of the central and Thirty-fifth Parallel routes to Los Angeles. The Rio Grande and Western Pacific use parts of the central route west of the Rockies, as does also the Southern Pacific between Ogden and San Francisco. The Northern Pacific, Milwaukee, and Great Northern all follow parts of the northern route. Singularly, the Union Pacific from Omaha to Ogden does not follow any path outlined by these explorations. The reason is that another explorer, John C. Fremont, shortly before the official surveys were ordered, had investigated that territory.

SIMILARITY IN PHYSICAL CHARACTERISTICS OF ROUTES

"The Pacific Surveys were carefully and conscientiously carried out and faithfully reported. They disclosed that the Rocky Mountains and the rivers which course down the canyons along their sides afforded feasible and practicable railway routes across the continent. The project nevertheless presented such serious problems in the way of costly construction and high maintenance and operating expenses as to give pause to promoters until the Government should come to the aid of the undertaking. The physical characteristics of the various crossings are surprisingly similar, with the exception of the fact that the passes through the central region are higher than those at the north or the south.

"The Rocky Mountain mass, of course, grows relatively smaller towards the Mexican boundary; but it seems strange that in the northern Rockies, where they are very wide and contain high peaks, as you have seen in Glacier Park, there should be found such relatively low passes. One reason is that the large tributaries of the Missouri and of the Columbia are so related to each other on opposite sides of the mountains that the intervening gaps have been narrowed and worn down tremendously. Thus it is that the most northerly pass, known as Marias Pass, through which the main line of the Great Northern crosses the Rockies on the southern boundary of Glacier Park, is practically the same elevation as the summit of the most southerly route, that through El Paso, or a little over 5,000 feet, and other northern passes range up to 6,000 feet, while in the central region the Rock Mountain summits are from 7,000 to 10,000 feet above sea level. The gradient which was found to be quite generally practicable for surmounting these mountains was 2.2 per cent, or about 116 feet per mile, and that gradient became practically a standard. The maximum grade on the Great Northern is 1 per cent westbound and 1.8 per cent eastbound.

"Another instance of the general uniformity of the railway lines through the various, widely separated passes is that their lengths between common points east and west and, in fact, between Chicago and the different points where they reach the Pacific Ocean,

are so nearly the same. For instance, three lines, the Southern Pacific, Santa Fe, and Union Pacific have their summits at Corona, New Mexico, Raton, New Mexico, and Sherman, Wyoming, respectively, and while the extremes of these passes are 600 miles apart, and take the railways through entirely different parts of the country, the distances Chicago to Los Angeles are 2281, 2228, and 2298 miles, respectively. Likewise, Marias Pass in Glacier Park is 600 miles north of Sherman, yet the difference in distance from Chicago to Portland, Oregon, by these two routes is only 60 miles, being 2212 via the Great Northern through Marias and 2272 via the Union Pacific through Sherman.

"It is even more surprising that Los Angeles, San Francisco, Portland, and Seattle are so nearly the same distance from Chicago by all of the direct lines, notwithstanding the fact that the routes meander along streams and through winding defiles to such widely different points where they cross the continental divide. I will cite the following distances from Chicago to illustrate the point, the shortest routes being used in each case:

Chicago to Seattle	2163 miles
Chicago to Portland	2212 miles
Chicago to San Francisco	2258 miles
Chicago to Los Angeles	2228 miles

"The shortest air-line distances of these points from Chicago are as follows:

Chicago to Seattle	1731 miles
Chicago to Portland	1755 miles
Chicago to San Francisco	1857 miles
Chicago to Los Angeles	1743 miles

"Owing to the higher elevations of the Rocky Mountain crossings in the central region, the amount of total rise and fall encountered by the various lines between Chicago and the Pacific is substantially different, ranging from a minimum of 30,000 to a maximum of 60,000 feet.

"After the first railway had been built, largely as a national necessity, the construction of other lines was influenced greatly by the knowledge that there were available other routes that would not be at any disadvantage as to distance, grades, and cost of construction and operation. Anyone who proposed to build across the Rocky Mountains gave serious consideration to the financial results, and if such consideration had not been based on accurate data and calculations the situation became doubly serious after the work had been undertaken.

HIGH COST OF MOUNTAIN CONSTRUCTION AND OPERATION

"It costs approximately twice as much to maintain and operate a mile of mountain railway as it does for a mile on the prairie.

The cost of construction, likewise, is doubly as great, or more. Grading is largely in solid rock, and consists of very deep cuts and tunnels and very high embankments with large and costly bridges; snow sheds are not infrequent. Mountain torrents require not only large drainage openings, but heavily riprapped roadbed. The much greater curvature involves the use of more ballast and ties and heavier rail, while the mountain grades, of course, necessitate more motive power and result in excessive wear and tear on equipment.

"Government aid was necessary for the first construction. The widely separated locations at which railways could be constructed over the Rockies, and the immense available territory tributary to each of such widely separated lines, coupled with the fact that there would be substantial equality in point of distance, gradient, and cost of construction and operation, were compelling influences in stimulating other transcontinental railway enterprises. There was strategy, too, in occupying what were considered the most favorable places to cross the mountains and building through the best territory in reaching those passes.

"Thus there were the conflicting influences of the forbidding Rocky Mountain barrier, the physical difficulties, and the handicaps of financing the costly construction, on the one hand, and the promise of ultimate reward in occupying favorable and exclusive locations on the other. There was also the influence of national policy and statesmanship in strengthening the ties between the remote parts of the country and making available new territory in response to the pressure of the westward movement of population, especially following the Civil War. This was the deciding factor because private financing was impossible at that time.

"The Government gave further aid in grants of land, and other transcontinental railways were built after the completion of the Union Pacific-Central Pacific in 1869, but there was not sufficient population or traffic to support the debt created by Government credit, and the roads were compelled to reorganize. The fundamental soundness of these ventures has been fully demonstrated by the later success of the four great early transcontinental systems, the Union Pacific, Southern Pacific, Northern Pacific, and Santa Fe. These roads, as they exist to-day, are ample justification and vindication, if any be necessary, of the judgment of the corporate as well as the Government officials who were responsible for their being created.

JAMES J. HILL AND THE GREAT NORTHERN

"It is true that James J. Hill built without Government aid, and that his road did remain solvent even though in handling Government mail and freight it did, and does, have to meet the low rates of

subsidized lines. He was successful because he developed his road and settled the country as he progressed across Minnesota, Dakota, and Montana. He had behind him 3,000 miles of paying system, with little debt to support the Pacific Coast extension when he started it about 175 miles east of Glacier Park.

"Singularly also, the Great Northern, which reached the Coast ten years after the Northern Pacific, follows the Government survey for a northern railway route to the Pacific more than any other transcontinental line. How this came about is quite a story. Isaac I. Stevens, who made the Government survey, sought a route across the Rockies due west from where the Milk river flows into the Missouri, which would have taken him north of Flathead lake on a short, direct line to Spokane. He failed to find it, although Marias Pass, which he sought, was described to him by a Blackfoot Indian chief. He therefore was obliged to go southwesterly up the Missouri to the well-known passes in the vicinity of Helena and Butte, which had been explored by Lewis and Clark. When the Northern Pacific came to build, its engineers accepted these passes without exploring for Marias Pass, probably because they had adopted the Yellowstone river instead of the Missouri by which to approach the mountains. At any rate, they did not follow the Government survey east of the Rockies.

"When James J. Hill, in 1889, decided to extend the Great Northern to the Pacific, his engineer, John F. Stevens, discovered Marias Pass exactly where Isaac I.Stevens had hoped in 1853 that he might find it - 125 miles north of Helena and 200 miles north of Butte. In this way the Great Northern, which was the last transcontinental line to build across the Rockies on an independent location, took the northern route surveyed by the Government in 1853 from St. Paul to Spokane, except that the Great Northern found and used Marias Pass, while the Government survey swung 125 miles to the south because no pass through the Rockies in the direct line could be located. In 1907 the Milwaukee built through Butte, paralleling the Northern Pacific practically all the way across Montana. In 1908 the Spokane, Portland & Seattle, owned jointly by the Great Northern and Northern Pacific, built from Spokane to Portland practically on the United States Government surveys. The distances between St. Paul and Spokane are:

Northern Pacific	1505 miles
Milwaukee	1471 miles
Great Northern	1435 miles

CONCLUSION

"It is not likely any more railway lines ever will be built across the Rocky Mountains. Existing routes will be improved, but they are so spaced that in reaching the mountain passes the entire productive country can be fully developed.

"The challenge which the great rock wall of the 'Shining Mountains' presented as an obstacle in the expansion of our national boundary has been completely answered by the various transcontinental railways. The ascents and descents, the steep, rocky precipices, and the rushing torrents in the canyon defiles, all have been overcome successfully. Thousands of persons travel daily across the continental divide by the various railways with the same luxurious comfort that they are accustomed to enjoying on railway trains everywhere. Only an occasional glimpse of some deep, rushing stream, over which, or of some sheer cliff, through which, the train passes may cause a moment's thought or prompt a remark upon the difficulties which the pioneer builders had the courage to attack.

"The employees who operate across these mountains, too, are entitled to more than ordinary appreciation for the safety as well as the smoothness with which they conduct the transportation.

"It remains for the railways, with the cooperation of your members and those of the Interstate Commerce Commission, to continue the policy of providing the most modern appliances for safety and efficiency, and to place them in the hands of the officers and employees who have developed an especial aptitude in these localities and circumstances. Nothing is more important now than to promote and facilitate the easiest possible communication between the remote parts of our country, not only for the advancement of trade and commerce, but for the further advancement of our national solidarity. Originally overland communication was necessary to preserve our national unity; now it is highly desirable to make travel easy and agreeable in order to promote a better understanding of the people and their problems in one section by those who live in other sections. As in so many other instances, it is safe to say that the progress already made in perfecting railway transportation is the best promise for the future."

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CORRECTIONS AND ADDITIONS

Page	Paragraph	Line		Correction (C) or Addition (A)
27	2	2	(C)	no Pennsylvania RR should be not Pennsylvania Railroad.
33	Footnote 10	1	(C)	Naton Cut-off should read Natron Cut-off.
36	1	7&8	(A)	(Insert) The Oregon Trunk then removed its track from a parallel location.
41	2	5	(A)	The "William Crooks" is now on permanent display in the waiting-room of the St. Paul Union Depot.
43	2	5	(A)	The Red River ox-carts were also a slow, tedious and expensive connection between that waterway and the Mississippi.
68	1	7	(A)	W. P. Kenney, Vice President and Director of Traffic was appointed Federal Manager.
72		Last line	(A)	Insert "General Mortgage" 4% bonds.
75	2	5	(C)	Interlockings (omit "s") should be singular.
76	2	5	(C)	(Insert comma as shown) of double track, crossings and gauntlets.
83	1	3	(C)	Delete the words that was.
87	1	1	(C)	Now reads "and earning power; notwithstanding the basic fact that is system" Should read: and earning power. This achievement is the greater in view of the basic fact that its system.
87	Foot-note	5&6	(C)	Parenthesis at end of extension should be deleted and following preceding word Siberian).
89	2	2	(C)	Siskiyou should be plural; Siskiyous.
93	2	5	(C)	Add an s to aid to make the word said, i.e. Mr. James was said

Page	Paragraph	Line		Correction (C) or Addition (A)
102	5	1	(C)	profect should be protect.
107	Footnote "f"	end	(A)	This indicates that diesel power can be safely, conveniently and comfortably operated through the Cascade Tunnel; thereby obviating electrification, which is too short to develop any economic superiority over the diesel, especially on a line of moderate train density.
112	1	3	(C)	xoon should be soon.
127	1	1-4	(C) & (A)	Delete first two sentences. Add: Construction of T.& B.V. began in 1903 as a promotion of Col. E. M. House, R. H. Baker and Frank Andrews, of Houston. (House was later Woodrow Wilson's "roving ambassador"), Benjamin Franklin Yoakum, Chairman of the Rock-Island Frisco System (See Chapter III Page 18) purchased the unfinished T.& B.V. in 1904 and sold a half interest to Colorado & Southern System the following year.
138	1	8	(C)	of 70 m.p.h. track should read: on 70 m.p.h. track.
144	1	1	(A)	Add footnote. As of January 1, 1954, C.B.& Q. had 1,509 miles of cTc equipped track on 1,291 miles of road. This installation included 84 control machines, 382 electrically locked switches, 129 cTc controlled sidings, 403 controlled switches and 1,167 signals. Including cTc installations, as of that date, C.B.& Q., had 2,486 miles of road and 3,362 miles of track equipped with automatic block signals.
156	3	Last	(C)	This sentence should be changed. The daily streamliners running between Chicago and Denver aggregate the highly average daily and total annual mileage. Since both Burlington and C.& N.W.-U.P. operate this service, it divides the honors for this record equally between them.
161	2	Last	(C)	152 persons should be 148 persons with 52 and not 56 on upper deck.
184		Last	(A)	Insert word and at end of last line.
185	2	8	(C)	C.T.Q.. should read C.T.A.
194	2	2	(C)	east should read ease.