

Dedication and Opening
of the
New Cascade Tunnel



Great Northern Railway

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Dedication and Opening
of the
New Cascade Tunnel

A Monument to
James J. Hill

Addresses delivered during the
Coast to Coast
Radio Broadcasting Program

and at the
Banquet

in the
Construction Camp

Scenic, Washington
January 12, 1929

Great Northern Railway

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Foreword

On Saturday evening, January 12, from 9:00 to 10:00 P. M. Eastern Standard Time, several million Americans, through radio sets in their own homes, participated in the dedication and opening of the new Cascade Tunnel on the main line of the Great Northern Railway in the State of Washington. These dedication ceremonies were under the control of the engineers of the National Broadcasting Company, who shifted the audience from the New York studios to Washington, D. C., to San Francisco, and to the mountain fastnesses of the Cascade Range in the State of Washington.

The inexorable hands of stop watches governed the movement of this program, and these watches, in turn, were synchronized with electric clocks on the Atlantic and Pacific Coasts, adjusted to the second with the clocks that govern the operation of the Great Northern Railway.

The opening announcement of this interesting program and a musical selection by George Olsen and his orchestra came from the National Broadcasting Company's studios in New York City, then, by throwing control switches, the engineers shifted the network of 36 broadcasting stations to the eastern portal of the Cascade Tunnel just as the first train approached. There the train came to a momentary halt while Graham McNamee, veteran N. B. C. announcer, presented Mr. Ralph Budd, President of the Great Northern Railway, who formally dedicated the new tunnel. Then both swung aboard the starting train, and, as its lights disappeared in the eight-mile tunnel, other switches transferred the radio listeners back to New York for another musical number by the orchestra.

Before the train emerged from the western end of the tunnel the center of the radio network jumped from New York to Washington, D. C., where Honorable J. B. Campbell of the Inter-

state Commerce Commission spoke; then clear across the continent to San Francisco, from which city Madame Schumann-Heink sang. The control switch then brought the audience east to Philadelphia, where General W. W. Atterbury, President of the Pennsylvania Railroad, spoke; and then once more the scene shifted to Madame Schumann-Heink for a few minutes, to be followed by George Olsen and his orchestra in the home studios.

Another microphone at the western portal then picked up Graham McNamee's description of the first trip through the longest railway tunnel in the western world. Then again the radio engineers shifted the scene of action to far-away Washington, D. C., to introduce the principal speaker of the program, The Honorable Herbert Hoover, President-elect of the United States.

More music and an announcement from the New York studios closed this nation-wide program which was broadcast over the following stations:

Atlanta, Ga. - - - - -	WSB	Omaha, Nebr. - - - - -	WOW
Boston, Mass. - - - - -	WEEI	Philadelphia, Pa. - - - - -	WFI
Buffalo, N. Y. - - - - -	WGR	Pittsburgh, Pa. - - - - -	WCAE
Charlotte, N. C. - - - - -	WBT	Portland, Me. - - - - -	WCSH
Chicago, Ill. - - - - -	KYW	Portland, Ore. - - - - -	KGW
Cleveland, Ohio - - - - -	WTAM	Providence, R. I. - - - - -	WJAR
Dallas, Texas - - - - -	WFAA	St. Louis, Mo. - - - - -	KSD
Denver, Colo. - - - - -	KOA	St. Paul, Minn. - - - - -	KSTP
Des Moines, Iowa - - - - -	WHO	Salt Lake City, Utah - - - - -	KSL
Detroit, Mich. - - - - -	WWJ	San Antonio, Texas - - - - -	WOAI
Fort Worth, Texas - - - - -	WFAA	San Francisco, Calif. - - - - -	KPO
Hartford, Conn. - - - - -	WTIC	San Francisco (Oakland) - - - - -	KGO
Houston, Texas - - - - -	KPRC	Schenectady, N. Y. - - - - -	WGY
Kansas City, Mo. - - - - -	WDAF	Seattle, Wash. - - - - -	KOMO
Los Angeles, Calif. - - - - -	KFI	Spokane, Wash. - - - - -	KHQ
Louisville, Ky. - - - - -	WHAS	Superior, Wisc. - - - - -	WEBC
Milwaukee, Wis. - - - - -	WTMJ	Washington, D. C. - - - - -	WRC
New York, N. Y. - - - - -	WEAF	Worcester, Mass. - - - - -	WTAG
Oklahoma City, Okla. - - - - -	WKY		

The four addresses follow in the order of their presentation.

Ralph Budd

President, Great Northern Railway

Speaking from the East Portal of the New Cascade Tunnel

LADIES AND GENTLEMEN:

At the very beginning of this project a plan of attack was carefully worked out in all its details, and that plan has been executed with a courage and enthusiasm that I have never seen equalled. Through nearly eight miles of solid granite, men have drilled and blasted and mucked their way in three years' time. The schedule of progress called for a speed that never had been approached in the world for so long a tunnel, and the men were determined that that schedule should be maintained. Thousands of feet under the mountains, working at times in water knee-deep, with fresh drenchings at each round of blasting, there was no stopping or even slackening of the pace. They changed shifts at the handles of the drills, as the saying goes. A thrilling sight it was; members of one crew splashing in and taking hold of the machines before the others let them go. The constant battering was kept up every minute of every hour of every day and every night for thirty-five months. Think of it! Drilling, blasting, mucking out the broken rock, then over again, drilling, blasting, and mucking; eight feet gained at each round, five rounds in twenty-four hours, all by machinery, but machinery in the hands of enthusiastic, expert workmen. There was no letting up until the last foot of tunnel had been excavated and the entire bore lined with concrete.

Another group, equally enthusiastic and determined, were always present at the front. They waited their chance to dodge in when they could to do their work without interfering with actual excavation; yet without them there would have been no aim or direction to the drifting which went on at such feverish pace. They were, of course, the engineers who gave the line and grade. Contending with the many handicaps incident to such a job, they nevertheless made their calculations and did their work so accurately, that when they had carried the survey eight miles, over mountains 3,500 feet high, and back from each portal nearly four miles into the blind ends of the tunnel, where the last barrier was removed, the centers were only eight inches apart and the levels only nine inches different. I am glad of this opportunity to give credit to the engineers, the superintendents, the foremen, and all the men on the job for the wonderful spirit which characterized this great undertaking.

The completed tunnel symbolizes the main idea behind the railroad career of James J. Hill; namely, the importance of economy and efficiency in railway operation. His definite policy was to be sure of the country through which he was to build; then to insist upon the lowest possible operating costs for the benefit both of

the railway and the producers. Years ago, when the Great Northern was under construction and before his rails had reached Montana, he was telling Marcus Daly in Butte that he hoped, by giving low rates, to enable shippers greatly to increase their business. He said: "What we want over our low grades is a heavy tonnage, and the heavier it is the lower we can make the rates." When he first talked of building a railway to the Pacific Coast according to his ideas; that is, by relying solely on what the road could earn, people laughed at him for thinking a transcontinental line could be financed without Government aid, and his proposed line was called "Hill's Folly." To-day, his basis of railway expansion is accepted so completely that we forget it was once ridiculed. Thirty-six years ago "Hill's Folly" reached Puget Sound, the golden spike being driven a short distance west of here on January 6, 1893. The Great Northern is the only transcontinental railway that has paid dividends every year since then. In 1914, when Mr. Hill made his last trip over the system, I was privileged to be on the train and to hear him discuss various future plans. Among them, he mentioned a long Cascade Tunnel, and said: "Some of you will live to see this mountain grade eliminated." It is, therefore, with especial satisfaction that I am able, on behalf of the directors and stockholders of the Great Northern Railway, to dedicate this tunnel to the illustrious founder, the Empire Builder, James J. Hill.

Honorable J. B. Campbell

Member, Interstate Commerce Commission

Speaking from Washington, D. C.

The completion of the Cascade Tunnel on the Great Northern Railway in the State of Washington has significance from both a local and a national point of view. As a resident of the State of Washington I can feel the thrill of pleasure which must come to the people of that state from this piercing of a mountain barrier which will promote freedom of travel and commerce between the far west and the rest of the nation, and right here may I add a word of greeting to my Washington State friends who may be listening in. As a member of the Interstate Commerce Commission I view with deep interest this latest evidence of the unceasing effort to improve the operating performance of our national railroad system. The management of the Great Northern Railway, in putting through such a stupendous engineering work, has carried on the policy of that pioneer builder to whom the tunnel is dedicated, James J. Hill. It was my privilege to know him personally. If he were here to-day he would observe with approval the supplemental execution of an order which he gave to his chief engineer in the summer of 1890, when the Great Northern was being projected across the Rocky Mountains.

He then said: "What we want is the best possible line, shortest distance, lowest grade, and least curvature that we can build between the points to be covered." The construction of this tunnel and the accompanying program of electrification will serve to refute the notion that our railroads are becoming obsolete. The iron horse may be a little lame from competitive conflict with the automobile, but with appropriate adjustments he will long continue to be, as he is now, the main factor in our transportation system. The total volume of business is bound to grow, although not as rapidly as when the nation was younger. Year by year, since the great war, improvements in the economy of railroad operation have taken place, and the cumulative effect is striking. We find that as a result of simultaneously increasing the size of trains, and of moving them faster, the efficiency of freight train operation in the eight-year period, 1920-1928, has increased nearly 59 per cent.

I congratulate Mr. Budd and his staff upon the successful result of their skill and courage in this enterprise.

General W. W. Atterbury
President, Pennsylvania Railroad
Speaking from Philadelphia, Pa.

The opening of this great tunnel through the Cascade Mountains means more than the completion of a remarkable feat of engineering. The importance of the event extends far beyond the lines of the Great Northern Railway. It consists not alone in the shortening and straightening of a piece of track, nor in the piercing of a mountain range. There is a much greater significance. The passing of the first train over the new Cascade route dramatizes the new spirit which dominates American railroads. Railroad men to-day are as truly pioneers as they were when the first railroad construction gang pushed its way across the country; but it is a new kind of pioneering. It is a searching out of new and better ways of doing things, a constant striving for improvement in facilities and service. Courage, broad vision, and a real sense of public service characterizes the undertaking which the management of the Great Northern has now brought to successful completion. This twenty-five million dollar enterprise was authorized three years ago; but that was merely the culmination of years of planning and study. That is the modern kind of railroad pioneering which this country must have in order to insure ten, twenty, or thirty years from now the high quality of railroad service that the future will require. American railroads are not finished projects. It is true that in recent years they have reached higher standards of performance than ever before, but in the field of railroading it is necessary to study and plan far into the future. That is the real significance I see in

this notable achievement of the Great Northern. President Ralph Budd and his associates are pioneers in this new kind of transportation of which "progress" is the watchword. They are thinking in terms of the future. Every railroad man in the country joins with me in our happy, hearty congratulations to Mr. Budd and his associates of the Great Northern Railway, and to wish all its officers and employes the success which their enterprise so richly deserves. I also congratulate the great territory of the Northwest, which now becomes more intimately interlocked with the country as a whole. It is but another step in bringing the whole world closer together and at the same time making each part of the world more useful to every other part.

The Honorable Herbert Hoover
President-Elect of the United States of America
Speaking from Washington, D. C.

PRESIDENT BUDD, FRIENDS IN THE CASCADE MOUNTAINS AND OF THE RADIO AUDIENCE:

I am glad to participate in a small way in recognition of a great engineering accomplishment—the completion of the greatest tunnel on our continent. Perhaps only engineers can appreciate the technical skill, the labor, the courage required for such an undertaking. But the opening of a great transportation tunnel is more than an engineering accomplishment. It is a contribution for all time to quickened and cheapened transportation. Through these savings it adds something to the productivity and prosperity of far-flung communities which it serves. In the end it means a mite of contribution to better living of many hundreds of thousands of people.

Never have we witnessed a more perfect coordination of the forces of American industry than in this great job. The miners, who have operated the drills, who cleared the rock, and built the new tracks during these three years, have established a record in construction. For their skill no one of them needs recommendation in the future other than that he was on the staff of the Cascade Tunnel.

President Budd and his fellow engineers who have designed this tunnel and carried it to successful completion have left an enduring monument to their skill and abilities. The great transportation organization which has made it possible through its courage and foresight has demonstrated again the progressive character of American industry. This accomplishment is of more moment than the improvement of the Great Northern Railway. It gives every American the satisfaction of confidence in the vitality of our civilization. The spirit of the frontier is still with us.

I congratulate you, Mr. Budd, your associates, and our whole country.

Banquet Program

In Dining Hall of A. Guthrie & Company

Scenic Camp, January 12, 1929

7:00 P. M., Pacific Time

Upon conclusion of the radio program the guests assembled for a banquet in the spacious dining hall of A. Guthrie & Company's construction camp at Scenic, Wash. This camp had been in service during the entire construction period, and this was the last time it was to be used.

There were present about 600 of the prominent men of the State of Washington, and a number from outside the state. The majority of these guests had come by the first train through the new tunnel. This train had 24 passenger cars, carrying 270 people from the Coast cities of Seattle, Tacoma, Portland, Everett and Bellingham, who, earlier in the day, had gone in the last train ever passing over the old line of the railway and had met the train from the East, which carried guests from Wenatchee, Spokane, and intermediate points, and those from the east of Spokane, about 125 in all.

One of the notable features of the banquet was a mammoth cake prepared by the camp cooks, showing in relief the Cascade Mountain Range, the old line and old tunnel to be abandoned, and the new tunnel that day opened for operation—a veritable mountain of cake, five feet long, two and one-half feet wide and two feet high.

MR. L. C. GILMAN, Vice President of the Great Northern Railway, presided and acted as toastmaster. Among the hundred or more prominent guests seated at the table with him were:

HONORABLE ROLAND H. HARTLEY, Governor of the State of Washington;

MR. ARTHUR CURTISS JAMES, of New York, Director, Great Northern Railway;

MR. A. C. LORING, of Minneapolis, Director, Great Northern Railway;

MR. E. T. NICHOLS, of New York, Vice President and Director, Great Northern Railway, with more years of service to his credit than any other member of the organization;

MR. JOHN F. STEVENS, the discoverer of Stevens Pass, through which the tunnel was constructed;

MR. LOUIS W. HILL, JR.;

MR. W. P. KENNEY, Vice President and Director of Traffic, Great Northern Railway;

MR. C. O. JENKS, Vice President, Great Northern Railway, in Charge of Operation;

MR. JOHN DOWER, President of the Tacoma Chamber of Commerce;

MR. JAMES L. STONE, President of the Spokane Chamber of Commerce;

MR. E. H. HATCH, President of the Seattle Chamber of Commerce;

MR. J. J. DONOVAN, of the Washington State Chamber of Commerce;

MR. D. J. KERR, Assistant to the Vice President, Great Northern Railway, who gave special attention to the tunnel construction;

MR. CHARLES FFOLLIOTT, MR. H. L. MUNDY, and MR. J. C. BAXTER, of the official staff of A. Guthrie & Company, the contractors who built the tunnel;

MR. J. R. W. DAVIS, Chief Engineer, Great Northern Railway, who had general charge as engineer of tunnel construction;

COL. FREDERICK MEARS, Assistant Chief Engineer, Great Northern Railway, who had direct charge of the engineering work involved in locating and constructing the tunnel; and

MR. GRAHAM MCNAMEE, announcer for the National Broadcasting Company.

The dinner was enlivened by music rendered by Bates' Orchestra and W. H. Gerrard, baritone soloist, of Seattle.

In introducing the speakers of the evening Mr. Gilman said:

"To us who have been long in the service of the Great Northern Railway the events of to-night are of great significance. They mean to us that the weakest link in our transportation chain has been replaced by one of the strongest, and we can now regard our railroad as complete in all its parts. The switchback has become tradition, snow troubles in the Cascades only a memory and the snowsheds antiques. While the radio has given the good news to the entire nation, and the event is of national importance, it is of greater importance to the State of Washington. The eastern and western sections of the state have been separated by the barrier of the Cascade Mountains, and to-night for transportation purposes that barrier has been removed. Because this is so, a few of the prominent citizens of the state have met us here to join with the Great Northern people in recognition of an achievement that means progress for the state and gives us the power to render better service to the people we have elected to serve. Representatives of the different sections of the state, headed by our Governor, will give voice to the appreciation of our citizens that the great enterprise is completed and dedicated to their service."

The addresses, somewhat abbreviated, follow.

Honorable Roland H. Hartley

Governor of Washington

"The State's Interest in Railroad Development"

It is a genuine pleasure to be here to-day, to extend to the Great Northern Railway and its officials congratulations on behalf of all the people of the State of Washington. My personal pleasure on this occasion is enhanced by the fact that it was my privilege to know James J. Hill during his lifetime, and to have followed his career as an Empire Builder. The completion of this gigantic enterprise is a fitting monument to his vision and genius as a railroad builder.

When Mr. Hill undertook to build a transcontinental railroad in competition with two railroads already constructed, through an undeveloped country, much of which was barren waste, it was generally regarded as an impossible undertaking. But time has proven the soundness of his judgment, and to-day the people of the great Northwest are reaping the rewards made possible by his foresight.

When we look back over the years and visualize the development of the country west of the Mississippi River, then, and then only, can we realize the importance of rail transportation. We are prone to speak in glowing terms of our great natural resources, and yet, without railroads, these resources would be of little value. Railway transportation opened the storehouses of the wealth of forests, mines, and fields, and made their products accessible to distant markets. The construction of the Great Northern Railway developed and populated the entire stretch of country along its line from the Twin Cities to Puget Sound, and, in contrast with its competitors, who had been subsidized with immense land grants, it was constructed on a purely business basis. Truly, James J. Hill was an Empire Builder.

The construction of this mammoth tunnel, the longest on the American continent, is a remarkable engineering achievement, but more, it is visible evidence that the spirit of Mr. Hill still guides and directs the management of the railway which he built and developed.

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The people of this Northwest Empire owe a lasting debt of gratitude to James J. Hill and those who have followed him in conducting the affairs of the Great Northern Railway. The construction of this tunnel increases that debt, for its use in the years to come must naturally bring lasting benefits in the further development of the Pacific Northwest.

It is my pleasure to express a small measure of appreciation on behalf of all the citizens of the State of Washington.

John Dower

President, Tacoma Chamber of Commerce

"Faith"

It is a great pleasure to me to have this opportunity of attending the formal opening of one of the man-made wonders of the world—this great tunnel, reaching as it does through the range of the Cascade Mountains from the east side to the west side for a distance of about eight miles, and being the longest tunnel in the United States. And also to say a few words upon the subject of faith, because I think that faith is the foundation upon which this earth is built. If we have faith, we have the whole world before us, bright and full of sunshine; but without faith the universe is full of darkness and is void.

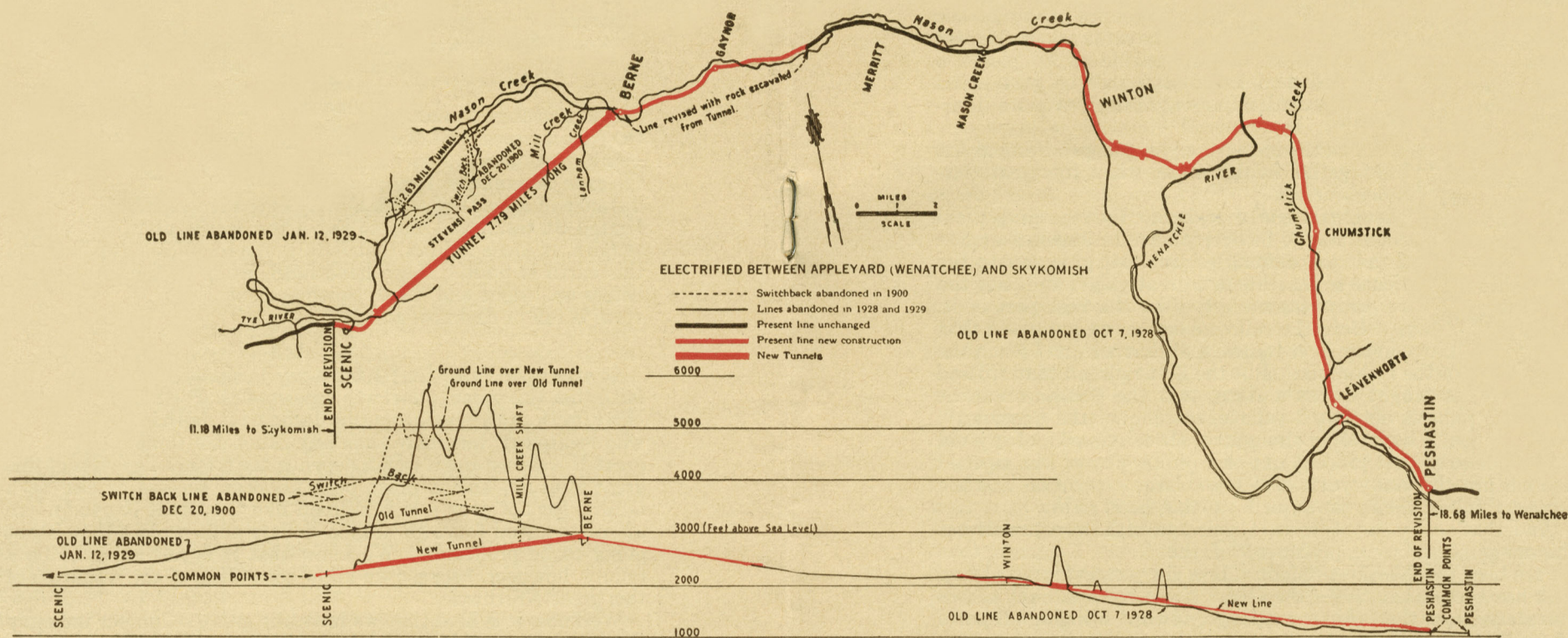
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It was upon faith that I built my business, and it was upon faith that this great tunnel was constructed. Faith in its practicality, faith in the engineers who designed it, faith in the surveyors who located it; but more than any other one thing, faith in the great Northwest upon which depends the financial success of this great venture, and it must be a financial success or else be a failure, for not even a rich railroad like the Great Northern can afford to spend fourteen million dollars on a project that is not going to be profitable. We know that it is not going to be a failure, however, because we know something of the resources of this great Northwest.

We know it is here that we have the greatest lumber industry there is in the world. We know that here is the center of one of the finest fruit countries that can be found anywhere. We know that within a few years it will be known as one of the great farming and dairying countries of the world. We know, too, that within a comparatively short time there is going to be located in this Puget Sound territory one of the very large cities of this country; a city that will not be second to any in size or importance; a city that will have fame as a manufacturing, as an industrial, as a shipping, and as a commercial center.

Through the building of this tunnel one of the barriers that has kept the east from the west has been removed, and it has brought them closer together. This is particularly true as far as the State of Washington is concerned, where there has been an east side and a west side. This will tend to unite us more solidly as a single state.

Upon behalf of the Chamber of Commerce of the City of Tacoma which I represent here this evening and also upon behalf of the City of Tacoma, I want to congratulate the officers and directors of the Great Northern Railway for their wonderful foresight and their faith in the great Northwest, without which faith this tunnel would never have been built. * * * * *



Map and Profile of Old and New Lines between Peshastin and Scenic

It is our sincere hope that as the years go by, one by one, it will be clearly shown that in the building of this tunnel the faith of the officials of the Great Northern Railway was not misplaced; but, on the contrary, we hope they will receive all that they anticipated and more, too, if possible.

James L. Stone
President, Spokane Chamber of Commerce
 "State Unity"

A few days ago I listened to a very interesting discussion by a group of well-known business men. It started when a very enterprising and energetic younger man of the group remarked that, in his opinion, it was a great mistake that the State of Washington had not been originally formed so that the part of the state west of the Cascades would be one state, and so that the rest of the state lying east of the Cascades, together with

northern Idaho and a part of western Montana, would form another state.

He pointed out that the eastern and western parts of the State of Washington had very little in common, that the climate and resources of western Washington differed widely from the climate and resources of eastern Washington, and that the high, steep mountain range of the Cascades formed a natural boundary between them.

Most of us in the group were, at first, inclined to agree with him; but finally one of the men, who had remained silent up to this point, spoke up. As I recall it, he said, in substance:

"I'm afraid I can't agree with the rest of you. I've lived in this state since territorial days, and the longer I live in Washington, the more I'm convinced that our differences between east side and west side in resources and climate are a source of potential strength, not of weakness. Because we have this great variety, when we once learn our lesson and pull together, we will find that the east side can prosper best when the west side is

prosperous and furnishes us a better market for many of our resources, and the west side will find out the same about the east side. And our differences in climate enable us to please a greater percentage of tourists and settlers from other states, and make an interchange of vacations among ourselves more desirable."

"But how," said one of the men, "are you going to bring about the spirit of pulling together in this state, when the great Cascades divide us so decisively?"

To which my thoughtful friend replied: "By regarding them as a problem or an obstacle to be overcome. In business and in golf alike, we find that the difficulties are what give zest to the game. My experience is that life is a great game, and that the difficulties that we can overcome are often the best part of it. In territorial days, before the railroads came, we supposed that traffic must move along river routes, and that we must reach the sea by way of the Columbia. But the first railroad that crossed the Cascades taught us, as a state, that the Cascades can be conquered; that's our job, I believe, to conquer the Cascades!"

Since then, I have often thought of these remarks of my old friend, remarks that proceed out of a philosophy of life, ripened and matured by many years of rich and large experience, and the more I think of them, the surer I am that he is right.

And that's why, my friends, I welcome with an especial zeal this magnificent accomplishment of the Great Northern that we are here to celebrate to-night. It is the greatest forward step that has been taken, since the Great Northern was built across our state more than thirty years ago, toward bringing all parts of our state closer to each other. In other words, it is one more great and significant victory over the mountains that divide us as a people.

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I am delighted that the Great Northern has given us this great help, this signal demonstration of how the mountains that divide us can be conquered. Let us profit by it, my friends. We are brought closer together by this great accomplishment. Let us feel in our hearts our closer kinship and dependence on each other.

And, last of all, let us take into our hearts this magnificent accomplishment of the Great Northern as a symbol of what we as a people can accomplish. As the Great Northern has conquered these Cascades that divide us, let us conquer the mountains of spirit that separate us.

E. H. Hatch

President, Seattle Chamber of Commerce

"Aids to Progress"

When a survey is made of all the varied factors which have given impetus to the development of the Pacific Northwest,

its settlement, its institutions, and its civilization, it will be found that no one force has exercised a more profound influence than the Great Northern Railway.

The story of that influence is one of the great American romances, beginning with faith, continuing through adventure and the successful defeat of innumerable obstacles, and ending in ultimate achievement. It was Mr. James Jerome Hill who brought the elements of faith and vision into what had been called the St. Paul and Pacific Railroad, in the year 1875. It was eighteen years before the reorganized railroad reached the shores of Puget Sound, in 1893. It had passed through sagebrush, and mountains, and wholly unpopulated country, and it had required a great confidence in the youthful Northwest to give courage to such a tremendous enterprise.

Mr. Hill and the Great Northern backed up their faith with deeds. Where there were no people for passengers and no tonnage for freight, they set about to provide both. They converted wilderness wastes into thriving countrysides. They established low colonist rates to encourage immigration, and towns and cities sprang up under the magic of this policy. They aided in bringing fine breeds of livestock to the wide areas which their road had opened up. The lumber industry of the Pacific Northwest received its first stimulus from their original forty cent fir rate to eastern terminals.

In Montana and eastern Washington the Great Northern furthered the irrigation of arid lands, thus developing our hinterland in the Inland Empire. To disseminate knowledge of this new and fertile domain, they bought space in land-products shows in Chicago, New York, and other eastern cities, where the products of our farms and orchards were exhibited. Their illustrated lectures, carried on in eastern centers for years, attracted no one knows how many settlers to the region which the railroad served. Mr. Hill personally gave thousands of silver cups and other trophies at fairs and livestock shows to stimulate a high grade of agriculture and horticulture. Exhibition cars, displaying the products of the Northwest, carried the message to distant parts of the country, and drew other settlers to our valleys.

At Mr. James J. Hill's death, the work was carried on under the direction of his son, Louis W. Hill, as Chairman of the Board of Directors. Glacier National Park was established and made famous by Great Northern influence. Closer to home, the Wenatchee and Okanogan valleys received the magic touch, blossomed and bore fruit, destined to make Washington the leading apple producing state in the Union. The West Okanogan irrigation project was financed under Great Northern auspices. A Great Northern branch opened up the Waterville and Douglas County wheat country. The Coast Line, between Seattle and Vancouver, revealed a scenic route of incomparable beauty.

These aids to progress, fundamental to the development of

the district, were followed by refinements in the service, which gave still further impetus to our growth. The old Cascade tunnel, built from 1897 to 1900, took the place of the old switch-back through the Cascade Mountains, reduced the distance between Puget Sound and the Inland Empire by nine crucial miles, and lowered the altitude by a thousand feet. The great tunnel under the city of Seattle, whose existence is not even suspected by newcomers, eliminated the necessity of running trains through a section destined to be almost overwhelmed with traffic. It is impossible to estimate what this improvement has saved in preventing loss of life and accident. Then the King Street Station was built.

* * * * *

These are but a few of the progressive steps which have characterized the long and glorious history of the Great Northern Railway—its major contributions to the development of the Northwest. To-day's occasion is a climax of this story of achievement, marking another shortening of the distance between our ocean gateways and our rich hinterland, through the opening of this great tunnel supplemented by the new electrification and the Chumstick cut-off. We have seen the material evidences of Great Northern enterprise and the beneficent results of each step in its development. It is not difficult for the imagination to picture the influence of this new accomplishment reaching down the years ahead, as those of former years have reached into the present.

Seattle, whose keen interest in this event I bespeak today, has long drawn life and energy from the transcontinental artery of the Great Northern Railway. As a sharer in the benefits to be derived from this \$25,000,000 betterment program, Seattle feels that she has cause for congratulation. But we in turn congratulate the Great Northern Railway and its officers for their faith and vision. Faith and vision have been amply justified in the past; they will be more amply justified in the future. These most recent significant aids to the progress of the Pacific Northwest culminate what has indeed been a history of honor.

J. C. Baxter

Vice President, A. Guthrie and Company

"Why the Cascade Tunnel was Completed in Three Years"

I have been asked to tell you why the Cascade Tunnel was completed in three years.

The answer, I believe, comprises four elements, and it is of them I will speak briefly in the reverse order of their importance.

First, *Equipment*. The Cascade Tunnel was equipped, three years ago, with machinery which we believed to represent the

last word in the art of tunnel driving. That this was so is evidenced by the fact that no improvement in the art has been made until within the last few months when a rock drill has been produced by one of the manufacturers with a slightly higher drilling speed than those in use in the Cascade Tunnel.

After equipment, next in importance comes *Man Power*. The Cascade Tunnel was manned by approximately 1700 of the flower of American manhood. Their average age was only 33—42 per cent of them were under 30, 73 per cent of them were under 40, 85 per cent of them were American born, and while speaking of the men on this job I am impelled to pay tribute to the women. There were about 100 women who lived on this job from its start to its completion and in my opinion the influence of each woman in maintaining the morale of our organization was in its effect equal to the labors of four or five able-bodied men.

With such men and women and good equipment eventual success rested on only two other elements, the next in importance being *Leadership*. The Cascade Tunnel job, in the difficult days of organization, was led by Dick Hoffmark, who, as a leader in the turmoil incident to the starting of a new and large construction enterprise, stands without a peer. The gruelling and incessant work of driving and lining the tunnel was led by Bill Conroy, the best tunnel man in the world.

But all of these things would have counted as nothing without the fourth and most important element. I speak of *Courage and Persistence*—that quality of "stick-to-it-iveness" sometimes called "The Will to Conquer." This quality is a spiritual one that an organization cannot create wholly within itself. In our case, on the Cascade Tunnel, we received this spirit of courage and persistence, this will to conquer, from the officials of the Great Northern Railway Company, who, from President Budd on down the line, by their constant daily confidence, encouragement, and helpfulness made it possible for us, with equipment, man power, and leadership, to complete the Cascade Tunnel in three years.

J. J. Donovan

Washington State Chamber of Commerce

"Other Cascade Tunnels"

This great tunnel is now complete and it is fitting that leaders of the state and nation should celebrate the triumph of courage and skill.

The tunnel which the Great Northern abandons to-day was probably the most decisive factor in the commercial growth of Seattle. It made Everett, which consisted of a single house at Port Gardner in May, 1890. Had this tunnel been driven from Wenatchee into Sauk Valley, and the railroad built down the Skagit to Bellingham, the commercial history of Puget Sound

would have been very different. Feasibility of Stevens Pass for a switchback caused Mr. James J. Hill to decide for the Skykomish as against the Skagit Valley route.

As one of the younger engineers of the pioneer line, the Northern Pacific, working under and with General Adna Anderson, W. L. Darling, V. G. Bogue and W. H. Kennedy, I now pay tribute to their engineering skill and the work they did in completing the line that first opened the great Northwest from the Mississippi to the sea.

* * * * *

Then came the Great Northern, swinging north from Spokane and opening new country, with John F. Stevens as locating and E. H. Beckler as chief engineer. This was followed fifteen years later by the Milwaukee, E. J. Pearson, chief engineer, intermediate between these lines, and crossing at the Snoqualmie Pass.

* * * * *

One other good line remains. It runs up the Skagit, through Cascade Pass, then via Lake Chelan, the Columbia and Spokane rivers to Spokane. * * * * * This line will not be built because existing lines will care for the traffic. Railroad lines have been run through various passes south of the Northern Pacific but there is no probability of construction.

* * * * *

I cannot close without devoting a moment to a project somewhat in the public eye in recent years and now asking money from private, state, and national funds—the Thirty Mile tunnel from Leavenworth to Monroe. It will never be built. There is no economic foundation for such a structure. The value of the saving in summit elevation has been greatly overestimated, as has the volume of possible traffic. None of the great railways are giving it a second thought. It would require ten years to build, between one hundred and one hundred and fifty million dollars capital, and an income of at least twenty-five thousand dollars per day. All must be secured from automobiles sent through on electric trains. Whenever any demand arises the railroads will provide a ferry service at a fraction of the cost.

A number of reputable gentlemen of various professions are promoting this project and are described in their literature as “men of vision.” They are—of visions!

The tunnel we have opened to-day is the greatest achievement in this line in the world, except for three Swiss tunnels. It reflects the highest credit upon the foresight of the management and the skill of the engineers of the Great Northern Railway. It increases safety and speed, lessens cost of operation, and we must thank President Ralph Budd, Vice-President L. C. Gilman, and Assistant Chief Engineer Col. Frederick Mears; the contractors, A. Guthrie & Company; the engineers and superin-

tendents, and scores of others for its successful completion. It marks the boldest step forward yet made by any railroad in America.

John F. Stevens

“The Cascade Crossing”

In the early spring of 1890 I was placed in charge of reconnaissance and surveys of the country from Spokane to Puget Sound and from the Northern Pacific Railway to the British Columbia line, an area of some 45,000 square miles, with orders to find and locate the best line for the Great Northern Railway to the Sound. The only suggestion made to me was that only as a last resort would a paralleling of the Northern Pacific be considered. My instructions were very broad—“Get the best line.” There had been some exploring done before my time, but I had no reports of its results then, and never have had. I heard verbally from outsiders that a line was suggested across the Big Bend country, crossing the Grand Coulee (how I don’t know—that Coulee is some half a mile wide and 300 or 400 feet deep), then heading off Moses Coulee and, starting near the town of Waterville, to drop on a heavy grade down along the east side of the Columbia River and cross that river near the mouth of the Wenatchee and so on up that Valley. I dismissed that plan at once; it was not a practicable route.

The process of reconnaissance for a railway line is largely one of elimination—to find out where *not* to go. Starting down the Spokane River I examined the Columbia River clear to Pasco. I studied the Northern Pacific from there to west of Stampede Pass. I also went through Snoqualmie Pass and down several miles into Cedar River. I went from the Columbia River west across the Rattlesnake Mountains, I think they were called, to Ellensburg and on again up to Snoqualmie. The stretch of country as far as Ellensburg is very forbidding, apparently being made of the remnants of rock and greasewood left over when the world was made. It would require heavy grades and costly work. I believe though that other engineers since that time, who were abler than I, have gotten a line across it. However, I think that you will agree with me that it will be some time before that country ships 19,000 carloads of apples in a year as the Wenatchee District has done.

I examined every stream coming into the Columbia River from the north—Okanogan, San Poil, and Methow. There was naturally a strong desire on the part of the people there that the line should reach Bellingham Bay directly, and I could not afford to make any mistakes. I had an idea that I could get across from the Methow to the head of Chelan Lake and so on up and over Cascade Pass, but found it impracticable. I may say that I had

gone up Chelan Lake and over Cascade Pass and down on to the Skagit River.

Lake Chelan is some 50 miles long and 2 to 3 miles wide and very deep. Lieut. Pierce, previous to my time, had sounded it as far as his line would let him and reported 1600 feet in depth, 400 feet below sea level, and the U. S. Army engineers are generally correct in their data. The west shore of the lake is very abrupt with miles of almost vertical bluffs—an impracticable, prohibitive line from point of cost, even if such a line would not be entirely out of direction. I examined the various small streams coming into the lake from the west, but nothing developed.

Lake Chelan lies there—a deep, wide trough, impracticable to bridge or get around. My studies had confirmed me in the knowledge that a direct line to Bellingham Bay was not feasible.

I examined the Entiat which comes into the Columbia River about 10 miles north of Wenatchee, but found that nothing could be developed in that valley.

There then was left the Wenatchee. From my studies I had found that the narrowest part of the Cascades must lie somewhere at the heads of the Wenatchee and Skykomish; in other words, the Cascades were in a way like an hour glass with its waist at the heads of those rivers.

I had already picked a crossing of the Columbia River about a mile above where the road crosses now, and found a way to get to it from the east. I went up the Wenatchee Valley and on up the Chumstick, across the sharp divide and to Wenatchee Lake. Went on up several streams coming into the lake and went over the divide through Indian Pass, I believe it is. I didn't like it at all. I made several trips up the Wenatchee, also down; one through Tumwater Canyon at high water, and it was some trip! On one of my visits to the lake I noted a creek coming into it directly from the south. I went up it for a short distance and found that it turned and came directly from the West—the Cascades. I put this fact in the back of my head for future reference. This creek is now called Nason Creek. From Indian Pass or thereabouts I traveled as nearly as practicable south along the top of the range and down the Icicle to its mouth at the town of Leavenworth. No good. On this trip I noted a low gap in the Cascades and was near enough to hand-level it and get an idea of its elevation. I immediately made up my mind that the small creek which led east from this gap must of necessity be a head of Nason Creek, it could be nothing else.

I had to return to Waterville, where my headquarters were, on some business, and when I arrived there I at once asked Engineer Haskell, my assistant, to go up to Wenatchee Lake, follow up Nason Creek to the heads of everyone of its forks, and told him of the gap I had noted and that it must be a head of Nason Creek (we didn't call it Nason Creek then) and if so, *we had the Pass*. He did so and his trip confirmed my idea. He blazed a big tree

on the summit of the pass and marked it "Stevens Pass," and that's how the name came about.

Immediately on Mr. Haskell's return I went to Stevens Pass and confirmed in every particular his report. Then I put two parties at work, one from the pass east, and one on the west side, as winter was coming and I had to know what was what. The east side party got along all right, but when I got the results of the preliminary survey from the party west, I was rather discouraged. The line as hastily run was impracticable, but deep snow prevented any further work that season. I thought of but little else that winter. I felt that I had not failed and that a line was there, and waking or sleeping it was on my mind. Now you all may think that I was crazy and that only Conan Doyle could see it as I saw it, but I woke up one morning early in March with an idea. I have always thought that I dreamed it: subconscious mentality probably. I started at once (was living at Snohomish) and, picking up my faithful co-packer, John Maloney, at Sultan, went up into the mountains. We had no snowshoes, but by starting early the crust on the snow would hold us up for a few hours.

We went on up the valley, and standing on a point above it I sketched out what was afterwards known as the Marten Creek loop. As soon as the snow melted enough, I sent the field party back there, and it laid the line as I had sketched it, and as it was built. This solved the problem.

I will add that when I had the preliminary lines of the switch-back laid, I laid the line of the old tunnel, alignment, and gradient, 7 years before it was completed, and not a rod of new line had to be built nor a rod thrown away to make connection with the permanent line.

The new tunnel is a great piece of work, and it reflects great credit on directors, executives, engineers, and contractors. So does the new Chumstick line, and I am glad that my voice was in favor of both. The Great Northern Railway has accomplished marvels. Just as an illustration of its big way of doing things, during the past 3 years it has spent as much money between Peshastin and Skykomish, \$25,000,000, as it cost the Thirteen Colonies to win their independence. But you all know the old story of Washington throwing a dollar across the Potomac River—a dollar went farther then than it does now! The speed with which the long tunnel was built is a world's record. It beat my guess by at least two years.

* * * * *

And so the new tunnel is put into operation, and I am very, very pleased. A long tunnel was a dream for years, and I am so glad to have lived to see it an accomplished fact. But I can't help feeling a regret to know that the old line is a thing of the past and that I probably will never see it again, for I put in some of my best days on it.

Significance of Improvements in the Cascade Mountains

Completion of the new tunnel and 34 miles of easy, high speed track replacing 43 miles of steep and winding mountain line, together with electrification of 75 miles of road, mark a great step forward in bringing the West Coast closer to the East. These improvements eliminate from operation the problems incident to crossing a mountain barrier, and will expedite the flow of commerce and contribute to the comfort of travelers, as well as save time. Trains will cover the distance between Seattle and Spokane on shorter schedules than ever before.

While these savings and advantages over a period of years will repay the cost and carrying charges of the improvements, the public as well has a vital and immediate interest in these and all similar improvements in the Nation's transportation facilities. Such improvements constitute an elemental achievement that fixes shorter distances and lower grades, and these in turn set up new standards of performance, resulting in benefit to all who are affected by the advancement of transcontinental transportation.

COMPARISON OF OLD AND NEW LINES BETWEEN PESHASTIN AND SCENIC

	<i>Old Line</i>	<i>New Line</i>	<i>Favorable to New Line</i>
Length of Line.....	49.98 mi.	41.10 mi.	8.88 mi.
Degrees of Curvature.....	5683	2009	3674
Summit Elevation.....	3383 ft.	2881 ft.	502 ft.
Grade in Tunnel.....	1.69%	1.56%	0.13%
Length of Maximum Grade.....	24.63 mi.	6.37 mi.	18.26 mi.
Rise Westbound.....	2410 ft.	1889 ft.	521 ft.
Fall Westbound.....	1402 ft.	881 ft.	521 ft.

Tunnels and Snow-Sheds Eliminated

Tunnels.....19,332 ft. Snow-Sheds.....39,870 ft.

PIONEER TUNNEL

Work begun at Scenic December 14, 1925

Completed May 1, 1928

Length.....28,292 ft. Size.....8 ft. high x 9 ft. wide
Cubic yards excavated 94,900

MAIN TUNNEL

EXCAVATION

Work begun at Scenic March 6, 1926

Completed December 8, 1928

Length.....41,152 ft. Size.....18 ft. wide x 25 ft. high
Cubic yards excavated 839,700

CONCRETE LINING

Work begun at Scenic October 12, 1926

Completed December 24, 1928

Finished size.....16 ft. wide x 21 ft. 5 in. high from top of tie
Length.....41,152 ft. Average thickness...2 ft. 9 in.
Cubic yards concrete placed.....262,564

ACCURACY OF INSTRUMENT WORK

Error of closure between East Portal and Mill Creek:

Alignment.....0.23 ft. Elevation.....0.20 ft.
Distance.....0.90 ft.

Error of closure between Mill Creek and West Portal:

Alignment.....0.64 ft. Elevation.....0.78 ft.
Distance.....1.00 ft.

TRACKLAYING AND BALLASTING

Tracklaying began December 25, and was completed December 30, 1928.

Ballasting of track began December 29, 1928, and was completed
January 6, 1929.

BEST RECORDS

EXCAVATION

Great Northern Railway

CASCADE

Pioneer Tunnel—8x9 ft.

1 day.....52 ft.
2 days.....90 ft.
3 days.....140 ft.
1 month.....1157 ft.

Main Tunnel

Enlargement from Center Heading
1 month.....1220 ft.

Canadian Pacific Railway

CONNAUGHT

Pioneer Tunnel—6½x8 ft.

1 day.....37 ft.
2 days.....68 ft.
3 days.....98 ft.
1 month.....932 ft.

Main Tunnel

Enlargement from Center Heading
1 month.....1030 ft.

COMPARISON OF LONG RAILWAY TUNNELS

<i>Name of Tunnel</i>	<i>Length</i>	<i>Width</i>	<i>Height above top of tie</i>
*Simplon No. 1....	65,734 ft. 12.45 mi.	16.40 ft. Single Track	18.05 ft.
St. Gothard.....	48,983 ft. 9.28 mi.	26.24 ft. Double Track	19.68 ft.
Loetschberg.....	47,685 ft. 9.03 mi.	26.24 ft. Double Track	19.68 ft.
Mt. Cenis.....	42,150 ft. 7.98 mi.	26.24 ft. Double Track	19.68 ft.
New Cascade....	41,152 ft. 7.79 mi.	16.00 ft. Single Track	21.43 ft.
Moffatt, Colorado	32,253 ft. 6.11 mi.	16.00 ft. Single Track	22.50 ft.
Connaught, B. C..	26,512 ft. 5.02 mi.	29.00 ft. Double Track	21.54 ft.

*A second bore (Simplon No. 2) parallel to No. 1 and of similar dimensions was completed in 1921.

All of the tunnels which are longer than the Great Northern's Cascade Tunnel are located in the Alpine region of Southern Europe.

ELECTRIC LOCOMOTIVES

The locomotive dimensions and electrical characteristics are shown in the following table:

	<i>Single Cab</i> LOCOMOTIVE	<i>Double Cab</i> LOCOMOTIVE
Classification	1-C+C-1	1-D-1+1-D-1
Total weight each locomotive . . .	527,200 lb.	715,400 lb.
Weight on drivers	420,600 lb.	550,000 lb.
Weight per driving axle	70,100 lb.	68,750 lb.
Maximum rigid wheel base	15 ft. 4 in.	16 ft. 9 in.
Total wheel base	58 ft. 8 in.	78 ft. 11 in.
Total length	73 ft. 9 in.	94 ft. 4 in.
Height over pantograph, locked down	15 ft. 3 in.	15 ft. 10 in.
Number of motors	6	8
Tractive effort cont. rating	60,500 lb.	88,500 lb.
Tractive effort—starting—30% adhesion	126,180 lb.	165,000 lb.
Power at traction motors	750 Volts D. C.	600 Volts D. C.
Power at trolley	11,500 Volts, 25 cycle A. C.	



The Great Northern Railway Company will be glad to send upon request an illustrated booklet about the new Cascade Tunnel.