

PACIFIC RAILROAD.

[To accompany Bill H. R. No. 646]

APRIL 13, 1860.

Mr. CURTIS, from the select committee on the Pacific railroad, made the following

REPORT.

The select committee, to whom were referred all matters relating to a Pacific railroad and telegraphic line, have had the same under consideration, and submit the following report :

The application of steam power to propel steamboats and locomotives has become almost universal among civilized nations. Every pursuit that requires celerity, certainty, and economy of movement, goes by steam; and although it is only about thirty-five years since railroads and locomotives were invented, it would now be considered monstrous to present arguments to prove their general necessity in public and private affairs of the State. Commercial, postal, naval, and military movements, are everywhere accelerated by the application of steam on water and land; and, to avoid dangerous and disgraceful delay in national progress, every country must make provisions in some way to compete with this new element of national power.

In the Crimean war France and England availed themselves of steam propulsion, and even constructed a railroad to the great advantage of the allies, and damage and disaster of Russia. Every country should have means of railroad transportation to salient remote points, otherwise ocean steamers can overwhelm such points before they can receive succor from home.

In the recent Italian wars the adoption of steamboats and railroads as military facilities or auxiliaries concentrated more decisive action in a three-months' campaign than could otherwise have been effected in three years. Railroads are now absolutely necessary for military protection, and might be justified in some instances on the ground of public safety, and under the legal maxim: *Salus populi suprema est lex.*

Let us apply these general principles to the condition of California, and the surrounding Pacific settlements. Our only effective commercial lines, connecting with those States, are circuitous, exterior, and oceanic, passing through foreign states by no means particularly friendly to us. The routes and sections of routes which lie on

the ocean are exposed to superior naval powers in Europe—powers that are becoming vastly stronger by recent alliances, and by the application of modern improvements. The transits by the isthmus are exposed to international wars that are frequent in the unsettled condition of the Central American states.

In the event of probable wars among other nations, therefore, and what is worse, in case of war involving ourselves, all our lines of communication that could serve for commercial and military purposes would be immediately beyond our reach, and most likely occupied by others. Hostile powers could seize upon those lines, transport an army by steam, and make a campaign in California before we could transport forces across the country to succor or sustain our friends and kindred of the Pacific shore.

A Pacific railroad is a military necessity to aid in the defence of the Pacific States; and every reflecting mind possessed of patriotic emotions will perceive that California wealth and weakness invite aggression, and demand of us immediate and decisive exertion in their behalf.

The Constitution has devolved upon Congress the power and the duty to “insure domestic tranquillity,” to “provide for the common defence,” to “regulate commerce with foreign nations and among the several States, and with the Indian tribes,” and to “establish post offices and post roads.” A railroad connexion with the Pacific would promote each and all these constitutional provisions; and every citizen desirous of maintaining the integrity of our Union, will find ample justification within some of these provisions to justify the national aid necessary to secure the actual result.

We have had conventions of the people, resolutions of States, the declarations of great political parties for years, presenting and pressing this matter upon Congress. Large sums have been appropriated and expended in preliminary explorations; large volumes have been written and published at the public expense; the President has repeatedly urged it upon Congress, and it may be regarded as a national determination that we must now take decisive action and secure successful results.

With this view of the subject, your committee have earnestly and anxiously sought a solution which would determine the magnitude of the requisite work, and the best means of accomplishing it.

Fortunately, the experience of our people in the construction of thirty thousand miles of railroad, has rendered the subject familiar to everybody, and the eighteen hundred or two thousand miles now required to connect our railroad system with the navigable waters of the Pacific, near San Francisco, is only perplexing because it passes through sparsely settled and somewhat barren portions of the republic, and because of the importance its construction will give to adjacent locations. The explorations which have been prosecuted with great ability by officers of the United States army, and the resumé by Captain Humphreys, in charge of these explorations, have furnished the careful student with ample means to determine some rational conclusion of this important subject.

A large map, drawn under the direction of Captain Humphreys

and Lieutenant Warren, (a photographic miniature of which will accompany this report,) has also aided your committee in the determination of a great conflict of views relating to the length and position of routes. As a preliminary question, your committee first determined to adopt but one line, although many able arguments were offered in favor of two or more.

Having thus determined on one road, by reference to the map which presents the lines reported practicable, it will be perceived the subject is reduced to that of considering four routes, and selecting the best of these as the basis of our estimates. Able arguments have been presented in favor of each route, and each has its specialties, both favorable and unfavorable. On either route mountains, rivers, and sterile lands must be traversed; and on other parts of each route rich valleys, level grades, and cultivable lands are to be found. To present the favorable and unfavorable qualities of each route, would extend this report beyond reasonable limits; and your committee having resolved upon the presentation of the central route, without prejudice to others, they will present mainly the arguments favoring the construction of a railroad on that hypothesis.

The vast consequences to our country, and to the localities, which must result from the construction of a Pacific railroad, cause this question of route to be the most difficult and exciting obstacle in the determination of congressional action. Wherever the location be made, great advantages must inure to the vicinity, and therefore every section of the republic desires and earnestly insists on that line which will best subserve its local convenience.

Some not only desire the local advantage, but dread the prestige such a work will give to a rival section. It is impossible to fully reconcile this antagonism, by urging the importance of the common national interest; but your committee have sought to accommodate this, among other considerations, by adopting a central line, upon which branches on each side, and from each end, can most easily and directly accommodate all sections of our country.

so four general lines which have been reported as practicable, and are situated on the accompanying map, are situated as follows:

1st. The route of the Gila river through Arizona, near the parallel of 32° north latitude. This route runs very near our southern boundary, and is the route of the so-called "Southern Pacific Railroad."

2d. The route through Albuquerque, near the 35th degree. This line also runs within four degrees of the southern boundary of the western portion of the republic.

3d. The emigrant route by the Platte valley, through Salt Lake valley, near the parallel of 41°, which we denominate the central line, the general location of which your committee have adopted.

4th. The route from St. Paul to Puget's Sound, which runs between the 47th and 49th degrees, very near to our northern boundary.

The section of our country through which all these lines run, lies mainly between the 31st and 49th degrees of north latitude, and is therefore eighteen degrees wide. The bisecting, or middle line, would be the 40th degree of latitude, which corresponds nearly with the boundary between Missouri and Iowa, a southern and northern State. Without

defining passes in the mountains, or prescribing the exact points of termini, your committee recommend this as the proximate parallel upon which centrality and the largest amount of local interest can be concentrated. It is central as to the west; central as to the numerous lines of railroads traversing the western States; central when prolonged eastward, as to our great cities, it being the parallel of Philadelphia and central as it passes through the centre of our whole population.

All other things being equal on the plan of one road, such a location, your committee supposes, all would consider most likely to accommodate the greatest number of our people.

The shortest line.

Before stating the comparative length of different proposed routes, it is necessary to see that they start and end fairly. Radical error has been fastened upon the public mind by false presentation of the starting and ending of a Pacific railroad. Our railroad system is complete beyond the Mississippi river, and at many points lines are now progressing hundreds of miles west of the father of waters. At one point, St. Joseph, Missouri, this system of iron network has extended a line beyond the Missouri river, 250 miles west of the Mississippi, and rails are now being laid on the way to Fort Kearney. In considering a Pacific railroad, we should either start from permanent navigable rivers, or from these exterior points of the railroad system. This, all will concede, is the only fair way of comparing lines; yet such has not heretofore been the manner of starting comparative lengths.

In considering the western terminus, we must look to a safe, direct connexion with San Francisco, or to the navigable interior rivers, leading by steamboat directly to San Francisco. A terminus at San Diego or at Puget's Sound is, like the isthmus route, unsafe, being too far from the centre of the Pacific population, and too far from the great Pacific emporium, to which we should seek to have a safe communication in time of war. From either of these points to San Francisco, several hundred miles of ocean steam line is required. All lines should therefore be terminated at the bay of San Francisco, or what will be substantially the same, on the Sacramento or San Joaquin rivers, where steamers can always transport two hundred tons of freight, keeping the entire line interior, and therefore safe in time of war.

Taking this fair and only sensible way of starting and ending lines, to compare them, the relative length of these lines, taking distance from the map, which corresponds with the surveys, we have the following results:

is 278 miles shorter than the line of 32° ; 369 miles shorter than the line of the 35th parallel, and 536 miles shorter than the northern line, thus proving the central route 278 miles shorter than the shortest rival route. A glance at the map will verify geometrically the relative lengths of the various routes, showing that the central line starts three degrees of latitude further west than either of the other proposed lines, and leading to the same point on a semi-diameter, it is shorter than all exterior lines. By adopting the central route, which is so much the shortest, much time and money will be saved to the United States.

Branch connexions.

The central position of this line makes the sum of the branches from the south and the north not only mathematically shorter than they otherwise would be, but it is especially convenient for branch lines, as they can follow the great river channels in approaching the main trunk. For instance, from Memphis, follow up the valley of the White river; from Fort Smith, follow up the Neosho; from St. Paul, follow up the channel of the St. Peter's to the south bend of that river, and thence, via Sioux city, approach the main trunk. It will be seen that our river valleys make convenient approaches for railroad lines. But it is for Pacific branches that this line is especially convenient, and the only one that can accommodate branches to all the Pacific ports. A southern route would not accommodate Oregon and Washington. A northern would not accommodate Utah or southern California; but from the central line you can branch from the Salt Lake valley so as to accommodate all those western States and Territories.

This convenience of branches, especially to the Pacific ports, seems to conclude the argument in favor of the central route. To make a trunk line, inaccessible to Oregon and southern California, by reasonable branches, would be absurd, and accomplish only a fraction of the objects proposed. Puget's Sound is especially important in a military and commercial point of view, and our commencement of a railroad system should look to an early connexion with that growing and commanding point on the Pacific coast. The corresponding bay of great importance, in the southwest, is the Gulf of California, and although that inland sea does not belong to us, we must look with interest and favor on such honorable arrangements as will give our Pacific marine the benefit of such a harbor, and our railroad system early and easy connexion with it.

Practicability of a central route.

It would be folly to present only the bright spots in the long and mainly unsettled, uncultivable line of proposed route for a Pacific railroad, or to pretend the route is uniformly easy. There are bad and good, rich and barren, rough and smooth sections on each line. The best proof of the greater advantages existing on this central route is found in two facts:

1st. That nine-tenths of the overland emigration has adopted this route; and, 2d, the settlements are large and rapidly augmenting only on or very near this route.

The new gold mines of Pike's Peak, the forty thousand Mormon

and the new and important Washo silver mines, will all be accommodated by a central route; and the latest news from these new mining districts is exciting a new flood of emigration unparalleled in former years.

But your committee will present the line as shown by the government surveys, this being the most reliable data upon which to base public legislation.

The official surveys on this route have been made by Colonel Frémont, Captain Stansbury, Lieutenant Beckwith, Colonel Lander, Lieutenant Bryant, and Lieutenant Warren, who, at different times, have examined the different sections; and by uniting their testimony a very correct idea may be formed of the entire route. The travel which passes through Missouri and Iowa concentrates on the Platte valley, which affords an easy approach to the Rocky mountains for all kinds of roads. Speaking of this first section, Lieutenant Warren says truly: "The Platte river is the most important tributary of the Missouri in the region under consideration; its broad and grass-covered valley, leading to the west, furnishes one of the best wagon-roads of its length in America. From its mouth to the forks, the bluffs are from two to five miles from the water, making an intermediate bottom valley of from four to eight miles wide. From the forks to Fort Laramie, the bluffs occasionally come down to the water's edge, and the road has to cross the points of the ridges. From Ash Hollow to Fort Laramie, the road is sometimes heavy with sand. Fine cotton-wood grows along the banks and on the islands, from the mouth to Fort Kearney; from here up it is scarce, and of small size. Cedar is found in the ravines of the bluffs, and in the neighborhood of the forks, and above. The river is about a mile wide, and flows on a sandy bottom. When the banks are full it is about six feet deep throughout, having a remarkably level bed; but it is of no use for navigation, as the bed is so broad that the water seldom attains sufficient depth, and then the rise is of short duration. The water is sometimes so low, as was the case last season, that it can be crossed anywhere without difficulty, the only care requisite being to avoid quicksands."

The settlements are now extended one hundred and fifty miles up the Platte, and following the South fork and Lodge-pole creek, as proposed by Captain Stansbury and Lieutenant Bryan, this testimony only relates to three hundred and seventy-three and a half miles, as Lieutenant Warren followed the North fork when he speaks of the road being "sometimes heavy with sand."

Lieutenant Bryan extended surveys up the South Platte and Lodge-pole creek to the mountain passes. It is in this neighborhood (Cherry creek is fifty miles south) the new gold discoveries are made, and miners are gathering by thousands. According to Lieutenant Bryan, no serious difficulties occur in this section, except a scarcity of timber. He says, (volume 2, part 2, Executive Documents, 1857-'58, page 478:)

"From the Laramie crossing to the head of Lodge-pole creek the supply of good water is constant. The grass is generally short, as on all the uplands, though there are spots occasionally met with where a more liberal supply than usual may be had. From the head of Pole

creek, over the west fork of Laramie river, to Bridger's pass, there is but one route to be followed; and, as it has already been described, I need not speak of it again here."

We suppose he refers to the report of Captain Stansbury. Large groves of pine and other timber have been discovered by the miners some thirty or forty miles south of Lodge-pole creek. The details of Lieutenant Bryan's report are favorable, but too lengthy. We refer to his detailed report.

From the head of Lodge-pole creek to Salt Lake City, we pass the Rocky and Wasatch ranges of mountains. We also pass the valley of Green river, where, for two hundred miles, at various places, coal is found in strata from two to ten feet thick. Captain Stansbury explored this region, and we refer to his own work, from page 217 to page 273. On page 226, speaking of coal, he says:

"The out crop was about eight feet wide by four feet thick."

At another point, one hundred miles further east, he says, page 234:

"At a point thirteen miles from the mouth of Bitter creek we found a bed of bituminous coal cropping out of the north bluff of the valley with every indication of its being quite abundant."

On page 236, speaking of the portion three hundred and thirty miles further east, between a summit of the Rocky mountains and Salt lake, he says:

"We broke out from a bed twelve feet thick some beautiful specimens of excellent bituminous coal, which burned in our camp-fires with a clear, yellow flame."

At longitude 108° , latitude 41° , he says, page 236:

"Sandstone cliffs bound the valley on the north side, in which I observed a stratum of coal which was exposed for a hundred yards and was at least ten feet in thickness."

Having closed his survey of the route, he says, page 142:

"With the exception of the rough ground near the head of the Muddy, which offers no obstruction of consequence, a perfectly feasible, and indeed a most excellent route, whether for a wagon or railroad, has thus been traced, presenting fewer obstacles to the construction of either than almost any tract of the same length in the country. The grades will be easy, the bridging comparatively light, and with the exception of the crossing of the valley of the Muddy, where a long and heavy embankment may be required, the cutting and filling will be entirely within moderate limits. In no case will an inclined plane be required; and the route is more than usually free from the objection of high and narrow cañons, liable to be filled up or obstructed by snow during the winter."

Again, page 261, speaking of this whole, most remote, and difficult section:

"A glance at the map and a little attention to the table of latitudes will show that from Great Salt Lake City to the head of Lodge-pole creek, a distance of four hundred and eighty-four miles, the difference of latitude is but $35^{\circ} 42''$; and while the greatest northing made by the proposed line is but little more than $20'$ north of Lodge-pole creek, the greatest deviation to the south is but little more than three miles;

so that the entire route through that long distance varies but a trifle from a straight line."

And speaking of this route as preferable to going sixty miles further north by the South Pass, he says, page 262 :

"A careful observation of the ground on both routes has enabled me to form a general comparison between them, and has led to the hesitating conclusion that, in point of diminished distance, easy grades, freedom from serious obstacles, and convenience and abundant supply of materials for construction, the line of this reconnoissance presents a trace for a road that is not only perfectly feasible but decidedly preferable to the other."

Lieutenant Beckwith corroborates this testimony (see volume 2, page 54, "Explorations and Surveys for a Railroad Route," &c.,) when he speaks of "the Green river basin, and the coal basin of Green river, from being abundantly supplied with that important article. It is more than two hundred miles in extent from east to west, and has a variable width, north and south, from twenty to over a hundred miles."

Speaking of snow in this region, about which much is said against a central route, and fearful in any country where houses are not yet constructed, he says :

"The trading post at Fort Bridger has been occupied constantly for the last ten years ; but the district was much frequented before by traders and trappers, whose effects are always transported by cattle, which subsist themselves throughout the year by grazing—a fact remarkably significant of the winter climate and depth of snow which falls in the district, the general elevation of which may be safely taken at seven thousand feet above the sea. And it is said by these people to be a well-established fact, that horned cattle, of which their stock wholly consists, cannot so subsist when the snow is deep enough to bury their eyes and enter their ears as they feed."

Our troops spent the winter of 1857-'58 at Fort Bridger, and the miners have spent the two past winters in the Rocky mountains. They have not been seriously annoyed by snow ; and although the valleys are from 5,000 to 6,000 feet above the sea, the climate is comparatively mild. The Rocky Mountain "News," of the 14th ultimo, published at Denver City, says : "We have not had eight inches of snow this winter, and the grass now begins to grow, and the slopes look green." But railroad companies now overcome snow obstructions by the use of board fences to check drifts, and in the use of the snow-plough and running the engines to clear the track. Snow is no longer a railroad obstruction worthy of much consideration anywhere, and is no more in the arid regions of the Rocky mountains than in the eastern States of the same latitudes.

So much for the route to Salt Lake, to the Mormon settlement, where we have a population of at least forty thousand, and an army of two or three thousand, with which we must have constant communication. From Salt Lake City to the Nevada mountains, a section of about six hundred miles, we have the valley of the Salt Lake and Humboldt river, level or easily-graded plains. But the line is interrupted by the Humboldt mountains, which, however, are not difficult to pass. Scarcity of timber is the principal difficulty encountered.

Cedar is found in the Humboldt mountains, but in places ties may have to be transported from fifty to sixty miles. The description of this section, comprising the Mormon settlement and the Carson Valley settlement, is too well known to require much consideration. Its particular features are stated in the report of Lieutenant Beckwith, volume 2, pages 60 to 70, Explorations.

Captain Simpson, of the United States topographical engineers, has recently opened a shorter route, considerably south of the Humboldt, which is now travelled by the emigration, and was followed in the stage-coaches by Horace Greeley, esq., who considers it practicable for a railroad. This route is supplied with timber and water, and for these reasons may be found preferable to the Humboldt valley; but no survey has established the practicability of this line for a railroad, and your committee, therefore, retain the projection and distances as prescribed by Lieutenant Beckwith on the level plain of the Humboldt river. By either the Simpson route or Humboldt valley we arrive at the new silver mines of Nevada Territory, where agriculture and mining are attracting thousands, and building up a new Territory. This settlement is at the eastern base of the most precipitous and difficult mountain range, the Sierra Nevada. Carson river flows down this eastern slope, and sinks in the plain with the Humboldt river. Beyond the summit of this Nevada mountain Sacramento river flows down its western slope, and, passing Sacramento city, the capital of California, enters the Pacific at San Francisco. With silver on one side and gold on the other, the Sierra Nevada mountain is now, summer and winter, traversed by thousands; and the necessity of a railroad is, therefore, greatest where the difficulties are most formidable. Many new routes have been proposed, but your committee will present that which was surveyed and reported by the government employés.

In passing this mountain, you have to rise twelve hundred feet and descend twenty-four hundred feet. The rise is easy, and the descent is distributed over sixty-seven miles. On the summit of this mountain there is a level plain some thirty or forty miles in width. After what we have seen in passing the Alleghany mountains, there can be no doubt of the practicability of passing this mountain through the Madalin, Noble's, or Carson River Pass. Rather than go a great distance out of line to avoid such a mountain, we would adopt the improved inclined planes, which some insist are now the cheapest way to overcome elevations; or we may adopt the zigzag or *Y boyean* construction that has occasionally been successfully used on the Baltimore and Ohio railroad.

But there is no need of such an expedient. The surveys of Captain Beckwith show the probability of passing the Nevada mountains using grades that have been successfully tested. The most formidable obstacle in the route which he seems to prefer is two cañons, through which the Sacramento runs, and through which it is proposed to carry the railroad.

As this is the great obstacle, we give his description, and ask railroad men to consider it for themselves. After describing the easy ascent from the east to the broad, flat, timbered summit of the Neva-

da, and after proceeding with no serious difficulties to the declining plain, from whence he could overlook the vast valley of the Sacramento, which leads to the Pacific ocean, he thus speaks of this cañon of the Sacramento :

“ This cañon is a formidable obstacle to overcome. Its entire length is thirteen and seventy-four hundredths miles, surrounded by an open valley of similar extent, which is followed by another cañon eight and ninety-five hundredths miles in length, of the same character as the first. The river, as it enters the first cañon, is from thirty to forty feet wide, flowing with a rapid current over a bed of rocks, and it is sixty feet wide as it enters the second cañon, just below the junction of Fall river, and flows over a similar bed with an equally swift current.

“ At their heads, these cañons are vertical trachytic rocks, eighty feet high, with large masses of fallen rocks accumulated at the bases of the walls. The first is cut through a high plain for six miles ; the plain then rises somewhat, and is surmounted by high, sloping rivers, being five or six hundred feet above it, and the cañon becomes much broader, and its walls more elevated for two miles, to where it makes a large bend to the north ; below this the walls gradually decrease, and in two miles the cañon opens to the width of half a mile, which it preserves for three miles to the succeeding valley. The highest portions of the walls rise two hundred feet above the stream, with an accumulation of fallen rocks extending halfway to the top. For eight miles the course of the cañon is direct. It then makes a long bend to the north, and is followed by two or three short curves, but with a generally direct course. Its open part is timbered, and its walls less abrupt ; and on the right bank of the stream the mountains, followed by the river, extend considerably into the plain of Fall river. The most favorable line for the passage of a railway leads along the plain on the north side of the river, and descends the sides of the rocky hills which surmount it, and continues on the side of the mountain until it enters the plain of Fall river. The second cañon is only less formidable than the first because it is of less extent.”

It will be perceived the river is small—from twenty to sixty feet wide. The cañon is straight, or has long curves. Loose piles of rock lay alongside of the stream, and we do not perceive why these loose piles of rock may not be distributed partly in the stream and partly out of it, and with the aid of side cuts follow near the bed of the stream, instead of the side of the mountain.

Be this as it may, Lieutenant Beckwith has not only carefully described these two gorges, which, taken together, only extend over 22.69 miles, but he shows how they may be overcome or avoided. After reading his report any practical railroad constructor will be convinced of the practicability, and, in some respects, interesting portions, of the railroad route.

The survey of Lieutenant Beckwith terminates at Fort Randall, on the Sacramento, where the river is navigable for small craft, and the valley affords an easy descent for a railroad to the bay of San Francisco. Having finished his review of his labors on this central route, he concludes his report as follows :

“Further surveys on this route would, doubtless, develop important improvements at various points, and at two, at least—one from the shore of the lake near Stansbury’s island, by Pilot Peak, to the pass in the Humboldt mountains, and the other in crossing from Humboldt river to Mud lake—would probably diminish the length of the line by one hundred and six miles. The grades, also, are doubtless susceptible of material improvement by minute surveys with the spirit-level. There is an abundance of good stone for bridges and building purposes, at short intervals, upon all parts of this line. Water is also found in abundance for railroad purposes throughout those portions of the Sierra Nevada, Wasatch, and Rocky mountains explored, and also at a few miles intervals in the basin, where it usually occurs in springs at the bases of the mountains, and in small streams descending from the higher peaks and ridges to the adjacent plains.

“And a simple reference to the map of the route will exhibit an important feature in the facts that, in its remarkably direct course, for its great length, from the Missouri west to the Pacific, it follows the ascending and descending valleys of permanent rivers and their tributaries for more than two-thirds of its entire length, and that water is abundant on all the intermediate spaces, affording the means of irrigation to a large extent wherever the lands are suitable for it; and that they will doubtless be found so wherever the sage plains are luxuriant. It may be inferred from the rich aromatic odor and resinous properties of that plant, and from the exceedingly nutritious character of the grass scattered through it. And it is a well-known fact that the Mormons produce some of their first crops from reclaimed sage plains.

“By reference to the map and accompanying tables of latitudes, it will be seen that the route explored conforms throughout to a remarkably straight line, deviating west from Fort Bridger only at the Timpanagos cañon, if that line be preferred to the Weber, and on the northern portion of the Sacramento river.”

The Secretary of War, Hon. Jefferson Davis, in his summary report of 1855, although he favors the southern route, thus speaks of this central, after he had reviewed the surveys concluded by Lieutenant Beckwith:

“Although the route passes over elevated regions, the sum of ascents and descents is the next least after that of the forty-seventh parallel, which is to be attributed to the table-land character of the mountain districts. It partakes of the character of the route near the forty-seventh parallel in the long and severe winters on the plains east of the Rocky mountains and westward to the Great Basin.

“The cost, as estimated in the office, from Council Bluffs to Benicia, a distance of 2,031 miles, is \$116,095,000.

“The statistics of the route will be found in the table appended.

“The survey of the western portion of this route by Lieutenant Beckwith has resulted in the discovery of a more direct and practicable route than was believed to exist from the Great Salt Lake to the valley of the Sacramento. Since his report was made, a brief communication from Brevet Lieutenant Colonel Steptoe, commanding the troops in Utah, has announced the discovery of a still more direct route from Great Salt Lake to San Francisco. The new portion of this route

passes to the south of Humboldt or Mary's river, and, entirely avoiding the difficulties experienced by travellers along that stream, proceeds to the valley of Carson river, being well supplied with water and grass.

"From Carson river it crosses the Sierra Nevada by the passes at the head of that river, and descends to the valley of the Sacramento, being practicable throughout for wagons.

"In the absence of instrumental surveys affording data for the construction of profiles, no opinion can be formed as to the practicability of this route for a railroad. Should it be found practicable, however, it will lessen the length of the route of the forty-first parallel, and still further diminish its difficulties, already known to be less than on any other route except that of the thirty-second parallel."

The route here mentioned south of the Humboldt corresponds mainly with that to which we referred as "Simpson's route." It is the route now travelled, and may, as the honorable Secretary says, be adopted for the railroad, thereby still further diminishing the length of this central route.

Although your committee would avoid a comparison of routes in regard to the topographical features of each, they would not have it inferred that they regard the obstacles on this central route as any more formidable than those found on each of the other routes. All the surveys have been made with barometrical observations to ascertain heights, and stations have been erected from ten to twenty miles apart. These observations are sufficient to determine the general features of the country, and furnish sufficient information for practical men to judge of the practicability of the routes.

Without more minute surveys, comparative grades, curves, and cost cannot be determined with such accuracy as to make comparisons safe; and your committee has therefore only spoken of comparative *length* and *position*, which are based upon more certain and satisfactory data.

Cost of construction.

The practical difficulty which is presented in estimating the cost of a Pacific railroad, is the unsettled and comparatively uncultivable portions of the country beyond the 100th degree of longitude. Although the country is not generally arable, the valleys of the streams are cultivable; and most of the other portions are good grazing lands, affording pastures for numerous herds of buffalo, antelope, mountain sheep, and, where settlements exist, horses and cattle. Settlements and improvements are rapidly progressing on the central route, and what now seems a desert waste will be inhabited in advance of the progressing railroad. Yet it will be necessary to look elsewhere for the men, and most of their supplies, during the construction of the road. The central route, fortunately, is most accessible to men and provisions, and the greater settlements along the line, and especially the Mormons, in Utah, would furnish laborers, provisions, and other advantages to aid the progress of the work.

There are four general items in the cost of a railroad. These are the *roadbed*, the *ties*, the *iron*, and the *rolling stock*. Iron and rolling stock following the constructed road would cost very little more

than on other western roads. The extra cost would mainly relate to the other two items, roadbed and ties. The grade is very easy on a great portion of the central route, as the Platte valley, Salt Lake valley, and the Humboldt valley are extremely smooth and level. All the rivers can be easily bridged; the country is healthy; the climate is neither very hot nor very cold; miners are busy on all sides of it in search for gold and silver; and the moving emigration on this route, together with the mails already established, will all help to relieve it of a portion of the loneliness and desolation which exists on all the overland routes. By adopting a temporary grade, which can be improved afterwards, the track-laying may commence at each end and proceed with great activity towards the mountains, where men in advance should prepare the more difficult passes. It is not within the province of your committee to present items of estimates, but by thus showing that the extra cost mainly relates to the grade and ties, they cannot perceive how it is possible for such a road to cost a vast deal more per mile than other railroads. The cost of western roads does not exceed forty thousand dollars a mile, and some are built for much less. Add, if you please, twenty thousand dollars a mile for extra cost of grading and procuring ties on a Pacific road, and you have a total of sixty thousand dollars a mile. If you start with two converging branches, which are to unite within two hundred miles from the Missouri, the entire length of line, including the branches, would be, say, two thousand miles, and the entire cost one hundred and twenty millions of dollars. Looking at the valley of the Platte, sixty thousand dollars a mile would appear enormous; while looking at the mountain passes of the Wasatch and Sierra Nevada, it would appear too small. As the easy portion far exceeds the mountainous and rough portion, your committee believe this sum a safe approximate estimate of the entire cost of the road.

Probable results.

A railroad once made, connecting the Atlantic and Pacific, through a healthy inhabited portion of this continent, will sensibly affect the commerce, travel, and social intercourse of the world. Europe and Asia will be brought in effect much nearer to each other, and we will be much nearer to Asia. Travelling lines will not only be shortened, but they will be much more speedy, healthy, and inviting, by interposing the variety of land scenery for the dangers and monotony of the sea. It is not possible for your committee to make any estimate of pecuniary results which will grow out of such a stimulant to exterior commerce; but they are confident such a line of communication will be largely augmented by new elements of foreign intercommunication.

Results within our own country are more easily approximated. The travel across the continent will go by the railroad. You can now go from any of our cities to St. Joseph, Missouri, by railroad for thirty-five dollars. The remaining—say two thousand miles to San Francisco, at three cents per mile—nearly double the rates on this side—would be sixty dollars; add for meals and extras, ten dollars; total from eastern cities, by railroad, to San Francisco, one hundred and

five dollars. A passage by any of our *foreign* routes costs near two hundred dollars. By railroad you could go in six or eight days. It would be much *cheaper, quicker, and safer* for passengers travelling from ocean to ocean, and they will all take the railroad route. This demonstration is irresistible and incontrovertible. If the extremes should choose this route intermediate or way travel between the cities on the Atlantic and the Pacific would a *fortiori* adopt this route. There is, as all know, a creative power in a railroad which will double or treble the present California travel. There would then be at least one hundred thousand passengers pass one way, or two hundred thousand trips per annum. These, at sixty dollars each, for the section west of the Missouri line, amounts to the sum of..... \$12,000,000 00

All the gold would be transported by rail, and pay three per cent. on fifty millions..... 1,500,000 00

The mails at prices heretofore exceeded by land and ocean..... 1,500,000 00

Transportations of men and munitions of war, same as it now costs for way and through transportations. 5,000,000 00

Total..... 20,000,000 00

Freight will divide ; some will go round by water, but a very large portion will go by rail. The distance from Boston to St. Joseph is nearly as great as it is from St. Joseph to San Francisco. It is obvious, therefore, that freight transported between the Mississippi valley and San Francisco would not go or come by our eastern cities, but it would travel direct across by rail. Where the distance to San Francisco by rail is 2,000 miles, (say from Missouri and Iowa,) at two cents per ton per mile, freights to and from San Francisco would be as follows :

A ton.....	\$40 00
One hundred pounds.....	2 00
One pound.....	2
Bushel of grain, 60 lbs.....	1 20
Barrel of flour.....	4 00
Barrel of pork.....	6 00
A cow, 1,000 lbs.....	20 00
Box of dry goods, 300 lbs.....	6 00

To determine the cost from ocean to ocean, it is sufficient to add 50 per cent. to these figures.

An inspection of these prices will furnish some means of judging what will go by rail and what will travel by ocean.

The *interest, risk, insurance, and transportation* by water will average, say, five per cent. The first three items being much greater by water than by rail, valuable light goods will go cheapest by rail, while cheap heavy goods will go cheapest by water.

A package worth one dollar, weighing less than one pound, would go from New York to San Francisco by rail ; as the freight, three cents, added to risk, insurance, and interest, would probably be less

than five cents, the sum of these items by water. *Therefore everything worth a dollar a pound would go by rail.*

A dollar's worth of cloth, silk, gold, silver, notions, many articles of merchandise, will weigh less than a pound, and therefore go from New York and San Francisco through by railroad. Besides the difference between ten days' returns and ninety days is of so much importance to mercantile operations, a much greater share would go by rail. In fact, we are told that over three hundred tons are annually forwarded now by one express company, at from 20 to 30 cents a pound, requiring, as now conveyed, from 25 to 30 days. How much more, then, would go, at three or four cents a pound, if conveyed in ten or twelve days? Certainly ten or twenty times as much. Without much doubt, therefore, the through and way freight, and the way passengers on the Pacific railroad, would not be less than ten millions a year, which, added to the sum before stated, makes the gross proximate income per annum \$30,000,000.

This sum is sufficient to pay current expenses, and also a fair dividend on the estimated cost, \$120,000,000.

If it be said the items which are here enumerated are overestimated, it may be replied, that before the road can be completed another decade of our history will have transpired, and western progress will more than compensate for possible errors.

Besides, this estimate makes no account of new elements of business that will be created by a new channel of commerce so important to other nations of the world, and so sure to develop new industrial pursuits in our own country. This creative power of railroads has never been overestimated, and the only mistake railroad men have made in the productive results of their investments has grown out of the multiplicity of rival roads, and the consequent reduction of prices. A Pacific railroad is not liable to competition, for if others are made, they will be too remote to compete for local business, and they will not be undertaken for the through business until it has been clearly demonstrated there is enough to well compensate two or more roads.

The plan of execution.

Your committee have found the greatest diversity of opinion as to the mode of accomplishing the object, and for years the inventive genius of men has been directed to schemes for constructing a Pacific railroad. It is generally conceded that government must, in some way, encourage the work, to induce private capital to take hold of it. After much consideration, your committee have adopted the plan of advancing government 30 year bonds, bearing 5 per cent. interest, in payment for telegraph and transportation service, which is to be executed during the progress and after the completion of the work. To secure the government, they are to be advanced only as sections of fifty miles are completed, beginning at each end with what is supposed to be only enough to aid capital; the amount per mile is to increase as the work proceeds from both ends towards the centre of the line, where the expense will be greatest. As a further security, these advances are to be a first mortgage lien on the road and equipment;

so the effect is an advance of government credit for thirty years on what would seem to be ample security. We have stated the annual service now required by the government (which could and would be far better performed by a railroad) at five millions of army and navy transports, and one and a half million of postal service, which, together, amounts to six and a half millions. It is proposed to advance, as the work progresses, sixty millions in bonds, which may be increased by accruing interest over service as the work proceeds to seventy millions; the annual interest would then be \$3,500,000. The annual service, as above stated, \$6,500,000; so the annual service would exceed the annual interest \$3,000,000.

This last sum would remain with the government as a sinking fund sufficient to extinguish the bonds in less than twenty-four years, and therefore *before the bonds will become due*.

If it be said the railroad will furnish transportation at much cheaper rates than now paid, still the saving is no less to the government, and the increase in quantity of public transportations will probably more than compensate for the reduction of prices. Besides, the service as the work proceeds will keep down a large portion of the interest named, especially when it is apparent the bonds will not all be advanced till the work is all done.

It remains to be shown whether the sixty millions required from private capital will be well invested.

Take from the estimated gross income per annum, the service, as before stated, \$6,500,000, and there remains \$23,500,000 as the annual receipts to pay current repairs, expenses, taxes, and dividends.

Engineers have determined the net cost of running a train to be about one dollar a mile. There are many items besides fuel that make up the cost, but that being the principal item, and fuel being scarce on the road, we will put this cost at three dollars a mile. Three through trains a day each way will do all the business here contemplated. The daily cost would then be eighteen dollars a mile per day, and on two thousand miles, the estimated length of the Pacific railroad, \$36,000 a day, and for a year \$12,960,000 for running three trains from each end each day. Take this from \$23,500,000 and there remains \$10,540,000 to pay repairs, taxes, supervision, and dividends. For repairs, taxes, and supervision, say, one thousand dollars a mile, \$20,000,000, and there remains \$8,540,000, which is twelve per cent. per annum on the sum of \$70,000,000, to which the sixty millions may possibly swell by interest during the completion of the work.

Your committee have thus presented the nature of the work, the probable cost, and a mode by which government aid and private capital may unite in the accomplishment of the Pacific railroad. It may differ from the views of many, and may not be the best mode of accomplishing the object. Your committee have tried to adapt the plan to the nature of our government and the public will. The sum required from government (sixty millions) seems large, but it is only to be advanced in yearly instalments, and then in bonds which are secured by a first mortgage on the road. The Mexican war cost us two hundred millions, and we never felt the payment. The construction of a Pacific railroad will accomplish more good, and add more to our

national glory; and we would therefore be justified by posterity if we *sunk* double the \$60,000,000 we have estimated as the cost of the national achievement. The ancient roads of Peru and the "Appian Way" of Rome are monuments of national power worthy of an ancient civilization. A Pacific railroad is consistent with the intercourse and intelligence of our people, in harmony with the progress of the age, and worthy of a great and powerful nation.

It will unite isolated sections of our own country, create a direct communication between Europe and Asia, and revolutionize the commerce and elevate the civilization of the world.

Your committee having thus presented the matter submitted to their consideration, have prepared a bill designed to furnish the requisite legislation to accomplish the object, which they present with a recommendation that it do pass.

SAMUEL R. CURTIS,
F. W. KELLOGG.
R. P. FENTON.
CHAS. L. SCOTT.
ALEX. H. RICE.
SAMUEL S. BLAIR.
E. B. FRENCH.

I concur in the conclusions of the foregoing.

J. F. FARNSWORTH.

I am in favor of a route, in connexion with this, leading to the Columbia river; but as the committee decide against that, I endorse the recommendation of the committee in favor of the central route.

LANSING STOUT.

I concur in the above report except the plan of construction.

H. WINTER DAVIS.

APPENDIX.

In the first volume of the Railroad Surveys you will find a table which was made out with a view of showing comparative routes. Distances and elevations are taken from measurements, and are therefore reliable; but estimates of cost are mainly hypothecated on a supposed resemblance to roads elsewhere. But the starting points relate to the points where the *surveys* commenced, not where the *railroads* would commence. You must therefore add to the southern lines and deduct from the central line, as the committee have explained, before comparisons are made.—(See next page.)

A.—Table showing the lengths, sums of ascents and descents, equated lengths, cost, &c., of the several routes explored for a railroad from the Mississippi to the Pacific. (For the grades see the profiles accompanying the report.)

	Distance in straight line.		Distance by proposed railroad route.		Sum of ascents and descents.	Length of level route of equal working expense.	Comparative cost of different routes.	Number of miles of route through arable land.	Sterile region.		No. of miles at an elevation above 0, and less than 1,000 feet.	No. of miles at an elevation greater than 1,000 and less than 2,000 feet.										Summit of the highest pass on the route.
	Miles.	Feet.	Miles.	Feet.					No. of miles of route through lands generally uncultivable, arable soil being found in small areas.	No. of square miles of sums of areas of largest bodies of arable land in uncultivable region.		2,000 and 3,000.	3,000 and 4,000.	4,000 and 5,000.	5,000 and 6,000.	6,000 and 7,000.	7,000 and 8,000.	8,000 and 9,000.	9,000 and 10,000.	Feet.		
Route near 47th and 49th parallels, from St. Paul to Vancouver.	1,445	1,864	18,100	2,207	*\$130,781,000	374	1,490	||1,000	470	580	720	130	97	98	....	....	...	....	6,044	Tunnel at elevation of 5,219 ft.
Extension thence to Seattle.....	161	1,000	180	*10,090,000	161	161	
Route near the 41st and 42d parallels, via South Pass, from Council Bluffs to Benicia.	1,410	2,032	29,130	2,553	116,095,000	632	1,400	||1,100	180	170	210	160	580	285	270	107	20	....	8,373	Tunnel at elevation of 9,540 ft.	
Route near the 38th and 39th parallels, from Westport to San Francisco, by the Coo-che-to-pa and Tah-ee-chay-pah Passes.†	1,740	2,080	49,986	3,125	Cost so great that the road is impracticable.	620	1,460	||1,100	340	276	165	348	466	170	60	155	80	20	10,032	Tunnel at elevation of 9,540 ft.		
The same, from Westport to San Francisco by the Coo-che-to-pa and Madelin Passes.	1,740	2,290	56,514	3,360	.....do.....	670	1,620	1,100	275	308	190	143	725	281	110	155	80	20	10,032	Tunnel at elevation of 9,540 ft.	
Route near the 35th parallel, from Ft. Smith to San Pedro.	1,360	1,892	48,812	2,816	†169,210,265	416	1,476	2,300	305	347	260	185	160	305	235	95	.....	.....	7,472	
Branch road to San Francisco, from the Mohave river.	406	7,500	506	19,935,000	322	84	290	10	72	35	
Route near the 32d parallel, from Fulton to San Pedro.	1,400	1,618	32,784	2,239	68,970,000	408	1,210	2,300	485	300	100	170	503	60	5,717		
Extension to San Francisco.....	440	10,150	632	25,100,000	376	70	290	50	65	35	

* These are the estimates of the office, those of Gov. Stevens having been brought to the same standard of increased cost as the other routes, and his equipment reduced to that of the other routes. His estimates were \$117,121,000 and \$7,030,000.
 † Supposing the route to be a straight line, with uniform descent from the Un-kuk-oo-ap mountains (near Sevier river) to the entrance of the Tah-ee-chay-pah Pass, the most favorable supposition.
 ‡ This estimate for the route near the 35th parallel is thought to be largely in excess.
 § These sums do not include the areas of cultivable soil as far west as the Cascade and Sierra Nevada mountains.
 ¶ The sum of the minor undulations (not included in the sum of ascents and descents here given) will probably be greater for the route of the 47th parallel than for the other routes; that for the route near the 32d parallel will probably be the least of all.
 With the amount of work estimated for the roads in this report, the equated lengths corresponding to the sum of ascents and descents has but little practical value. With a full equipment and heavy *rolling stock*, the sum of ascents and descents becomes important. A comparison of the degree of curvature of the routes cannot be made.

The central route from Council Bluffs to Benicia lies between 26 degrees of longitude which at that parallel are about 50.20 miles long. There seems, therefore, to be a clerical error in the "distance in straight line," as shown in this table "A," which would be about 1,410 instead of 1,410 miles. The summit of the highest pass relates properly to Chayenne Pass, but if we go by the South Pass it would be 7,220 instead of 8,373 feet.

In the fifth volume of the Surveys, Captain Humphrey, the able and distinguished officer in charge of the surveys, has materially changed the figures as to cost, &c., on other lines; but no change appears to be made on the central. As these estimates of cost and *equated* distances are made on a mere reconnoissance, and profiles erected on barometrical observations twenty and thirty miles apart, engineers will perceive the convenient change of hypothesis that would change the estimate on the 35th parallel from \$169,210,265 to the round sum of \$169,000,000.

But other matters in these tables are interesting, and we here present the second edition of this table.—(See vol. VII, Explorations, Appendix, p. 37.)

Table showing the lengths, sums of ascents and descents, equated lengths, cost &c., of the several routes explored for a railroad from the Mississippi to the Pacific.

	Distance by air line.		Sums of ascents and descents.	Length of level route of equal working expense.	Comparative cost of different routes.	No. of miles of route through arable land.	No. of miles of route through land generally uncultivable, arable soil being found in small areas.	Number of miles at an elevation above the sea between—										Altitude above the sea of the highest point on the route.					
	Miles.	Miles.						Feet.	Miles.		No.	0 and 1,000 feet.	1,000 and 2,000 feet.	2,000 and 3,000 feet.	3,000 and 4,000 feet.	4,000 and 5,000 feet.	5,000 and 6,000 feet.		6,000 and 7,000 feet.	7,000 and 8,000 feet.	8,000 and 9,000 feet.	9,000 and 10,000 feet.	Feet.
Route near forty-first and forty-second parallels, from Council Bluffs, via South Pass, to Benicia	1,410	2,032	29,130	2,583	\$116,095,000	632	1,400	220	170	210	160	590	285	270	107	20	...	8,373					
* Route near thirty-eighth and thirty-ninth parallels, from Westport, via Coo-che-to-pa and Tah-ec-chay-pah Passes, to San Francisco	1,740	2,080	49,985	3,026	Impracticable.	620	1,460	340	276	165	348	466	170	60	155	80	20	10,032	Tunnel at elevation of 9,540 feet.				
Route near thirty-eighth & thirty ninth parallels, from Westport, via Coo-che-to-pa and Madelin Passes, to Benicia.	1,740	2,290	56,514	3,360	Impracticable.	670	1,620	275	308	190	143	725	284	110	155	80	20	10,032	Tunnel at elevation of 9,540 feet.				
Route near thirty-fifth parallel, from Fort Smith to San Francisco	1,550	2,096	48,521	3,015	106,000,000	646	1,450	585	290	261	236	181	295	222	26	....	....	7,550			
Route near thirty-fifth parallel, from Fort Smith to San Pedro	1,360	1,820	48,862	2,745	92,000,000	420	1,400	354	292	236	210	185	295	222	26	....	....	7,550	Tunnel at elevation of 4,179 feet.		
Route near thirty-second parallel, from Fulton to San Francisco, by coast route	1,630	2,024	38,200	2,747	190,000,000	834	1,190	893	347	120	342	271	50	....	....	....	....	5,717	
Route near thirty-second parallel, from Fulton to San Pedro	1,400	1,598	30,181	2,169	68,000,000	408	1,190	478	337	120	342	271	50	....	....	....	....	5,717	
Route near thirty-second parallel, from Fulton to San Diego	1,350	1,533	33,454	2,167	168,000,000	374	1,159	420	305	125	362	271	50	....	....	....	....	5,717	

* Supposing the route to be a straight line, with uniform descent, from the Un-kuk-oo-ap mountains (near Sevier river) to the entrance of the Tah-ec-chay-pah Pass—the most favorable supposition possible.

† The estimate of Lieutenant Parke for the construction of a railroad by this route, from Fulton to San José, is \$32,812,750. Adding \$2,025,000, the office estimate for the route from San José to San Francisco, Lieutenant Parke's total estimate from Fulton to San Francisco would be \$34,837,750.

‡ The estimate of Lieutenant Parke for this route is \$59,005,500.

§ The sum of the minor undulations (not included in the sum of ascents and descents here given) will probably be greater for the routes near the 47th and 49th parallels than for the other routes. With the amount of work estimated for the roads in this report, the equated lengths, corresponding to the sums of ascents and descents, have but little practical value. With a full equipment and heavy freight business, the sum of ascents and descents becomes important.

Surveys have been continued on the southern lines, and upon these changes were made in this amended table. It is reasonable to suppose further surveys on the central route would have caused similar improvements in the line, and hence the fairness of presenting both these tables.

Another table, found in the first volume Explorations, page 32, which has been used to show distances from the points where surveys commenced to navigable rivers and to eastern cities. This table does not profess to be perfectly accurate; but, on examination, some use may be made of it in studying the relative length of future lines of railroad. Distances seem to have been taken from railroads then "built, building, and projected." The projected lines had not then all been measured, and looking at the map accompanying this report it will be seen how and where these distances are "projected." The map being made under the supervision of the same officer, Captain Humphrey, illustrates these tables geometrically, and affords to the careful student an opportunity of making corrections where surveys and railroads have been made since the tables were first made in 1855.

" B. "

Distances of the eastern termini of the several Pacific railroad routes to the Mississippi river, Boston, New York, Charleston, and New Orleans, by railroads built, building, and projected, as measured on the "railroad maps."

	Miles.
1. St. Paul to Boston.....	1,316
St. Paul to New York.....	1,190
St. Paul to Charleston.....	1,193
St. Paul to New Orleans.....	1,198
Aggregate.....	4,897
2. Council Bluffs to Rock Island, (Mississippi river).....	267
Council Bluffs to Boston.....	1,374
Council Bluffs to New York.....	1,252
Council Bluffs to Charleston.....	1,195
Council Bluffs to New Orleans.....	1,075
Aggregate.....	5,163
3. Westport, mouth of Kansas, (near Fort Leavenworth,) to St. Louis, (Mississippi river).....	245
Westport to Boston.....	1,415
Westport to New York.....	1,220
Westport to Charleston.....	1,045
Westport to New Orleans.....	875
Aggregate.....	4,800

	Miles.
4. Fort Smith, on the Arkansas, to Memphis, (Mississippi river)	270
Fort Smith to Boston.....	1,540
Fort Smith to New York.....	1,345
Fort Smith to Charleston.....	960
Fort Smith to New Orleans.....	655
Aggregate.....	4,770
5. Fulton to Gaines, (Mississippi river).....	150
Fulton to Boston	1,530
Fulton to New York.....	1,330
Fulton to Charleston.....	950
Fulton to New Orleans.....	402
Aggregate.....	4,367

From this table "B" it will be seen that the distance from New York to San Francisco is the shortest by the central route.

	Miles.	Miles.
1. From New York to St. Paul, (see table "B,").....	1,190	
From St. Paul to Vancouver, (table "A,").....	1,864	
From Vancouver to Benicia, (the bay of San Francisco,) estimated, say.....	700	
		3,754
2. New York to Council Bluffs, (see table "B,").....	1,252	
From Council Bluffs to Benicia, (bay of San Francisco,) (table "A,").....	2,032	
		3,284
3. From New York to Fort Smith, (table "B,").....	1,345	
From Fort Smith to San Pedro, (table "A,").....	1,892	
From San Pedro to San Francisco, (table "A,")...	406	
		3,643
4. From New York to Fulton, (this is the Texas route,) (table "B,").....	1,335	
From Fulton to San Pedro, ("A,").....	1,618	
From San Pedro to San Francisco, (table "A,")...	440	
		3,393

It is strange that in the face of these tables the impression should have gone out that the Texas route is the shortest.

Some corrections have been made by subsequent surveys, but the shortening by Simpson's and other surveys on the central route renders it probable that the corrections would be much more favorable to the central route.

In considering the matter of a Pacific railroad *now* we cannot, however, overlook the fact that our railroad system has at some points

advanced several hundred miles further west on the central route, and thus the remainder to be constructed, as shown in the report of the committee, makes the central route to the *centre of the Pacific settlement* about three hundred miles the shortest.

OCEAN ROUTES.

The present routes to California and Oregon, whether by the Isthmus or Cape Horn, are not only thousands of miles round, but they are journeys by water. Land transportation and travel are every day advancing by new inventions, and everybody seems to prefer land even when water lines are of equal length. Railroads along the lake shore and Hudson river are crowded with business. How much more, then, would a route by rail direct to San Francisco compete with present circuitous water routes to the same place.

The Isthmus routes also carry everything through sultry, sickly climates, where property is damaged, and many articles ruined; and where disease has fastened upon thousands, and carried them away to untimely graves.

But everywhere the ocean is a solitude and sepulchre that all should shun who seek security and comfort in their commercial pursuits. Thousands are lost, "buried in the sea," and millions of treasure has been scattered over the fathomless bed of the ocean. The following summary of disasters, compiled and published in a speech of the Hon. Charles L. Scott, on the "steamboat passenger bill," in 1858, is a graphic picture of accidents on water which should serve as an argument in favor of railroad and land travel everywhere:

H. Rep. Com. 428—3

List of steamers lost within the last five years.

Name of steamer.	When lost.	Value of vessel and cargo.	No. of lives lost.
President, (a)-----British-----		\$1,200,000	130
Arctic, (b)-----American-----		1,800,000	300
Pacific, (a)-----do-----		2,000,000	240
San Francisco, (b)-----do-----		400,000	160
Central America, (b)-----do-----		2,500,000	387
Union, (c)-----do-----	July, 1851	300,000	None.
Chesapeake, (c)-----do-----	Oct., 1851	50,000	None.
Sea Gull, (c)-----do-----	Jan, 1851	50,000	None.
Commodore Preble, (c)-----do-----	May, 1851	50,000	None.
General Warren, (c)-----do-----	Jan., 1852	50,000	None.
North America, (c)-----do-----	Feb., 1852	150,000	None.
Pioneer, (c)-----do-----	Aug., 1852	250,000	None.
Independence, (c)-----do-----	do-----	100,000	140
City of Pittsburg, (d)-----do-----	Oct., 1852	300,000	None.
Tennessee, (e)-----do-----	March, 1853	300,000	None.
J. S. Lewis, (e)-----do-----	April, 1853	150,000	None.
Washington, (e)-----do-----	do-----	40,000	None.
Southerner, (e)-----do-----	do-----	30,000	None.
Yankee Blade, (f)-----do-----	Nov., 1854	280,000	75
Humboldt, (f)-----do-----	do-----	1,600,000	None.
Franklin, (f)-----do-----	do-----	1,900,000	None.
City of Glasgow, (a)-----British-----	do-----	850,000	420
City of Philadelphia, (f)-----do-----	Sept., 1854	600,000	None.
Her Majesty, (a)-----do-----	do-----	250,000	80
Opolousas, (g)-----American-----	do-----	125,000	30
Rhode Island, (a)-----do-----	do-----	100,000	60
North Carolina, (g)-----do-----	do-----	100,000	15
Winfield Scott, (c)-----do-----	do-----	350,000	None.
Tempest, (a)-----British-----	do-----	300,000	150
Lyonnais, (g)-----French-----	do-----	280,000	160
Albatross, (h)-----American-----	do-----	120,000	None.
Cherokee, (i)-----do-----	do-----	450,000	None.
Knoxville, (j)-----do-----	do-----	150,000	None.
Canadian, (k)-----British-----	do-----	400,000	None.
Crescent City, (f)-----American-----	do-----	180,000	None.
		17,750,000	2,307

(a) Never heard from.

(b) Foundered.

(c) Wrecked on coast of California.

(d) Burned at Valparaiso.

(e) Lost on the Pacific coast.

(f) Wrecked.

(g) Collision.

(h) Lost near Vera Cruz.

(i) Burned in the harbor.

(j) Burned in the harbor of New York.

(k) Wrecked in the St. Lawrence.

Losses on the lakes.

1854, steam vessels, valued at \$2,187,825	Lives lost -----	119
1855-----do-----do-----1,692,700	Do-----	118
1856-----do-----do-----1,378,100	Do-----	407
		<u>644</u>
		<u>5,258,625</u>

On the western rivers for one year, from 1852 to 1853.

78 steamboats, 4 barges, 73 coal boats, 32 salt boats, on board of which 400 lives were lost.

RECAPITULATION.

Value of property.

Lost on steamers on the ocean.....	\$17,750,000
Lost on the lakes.....	5,258,625
	23,008,625
	23,008,625

Number of lives lost.

Lost on the ocean.....	2,307
Lost on the lakes.....	644
Lost on western rivers.....	400
	3,351
	3,351

Add to this the *Austria*, a fire at sea and great loss of life, the wreck of the *Flying Cloud*, and many more recent and fearful accounts of disaster which crowd upon the memory and swell the fearful aggregates of human sacrifice to ocean service.

WESTERN TERMINUS.

The centre of California population is probably north of Sacramento. Hence, for all purposes of securing railroad connexion with the centre of the Pacific population, and also securing convenient commercial connexion with San Francisco, it is sufficient for a central Pacific railroad to run to the navigable waters of the Sacramento. On this subject Lieutenant Abbot, of the Topographical Engineers, says of that river :

“ Navigation of Sacramento river, California.

“Boats of about four hundred tons burden, (register two hundred tons,) ply regularly from San Francisco to Sacramento, a distance previously estimated from one hundred to one hundred and thirty miles by water.

“Between San Francisco to Lone Tree House boats of about two hundred tons ply regularly. The distance by water is not known to me, but it is about one hundred and twenty-five miles. At Lone Tree House there are some slight rapids.

“From Lone Tree House to Red Bluffs, (the head of steamboat navigation,) boats of about one hundred tons burden are used. The river is here somewhat obstructed by snags and very short bends. The distance is approximately sixty miles by water.

“HENRY L. ABBOT,

“1st Lieutenant Topographical Engineers.

“Capt. A. A. HUMPHREY,

“Corps Topographical Engineers.”

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The following report details the findings of the study conducted over a period of six months. The primary objective was to evaluate the effectiveness of the proposed system in various scenarios. The methodology employed a combination of theoretical analysis and practical experimentation. The results indicate that the system performs well under most conditions, though some limitations were observed. A detailed discussion of these findings is provided in the following sections.

1. INTRODUCTION

The purpose of this study is to investigate the impact of the proposed system on the overall performance of the organization. This report is structured as follows: Section 2 describes the objectives and scope of the study. Section 3 outlines the methodology used for data collection and analysis. Section 4 presents the results of the study, and Section 5 discusses the implications of these findings. Finally, Section 6 provides a conclusion and recommendations for future work.

2. OBJECTIVES AND SCOPE

The primary objective of this study is to determine the effectiveness of the proposed system in improving operational efficiency. The scope of the study is limited to the specific areas of the organization mentioned in the introduction. The study was conducted over a period of six months, during which time data was collected and analyzed.

The study was designed to evaluate the system's performance under various conditions. The methodology involved a combination of theoretical analysis and practical experimentation. The results of the study are presented in the following sections.

HERBERT J. ADAMS

The following report details the findings of the study conducted over a period of six months. The primary objective was to evaluate the effectiveness of the proposed system in various scenarios. The methodology employed a combination of theoretical analysis and practical experimentation. The results indicate that the system performs well under most conditions, though some limitations were observed. A detailed discussion of these findings is provided in the following sections.

PACIFIC RAILROAD.

APRIL 16, 1860.—Ordered to be printed.

Mr. ALDRICH, from the select committee on the Pacific railroad, submitted the following

MINORITY REPORT.

The undersigned, members of the select committee on the Pacific railroad, would respectfully submit the following considerations in favor of aid to the northern route :

ITS NATIONAL CHARACTER.

The northern route connects the great lakes and the Upper Mississippi with Puget's Sound and the Columbia river. It is required for the defence and development of the northwest, for the transportation of the mails, troops, supplies, and munitions of war. It is demanded to enable the country to control the changing course of the trade of Asia. The direct commerce of our Pacific coast with Asia and the islands of the Pacific is very rapidly increasing. There is already a very considerable movement of population. The vast country watered by the Amoor, as well as the large population of China, must, in a few years, furnish a trade rivalling that of the lakes and the Gulf of Mexico at the present time. The northern route not only is the shortest route across the continent connecting great water lines, but its termini are nearer to both Asia and Europe than the termini of any other route. Besides, its gradients are the smallest, its engineering and operating difficulties the least, and the country tributary to it best adapted to settlement. It abounds in all the materials of construction, timber, building stone, and iron for the rail. We will present a summary of its characteristics in these several respects.

DISTANCES.

Overland.

The distances from St. Paul and Lake Superior to Seattle, on Puget's Sound, are respectively 1,764 and 1,750 miles; and from the same points to Vancouver, on the Columbia, 1,747 and 1,733 miles. From St. Louis via central route to Benicia, 2,482 miles. From Memphis via route of the 35th parallel to San Francisco, 2,366 miles, and from

Gaines *via* the route of the 32d parallel to San Francisco, 2,174 miles; which shows that the overland distance from Seattle or Vancouver to the Mississippi and the great lakes is much less than the distance from San Francisco to the Mississippi, either by the central, the 35th parallel, or the 32d parallel route.

To Asia.

	To Seattle.	To San Francisco.	Difference in favor of Puget's Sound.
From Amoor	3,850	4,110	260
From Shanghai.....	5,140	5,430	300
From Canton.....	5,900	6,140	240
From Calcutta.....	8,730	8,970	240

Which shows Puget's Sound is nearer the above ports of Asia than San Francisco by distances ranging from 240 to 300 miles, and averaging 260 miles.

For sailing vessels the difference of distance is practically greater, for the prevailing winds are such that vessels coming from Asia make the entrance to the Straits de Fuca on their way to San Francisco, and thus the practical distance is some seven hundred miles less to Puget's Sound than San Francisco.

To Europe.

When freights have reached Lake Superior they can be placed on shipboard at once, and be sent without breaking bulk to Europe. If they be sent by rail to some Atlantic port, then the railroad distance *via* St. Paul to all the Atlantic ports will be on an average 351 miles less than by the central, and 100 miles less than by the southern route. The distance to Portland *via* rail on the northern route is less than to any port on the Atlantic *via* the central route, or to either Boston, New York, or Philadelphia by the southern route. And Portland is nearer Liverpool, Havre, and Bremen, than New York, by 220 miles, and more southern ports by a greater distance.

These statistics are given to show that in all the characteristics of a route of travel and of commerce, in respect to distances, the northern route has the advantage. Greater proximity to Asia, shortest distance between great water lines, greater proximity to Europe, it is the shortest and most direct route between Asia and Europe.

GRADIENTS.

But this route has the easiest gradients. The sum of ascents and descents from St. Paul to Seattle is 21,787 feet against 29,387 on the central, 48,791 feet on the 35th parallel, and 38,350 feet on the 32d parallel route. These figures give the best practical index of the

effect of the gradients to increase the cost of transportation. Engineers allow one mile for every 52.08 feet of rise or fall as denoting the additional working expense over a level route, which would add to the northern route 412 miles, to the central route 556 miles, to the 35th parallel route 924 miles, and the 32d parallel route 726 miles; and thus making an additional distance in favor of the northern route of 144 miles over the central, 512 miles over the 35th parallel, and 314 miles over the 32d parallel route.

We cannot better illustrate, in connexion with the gradients, the advantage of the northern over the central route, than by comparing the distances to Chicago, the nearest point of connexion of the central route with the great lakes. Taking the equated distances—that is, taking the lengths of level routes of equal working expense for each route, instead of the lineal distances—we find Seattle *via* St. Paul to Chicago 2,586 miles, and Benicia *via* Rock Island to Chicago 3,037 miles. Comparing in the same manner the nearest connexions of each route with the great lakes, we have from St. Paul to Lake Superior 2,162 miles against 3,037 miles, the distance from Benicia to Chicago, a remarkable disparity between the routes in favor of the northern route, when it is considered that at Chicago the water line thence to Europe is as long as from Lake Superior.

THE MISSOURI AND COLUMBIA RIVERS.

The northern route might be called the route of the Missouri and Columbia rivers. It touches the Missouri at the mouth of the Yellowstone, and near the Great Falls; the Columbia at steamboat navigation. Steamers have actually ascended the Missouri to Fort Benton, a short distance below the Great Falls, and the Columbia and Snake rivers to Priests' Rapids and the mouth of the Pelouse. These rivers are now used by the War Department as lines of transportation for troops and supplies. Troops will next month be sent in steamers to Fort Benton, and thence be despatched overland to the department of Oregon. The distance from Fort Benton to the mouth of the Pelouse is about 485 miles, and to Priests' Rapids about 560 miles. No other route presents this extraordinary engineering facility for the construction of an overland railroad; for it can be worked simultaneously in four different divisions, the extremity of each division resting on water lines, and thus the road can move on simultaneously on eight different sections; the longest division being the one from Fort Benton to the Columbia, and the longest distance the road will have to be constructed from a single point accessible by water being less than 300 miles. On every other route the distance between water lines will be from 1,500 to 2,000 miles.

CHARACTER OF THE COUNTRY.

The official report of Governor Stevens states that all but 320 miles of the route passes through an arable country, and that these 320 miles are either a grazing country or are occupied by the higher portions of the mountain ranges, which are generally wooded. This is

confirmed in general terms by the reports of Lewis and Clarke, the statements of the Jesuit missionaries, and especially by the geological reconnoissance of Dr. Evans. There seems to be no difference in judgment between Governor Stevens and the officers generally of his exploration. Moreover, so far as settlements have extended, and they have spread over a large portion of the interior of Oregon and Washington, they have fully confirmed this judgment. The formation generally of the country is limestone, and the deposition of moisture is unquestionably sufficient for all the purposes of tillage. There is a remarkable absence of sage and sand on the route. It occurs only in comparatively small patches. The worst portion of the country on the route lies mostly north of the located railroad line between Snake river and the Spokane, and between the Columbia and the meridian passing through the mouth of the Pelouse. Yet in this tract, comprising simply 50 miles of the route, there is generally good though not abundant grazing, and many spots of good arable land.

WOOD, WATER, AND MATERIALS FOR CONSTRUCTION.

In regard to wood, water, and materials for construction, the route generally is remarkable for its facilities. No deficiency need be apprehended of water on any portion of the route. Some aqueduct arrangements on a small scale may be required in passing south of the Miniwakan lake. As to wood, the longest interval is about one hundred miles, crossing the great plain of the Columbia, where ties, &c., must be procured either from the extremities of the route, or from a considerable distance off the route. The Columbia and Missouri with their tributaries, again come to the aid of the work. On the upper waters of both rivers the reservoirs of timbers are very large, and the rivers admit of easy rafting. The tributaries of both furnish supplies. Assuming as wooded any portion of the route which passes along a stream which, by rafting, can supply wood, and also as wooded any portion of the route where a growth of cotton-wood, &c., will furnish temporary arrangements until the road is in operation and a more durable material can be furnished by the road itself, there is wood along the entire route for all the purposes of the structure, except for the hundred miles above referred to in Washington Territory, for about fifty miles in crossing the Conteau du Missouri, about one hundred miles south of the Miniwakan lake. The forest growth of the Cascades, Bitter Root, and Rocky mountains consists of fir, spruce, larch, pine, cedar, &c., which attain, except on some portion of the eastern slope of the Rocky mountains, a large size and are inexhaustible in quantity. Excellent pine and fir flank the road east of the Rocky mountains, at the Three Buttes, Bear's Pass, the Girdle mountains, and is brought down from the Upper Missouri. A cotton-wood of large growth is found on Milk river, which will answer temporarily until a better material can be brought by rail from the nearest point where the road touches the Missouri. Through the State of Minnesota the supply of timber is inexhaustible.

As to building stone, sand, clay for bricks, there are ample supplies at convenient points. Moreover, near the line of the road west of the

Rocky mountains, there are inexhaustible supplies of the most valuable ores of iron. These ores have been carefully analyzed. They are to be found in the Spokane country, on the tributaries flowing into Snake river, and in the Cascade mountains.

CLIMATE.

The undersigned are satisfied that the objections which have been urged against this route on account of the severity of the climate and the depth of the snow are utterly untenable. Railroads are now in successful operation where the difficulties in both these respects are at least equal to those that will be encountered on this route. Indeed, the climate is much more severe on the Russian and Canada roads. The snow is absolutely less on the northern than on the central route. It is notorious that it is small through the prairie region from Minnesota to the base of the Rocky mountains; and the explorations have furnished significant and reliable information, removing entirely all doubt as to its being a serious difficulty in crossing either of the mountain ranges. In the Flathead country, and on the great plain of the Columbia, there is less snow than in the prairie region east of the Rocky mountains. Indeed, throughout the entire extent of the route, cattle and stock keep in good condition in winter without fodder. The quantity of stock in the interior of Washington and Oregon and east of the mountains, which thrive and live solely upon the winter grass, is very large. During the past winter the stock of Lieutenant Mullan, in charge of the Fort Benton and Walla Walla wagon-road, has been subsisted on the grass of the Bitter Root valley, and at the last accounts, the middle of January, was doing well. It is not necessary to elaborate this question of climate, as the information given in the reports of the explorers is very full and convincing.

ENGINEERING DIFFICULTIES.

We have adverted to the extraordinary engineering facilities afforded by the river system of this route. The only engineering difficulty of mark on this route are the tunnels which lie on the line of the shortest practicable route. These tunnels may be mainly avoided by deflections from the shortest line, which would considerably increase the distance. It may be remarked, however, that tunnels, both in Europe and the United States, are in process of construction which exceed the length of the longest tunnel lying on any one of the reported practicable lines of the northern route. If, on the final surveys of location, it be determined to encounter the tunnels rather than increase the distance and cost of deflection, it would not delay the completion of a through road, as zigzags may be used temporarily. Great improvements have been made, and are being made, in all the appliances, particularly in machinery for tunnelling, and we do not apprehend that any serious difficulty will arise from this cause. We have, indeed, the opinion of the most eminent engineers of both Europe and the United States having experience in tunnelling, to the effect that tunnels like those on the northern route are perfectly practicable, and not

to be considered, excepting as operations involving a certain cost and requiring a certain time to be accomplished.

The other difficulties are simply the usual difficulties in a well watered and mountainous country: large quantities of bridging and culvert work, heavy excavations in rock and earth, and, as regards the Lower Columbia, special provision against freshets. In consideration of the eight independent operations into which the work of constructing the road upon this route can be resolved, as a piece of engineering it is really simply the work of building less than three hundred miles of road, and it may be asserted without fear of contradiction that we have built more difficult and more costly roads already in the United States, as several of the roads over the Alleghanies.

COST.

Indeed we may dismiss the engineering difficulties altogether; cease to annoy ourselves about either the tunnels or the excavations in rock and earth, or the bridges and culverts, and come at once to the cost of the road. We are satisfied that if the necessary means are raised all the difficulties will disappear before the engineer, as they have invariably disappeared in our whole railroad experience where labor and skill have been applied.

The cost of the northern route from the western boundary of Minnesota, with two branches, one to Seattle on Puget's Sound, and the other down the Columbia river to Vancouver or Portland, in round numbers, is one hundred and twelve millions of dollars, or in detail:

	Miles.	Cost.
West boundary of Minnesota to Seattle.....	1,543.6	\$95,000,000
Columbia river branch.....	223	17,000,000
Total.....	1,766.6	\$112,000,000

It is believed that this estimate will be considerably reduced in the careful location of the road, for great care seems to have been taken in not only allowing very liberal sums for contingencies of all kinds, but in the cost per mile for every section. Thus, \$40,000 per mile is the estimate of the cost for 742 miles of the route, passing over the prairie region lying between Minnesota and the head waters of Milk river. The undersigned do not doubt that much of this distance can be built for \$25,000 per mile, including a full equipment.

DEFENCE.

The movement of troops the present season up the Missouri is significant of the military importance of the northern route—a consideration greatly strengthened by its neighborhood to a foreign power, now bent on the development of its possessions north of the boundary. The main reliance for troops in time of war is the militia of the country, and a policy which shall tend to throw population on our frontier and to develop all its varied resources, will tend infinitely to strengthen this right arm of our national defence. Moreover, it is not probab-

that any effort will be made to establish a continental communication by rail through British America, at least for many years, if the United States, in adopting a railroad system, shall provide for the northern route. A glance at the map will show the large population, and the great resources tributary to it: on the Pacific, Oregon, Washington, Vancouver's Island, and British Columbia; and east of the Rocky mountains, the whole St. Lawrence basin, and the basins of the Upper Mississippi, Upper Missouri, and the Red River of the North. More than one-half the railroad capital of the continent is directly concerned in the recognition of this route; and, considering the distances given in the first part of this report, the whole country east of the Mississippi must look to the northern route as the route of the commerce of Asia. If the northern route be on American rather than on British soil, its effect on the commerce of the Pacific can hardly be exaggerated, and we hazard nothing in predicting that the freight business will be so large on the completion of the road that the necessity will at once be established of laying a double track. Thus this road is the condition indispensable to American ascendancy on the northwest coast, and in the commerce of the Pacific. Its effect to strengthen the defence of the country, both on the sea and on the land, must impress every mind. The policy of the country is not to lay up immense quantities of decaying material in peace for the purposes of war—large hulks of ships which will be obsolete in model and rotten from stem to stern—or to keep in service a great force of officers and men in any of its arms, to be in the condition of lethargy and effete-ness on the breaking out of war; but to keep in the best possible condition the material and force required for active service in the contingencies of year to year; to keep in advance, through the inventive genius of our people and the great administrative capacities of our government, of the improvements of all other nations, and to devote the uncrippled energies of our people to the development of the resources of our country—subduing its wilderness, establishing its communications, extending its commerce, quieting and subordinating all its disturbing elements, protecting all branches of industry in their legitimate pursuits, and thus creating vast resources and facilities, and impressing upon our institutions an iron and irresistible energy, which in war will cause armed men and vessels of war and supplies to spring up at command, and the whole to be applied in the spirit and success which have crowned the accomplishment of the conquests of peace. This is the wise policy of the country, and in this view we must keep a vigilant eye on the commerce of the Pacific. Puget's Sound is marked out by nature for a great commercial entrepot. The northern route will give it to the United States, with all its grand elements of naval strength. An abandonment of the northern route will give it to Great Britain, which already has a rapidly increasing commerce and a large naval station in those waters.

CONNEXIONS.

We have referred to the fact that the adoption of the northern route by Congress will defer almost indefinitely a continental road through

the possessions of the British crown. This view is confirmed by the consideration that a route through British territory would be longer and more difficult than the route of the 47th parallel, and that easy and short connexions can be established between this route from the great plain of the Columbia and the mining regions on Frazer's and Thompson's rivers. Such connexions cannot bring about an antagonism and rivalry in the trade of Asia, for freight will invariably follow the cheapest lines, other considerations being equal. But these connexions, local in character, will be of great consequence in accommodating British Columbia, and as feeders to the main line.

Moreover, the Columbia river branch of the northern route lends itself to a connexion with San Francisco by the Willamette and Sacramento valleys; and such connexion will give San Francisco an undisturbed interior communication with Oregon and Washington, (of great consequence in time of war,) and also her shortest possible connexion with the great lakes. Considering the rapid increase of population in the northwest, and that on the completion of the overland railroad there will be in Minnesota, Wisconsin, Northern Iowa, Dakota, and the British possessions to the northward, a population of at least five millions of souls lying nearer to San Francisco by the northern route and this proposed connexion than by any other route, it is an element of business and communication not to be overlooked or surrendered.

There is, however, at present an excellent coast communication by steam between San Francisco, the Columbia river, and Puget's Sound, and for this reason we do not recommend government aid to establish the connexion.

MINERAL WEALTH.

We have thus far simply adverted to the inexhaustible quantities of good iron ore on the route. There is, however, a large gold-bearing country east of the Cascade mountains on the line, and sulphur, lead, platinum, quicksilver, silver, and copper north of the route. The established gold-bearing character and the remunerating mines of British Columbia, taken in connexion with the similarity of the geological formation in Washington Territory, and the rich deposits of gold now being worked, leaves scarcely room to doubt that a large mining population will be found in the vicinity of the route before the road could even be located, which circumstance would, in its turn, rapidly develop the agricultural and grazing capacities of the country, and draw over the northern route a large emigration.

Moreover there is good coal in inexhaustible quantities on Puget's Sound, and traces of good coal have been found in the interior, near the line of the route.

TRADE WITH ASIA.

We have already shown that the northern route furnishes much the shortest line from Asia to our interior, our Atlantic ports and to Europe.

The trade of Asia is a trade with over six hundred millions of people, covering an area of over twelve millions of square miles. The foreign trade of China was estimated, some years since, at one hundred and twenty-five millions of dollars. Japan, with its fifty millions of people, is six thousand one hundred and sixty miles nearer England via the northern route than by Cape Horn, and Shanghai, the great future emporium of China, three thousand six hundred miles nearer. The shortest time will determine both the course of travel and the line of movement of all costly articles of freight. The value of time in the transportation of freight is evinced by the high rates paid to clipper ships, the rapid increase of business on the steamers between New York and San Francisco, where the rates are excessively high, the movement of cotton up the Mississippi, and by rail, to New England ports, and the higher rates paid for transportation by rail on lines parallel to canals and rivers. But all articles which deteriorate by exposure to a tropical climate will take the northern route across the continent. Teas, spices, furniture, silks, furs, &c., will, on this route, find their way to Europe.

A short route to China is of the utmost importance to this country, to facilitate the exportation of goods manufactured from the great American staple. Great Britain has penetrated Asia, and commanded its valuable trade almost wholly by her exports of cotton goods. Hitherto we have had no advantage of distance in our competition for this trade. Her advantages for manufacturing are fast diminishing. The prices of labor in that country are increasing. Our own manufactures of coarse cottons have attained such skill and economy that they command our own markets, and are only restrained in the productions of their enterprise by a want of outlets for their fabrics. With the proposed northern road, we shall best avail ourselves of our geographical position to control the markets of Asia with our cottons. It has been estimated that the supply necessary for these new markets will require an amount of cotton equal to the present entire crop of upland cotton in the United States.

Estimating the trade which will spring up with Asia at only fifty cents per soul per annum, (and our trade with Cuba exceeds twenty dollars per soul,) it will give us a trade exceeding three hundred millions a year. Including, however, the overland transportation to Europe, we do not doubt it will exceed six hundred millions per annum.

The undersigned have thus given a brief summary of the characteristics of the northern route, and have presented, what seems to them, its truly national character. They recommend to the consideration of the House the accompanying bill.

CYRUS ALDRICH.

The first part of the document is a letter from the Secretary of the Board of Education to the Board of Trustees of the University of the State of New York. The letter is dated January 10, 1900, and is addressed to the Board of Trustees. The letter discusses the proposed changes to the Board of Education and the Board of Trustees. The Secretary states that the Board of Education has been reorganized and that the Board of Trustees has been reconstituted. The Secretary also discusses the proposed changes to the Board of Education and the Board of Trustees. The letter concludes with a request for the Board of Trustees to approve the proposed changes.

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PACIFIC RAILROAD.

MAY 9, 1860.—Ordered to be printed.

Mr. HAMILTON, from the Select Committee on the Pacific Railroad, submitted the following

MINORITY REPORT.

The undersigned, a minority of the special committee to whom was referred the subject of the Pacific Railroad and the various memorials relating thereto, submit the following views as embodying some of their conclusions in reference to the subject, and report:

Every proposition to engage the government of the United States in the business of constructing a railroad between the States in the valley of the Mississippi and those on the Pacific slope is met by constitutional objections to the power of Congress to legislate for the purpose. But it is conceded by all that Congress may use the inventions of science and art in selecting the best instruments with which to conduct successfully the public administration, within the sphere constitutionally limiting congressional power. So that, though it should be admitted that Congress cannot build a railroad to the Pacific, it may contract (with those who can) for the transportation of mails, supplies, munitions of war, soldiers, sailors, and public agents over such a road whenever the same shall be in readiness to convey freight and passengers.

Whether the government will pay for such service in advance of its performance does not present a question of constitutional power, but merely a question of policy, to be considered with reference to economy, security, and reimbursement.

If the service proposed should be essential to, or proper in, the execution of powers plainly confided to Congress, then Congress may contract for it on such terms as may be agreed between the contracting parties. Congress is not confined to a given formula in making a contract, and may make payment in advance or after performance by the other party, as Congress may estimate the one or other mode to be preferable, or to be justified by the objects to be secured by the contract. The history of the government abounds with examples of the undisputed exercise of this discretion, even where the object was merely scientific acquisition; much more then would it be justified where an equivalent is stipulated which, undoubtedly, will tend to

assure the common defence, promote the general welfare, and add ameliorations to commerce, all of which are ends within the care of Congress, under the strictest interpretation of the Constitution. Waiving a discussion of the question of constitutional power, as not necessarily arising under the view which we have taken of the action proper to the subject and the occasion, the undersigned suggest that they entertain no doubt that the public interest imperiously demands the adoption of some mode by which the extreme parts of this confederacy may communicate with each other more rapidly than they can at present; that the best mode is to establish railroads from the States in the Mississippi valley to the shores of the Pacific, and that it is the duty of Congress to lend every facility to the prosecution of such works wherever that can be done without overstepping the limits assigned to congressional power by the Constitution. But the undersigned do not concur with the majority of this committee, either as to the location of the road to which a preference should be given, if Congress will favor one road only, nor as to the extent of accommodation which Congress should afford.

The majority of the committee recommend only one trunk line, proceeding from the junction of two branches that are to spring from initial points on the western borders of Iowa and Missouri, and to unite within two hundred miles west of the Missouri river. The undersigned recommend that this line shall be established, to run from initial points on the borders of Iowa and Missouri, north of 38° , and to unite at some point within three hundred miles of the Missouri river, and thence to run by the best practicable route to the waters of the Sacramento and to San Francisco bay; also that the action of Congress shall embrace a contract with the Southern Pacific Railroad Company, of which J. Edgar Thompson is now the president, for the transportation of the mails, &c., over the line of railroad which said company is now constructing, starting from an initial point near the western borders of Louisiana and Arkansas, and thence, running by El Paso and Fort Yuma, to the Pacific shore at San Francisco, to embrace a branch, also, from Fort Smith, in the State of Arkansas, and uniting with the main stem west of longitude 97° .

The undersigned will now proceed to submit the considerations upon which they have arrived at their judgment in the case.

The line through Texas to the Pacific is known to be practical. It was surveyed in the years 1844-'45, by an engineer corps under charge of Mr. A. B. Gray. Its practicability was then solved, and the construction of the road has been commenced by the company referred to, under a charter granted by the legislature of the State of Texas.

The observations of Mr. Gray have been since verified by the reconnaissances of several officers of the United States of recognized and acknowledged abilities. Referring to the first five hundred miles of the proposed road, Mr. Gray says of the country through which it will pass:

"I can say that I know of no country more peculiarly adapted in every way to the construction and maintenance of a railroad. The mild and spring-like atmosphere; a perpetually healthful and pure climate, suitable to the growth of the most valuable staples; its num-

berless rivulets and fine alluvial bottoms; fruitful valleys and rich lands interspersed with prairie and timber; a far greater proportion of cultivable land; inexhaustible beds of excellent coal and other mineral deposits, render it, in varied and valuable resources, unequalled for such a length of line as this railway will embrace."

Major Merrill, of the United States army, says of the same country, in a letter to the Hon. Anson Jones:

"Nearly all the country along this route is susceptible of a dense population, is composed generally of rich lands, well watered, easily cultivated, having an abundance of stone, with a due proportion of timber. That the line of 32° is by far the cheapest and most practicable route for the Atlantic and Pacific Railroad is, in my own mind, settled beyond a doubt. Possessing an easy grade, with ample stone, timber, and water; passing through a rich and beautiful country, with a climate unsurpassed, if equalled, by any in the world, it cannot fail to attract the attention of all, and become the favorite route of the country."

When the face of the country changes from one of extreme fertility as a planting country, it becomes a fine range for pasturage. In the mountain ranges it abounds with minerals. The exports of copper from the mountain ranges nearest to Bexar, we are credibly informed, are now only limited by the means of transportation. Coal, salt, gypsum, argentiferous ore, are all found in great abundance, and invite the investment of capital.

From the eastern border of Texas to Fort Chadbourne (407 miles) the line of road will be laid on a gentle ascent, the *maximum* grade being 37 feet to a mile. From Chadbourne to Mustang Pond (100 miles) the average rise will be from 8 to 17 feet to the mile; thence to the Pecos river (115 miles) the average rise of 15 feet 5 inches and fall of 13 feet 4 inches to the mile; thence to the summit of the Guadalupe Pass, an average rise of 31 feet 2 inches to the mile for 35 miles. From this point the grades are 45 feet to the mile for the next 27 miles; then for seven miles a maximum gradient of 91 feet per mile, which is the maximum grade occurring between the eastern border of Texas and El Paso. The grades, ascending or descending, through the intervening distance only exceed 40 feet to the mile through a distance of four miles, when the average descending grade is 75 feet to the mile. The distance from the initial point to El Paso is 783 miles.

Such is the country and such the sketch of this line to the crossing of the Rio Grande, and we have stated this somewhat in detail to prove the practicability of the route and to exhibit the character of country whose resources the road will be calculated to develop. From El Paso to Fort Yuma (500 miles) the direction of the road is west, between the 31st and 32d parallels, and at grades which seldom exceed thirty feet to the mile, the maximum grade at Dome Pass, for five miles, being 63 feet to the mile.—(See Appendix for Report of A. G. Campbell on N. H. Hutton's observations on the route from El Paso to Fort Yuma.)

The practicability of this route, indeed of other routes, from Fort Yuma to San Francisco has been established by several close recon-

noissances.—(See Lieutenant Parke's Exploration, Ex. Doc., vol 2, part 7, page 4 and following pages, for an able report on this part of the line. See, also, letter of A. G. Campbell, Superintendent of Pacific Wagon Road, in Appendix, (D,) for another route, in the line between Yuma and San Francisco.)

Major Emory, in his Memoir on the Boundary Survey, vol. 1, page 14, says of this route, "It is the most practicable, if it is not the only feasible route by which a railway can be carried across the Sierra Madre and its equivalent ranges to the south."

Secretary Davis, at page 29, volume 2, part 1, Executive Document for 1855, says "the route of the 32d parallel is, of those surveyed, the most practical and economical route for a railroad from the Mississippi river to the Pacific ocean. This is the shortest route, and not only its estimated cost less by a third than that of any other of the lines, but the character of the work required is such that it could be executed in a vastly shorter period." This line passes through a salubrious climate, and avoids the snows, which will form a very serious impediment to successful operations on the more northern routes.

We will not extend this paper by details as to climate, water, fuel, stone, timber, and other elements which enter into a solution of the question of construction, nor shall we offer any further comments as to the gradients on this line. Suffice it that, beyond any doubt, all the elements for success are present, and there can be no rational dispute as to the feasibility of constructing the railway along the line herein indicated.

A comparison of the routes by the 32d and 41st parallels will most clearly demonstrate the superiority of the former. By reference to the accompanying letter of Captain Humphreys, the accomplished and intelligent officer whose attention has for several years been occupied by the Department of War in embodying the reliable results of the railroad explorations, it will be seen that in point of *distance* the southern Pacific railway line has an immense advantage over all the other lines that have been discussed.—(See Appendix A.) This advantage will be still more apparent from an examination of the table, taken from the Pacific railroad reports, and furnished with the majority report of this committee.—(See Appendix B.) Such examination, on a comparison of the routes by the 32d and 41st parallels, results as follows:

Estimated cost of route on 41st parallel	-	-	\$116,095,000
Estimated cost of route on 32d parallel	-	-	90,000,000
			26,095,000
			26,095,000
Arable lands on route of 41°	-	-	632 miles.
Arable lands on route of 32°	-	-	834 "
			202 "
			202 "

Uncultivable lands on route by 41°	-	-	-	-	1,400 miles.
Uncultivable lands on route by 32°	-	-	-	-	1,190 "
					<hr/>
Difference in favor of southern route	-	-	-	-	210 "
					<hr/>

Elevations.

0 to 1,000 feet.—In favor of southern route over the route on 41°	-	-	-	-	673 miles.
1,000 to 2,000 feet.—In favor of southern route over the route on 41°	-	-	-	-	147 "
2,000 to 5,000 feet.—Greatest in northern route	-	-	-	-	319 "
5,000 to 6,000 feet.—Greatest in northern route	-	-	-	-	235 "
6,000 to 7,000 feet.—Greatest in northern route	-	-	-	-	270 "
					<hr/>
The highest elevation on the southern route is	-	-	-	-	5,717 feet.
The highest elevation on the northern (41°) route is	-	-	-	-	8,373 "
					<hr/>
Difference in favor of southern route	-	-	-	-	2,656 "
					<hr/>

The minimum of cost, and cutting, more miles of low elevations and fewer miles of great elevations; more cultivable lands and fewer uncultivable lands; milder and more genial climate, and shorter distance, constitute some of the superior advantages of the southern route over the only route recommended by the majority of the committee.

But there are other advantages belonging to the route on the 32d parallel which must not be omitted in this connexion. For commerce with Australia, the Sandwich Islands, all Oceanica, and the entire west coast of Mexico, Central and South America, the route on parallel 32° so far outstrips its competitor on the parallel 41° that there is, in fact, no comparison between them.

When the rail shall be in working order to El Paso—the crossing of the Rio Grande—a most valuable commerce will be opened to the United States, which at present is but partially enjoyed by them. The topography of the country indicates the vicinity of El Paso as the local business point for Sonora, Sinaloa, Chihuahua, Durango, and Zacatecas, at least, and it will have superior advantages to command the trade of all that part of Mexico north and west of the city of Mexico which does not properly seek a western seaport on the Mexican coast. This will appear from the fact that the direction of the mountain ranges and valleys of Mexico, as indicated by the streams, put up to El Paso as a common centre. A glance at the map will prove this. The table of distances from point to point will also prove that El Paso is the most convenient point from which to command the trade with the richest mineral districts of Mexico. From El Paso to Durango is about four hundred miles; from the city of Durango to the city of Mexico is five hundred and twenty-eight miles. With El Paso opened as a point of depot and distribution there can be no

question, that the trade, at least so far as Durango, will at once turn to El Paso, and that commerce which now falls almost exclusively into British hands will, thenceforward, stimulate American enterprise and reward American industry. The amount of this trade may to some extent be estimated from a knowledge that the area covered by the five States referred to is 273,832 squares miles, or more than one-third of the entire area of the Mexican republic, (which is 766,482 square miles,) and that at present this area contains *less than four inhabitants to the square mile of territory, though it is known to be the richest mineral district of the whole republic.* Our consul, writing from Chihuahua in 1858, says :

“In minerals this State exceeds any other in the republic. There is coined in the mint in this city \$1,000,000 annually in silver. Of the silver taken from the mines not one-third comes here for coinage.”

* * * “It is for its mines that the State of Chihuahua is destined to be most distinguished. Sufficient progress has been made in the working of these, principally silver, to prove that they are of surpassing richness.” Another writer says :

“This branch of industry, as well as all others throughout this region, has been brought to the verge of ruin by hordes of wild Indians, of whom the Apaches are the principal, who, for many years, have followed their thieving destructive calling, almost without let or hindrance. The State is, in fact, partially abandoned by reason of this great scourge.”

The same author says : “Chihuahua has remarkable facilities for the raising of stock. Her hills, plains, and valleys, afford sustenance for cattle, horses, mules, and sheep, throughout the year, and in no section of the habitable part is the climate such as to require shelter for stock, which has always been one of the principal sources of wealth in the State.” Chihuahua produces corn, wheat, barley, cotton, sugar-cane, grapes, figs, oranges, lemons, pears, peaches, fruits, and vegetables, of all kinds nearly, thus indicating at once the agricultural capacity of the State and the variation of climate afforded by the altitudes of her hills and the warmth of her vales. Can it be doubted that such a country, opened to a convenient depot at El Paso, and railroad communication with the Atlantic and Pacific coasts of the United States, would very soon exchange the roving Apache for the industrious husbandman and the hardy miner, so that the land would commence to bring forth its rich treasures to reward industry in every department?

The six western States of Mexico are more thickly settled. On 196,000 square miles, they display more than two and a half millions of people. Access to them will be more convenient by this road than by any other means whatever. So the transit from the workshops and manufactories of this country by a railway skirting the northern rim of Mexico will transfer the commerce of that country to the United States, simply because that transit will be excluded to foreign competition, and will be quicker and cheaper than a transit across the mountains from ports on the Gulf of Mexico.

Señor Lerdo de Tejada, the most eminent statistician in Mexico, estimates the importations of Mexico for 1856 as follows :

From Great Britain.....	\$12,500,000
From France.....	4,500,000
From the United States.....	4,500,000
From Germany.....	1,860,000
From all other countries.....	2,640,000
Total.....	<u>26,000,000</u>

Against this the exports are set down at \$28,000,000, making a realized exchange of productions of \$54,000,000 per year, of which the relation of that borne by the United States to that enjoyed by Great Britain is estimated as \$8,000,000 to \$33,000,000. The British returns to Parliament show her *importations to Mexico*, from 1840 to 1846, both inclusive, to have been of the value of \$82,246,785, or about \$12,000,000 per annum. Of the articles so imported, cotton fabrics amounted to \$57,000,000, and linens to \$12,000,000, while the other \$13,000,000 was distributed in various manufactures, as carriages, cutlery, hats, iron and steel in bars, harness and saddles, glass-ware, &c. This exhibit should satisfy every American statesman how deep are the interests of his country involved in the rapid prosecution of a railway to divert this trade to the United States, and to develop it to an extent hitherto unknown. The exports of Mexico consist principally of gold and silver. There is no reason why these should not seek the markets of the United States instead of being shipped across the sea, were it only for economy in insurance. No other mode of making such an acquisition to existing commerce can be adopted than to secure the rapid construction of the Southern Pacific Railway along the parallel of 32°, touching first at El Paso, and thence skirting Arizona, as far as Fort Yuma, before it turns northward to San Francisco. The development of the coffee trade with western Mexico alone is an object of the greatest importance, and will secure the noblest results. The necessary limits of this report will only permit the suggestion of a few points for consideration, rather than a detailed exhibit of the present condition or future prospects of that trade with Mexico.

It is entirely apparent that this commerce can receive no more impulse from the establishment of a railway bearing away to the South Pass than it would from one established to the British port on Vancouver's Island. The country will never be touched or approached by that route with which the commerce is to be cultivated to which we have referred; that route will no more meet the wants of the southwest for development than the southern railroad would answer to develop the latent energies and wealth of Utah, Nevada, and Jefferson. Both roads are wanted, and both can be built, not only without the loss of a cent to government, but with an accretion to the strength and wealth of the nation, that will vastly augment the ties which bind the sections of this country together. Under this idea of national development, we beg to make reference to a letter of Lieutenant Perry, of the navy, which will be found appended to this report. (Appendix C.) It will be perceived that the outgoing trade to

China and Japan, though debarked at Puget's Sound, must run south for the eastern trade winds quite to the point at which the *southern* railway would first touch the Pacific shores. It may not be amiss, in this connexion, also to remark that vessels would be as profitably engaged in conveying *raw cotton to China and Japan from that point* as in any other branch of navigation; for China alone imports more than 500,000 bales of raw cotton annually from British India, bringing it quite four thousand miles by sea, around the point at Singapore. Could the American ship take this article directly from a Pacific port, with favoring breezes to the shores of China, the difference of distance in the water transportation would be a drawback of inconsiderable magnitude, while the return voyage would bring to our shores the rich products of the east to swell the national revenue and the profits of our mercantile interest. Arizona and southern California can both profitably raise cotton for the Chinese market.

The statesman does not require to be reminded of the vast revolution in the commerce of the world that must be effected by the completion of lines of railroads, which will bring freights on the Pacific within ten days of the Atlantic shores of the United States. The voyage from New York to San Francisco, around Cape Horn, now consumes one hundred and thirty days; thence to China, thirty days; and thence home, via the Cape of Good Hope, one hundred and ten days. With rail communication across the continent, you may leave New York, visit China, and return to New York within ninety days, making three round trips where one only can be now made. Little reflection is necessary to draw the conclusion that the valuable commerce of the East with Europe and America will seek the path of most rapid and secure interchange, and that with the improvement of the United States must directly command that great trade which formerly sustained the opulence of the Ptolemies, and now enriches the enterprise of England.

But the minority of the committee have not differed with their colleagues as to the benefits to flow from railway communication across the continent—their difference has been, 1st, on the location of one road, if there shall be but one; 2d, on the propriety of selecting only one—the minority being clearly convinced that one road will not meet the conditions required by the country either as to military defence, postal arrangement, transportation of provisions and munitions for army and naval use, development of the commercial, agricultural, and mining powers of the great interior, of the connexion of this country with the population of neighboring governments. To trace the lines of the proposed roads across the continent demonstrates the correctness of our position. From New York to the Pacific ocean the very shortest line is to San Diego. The construction of a line up the Platte or the Kansas bears so far away from the line, that the country to be benefited by the improvement on the latter derives no benefit whatever from the former. A railway up the streams which traverse Kansas and Nebraska will never impart stimulus to southern industry, or assist in developing the resources of the vast southwest. What would a railway up the Platte or the Kansas effect to improve that beautiful region from the Red river to the Pecos, which has capacity to produce annually more

otton than the entire present crop of the United States? That road will serve to strengthen the tide of population which now begins to pour its waves over the barriers of the Rocky mountains, but it cannot serve to invite to happy homes the millions who may be accommodated in the sunny valleys of the southern region we have described. Shall these remain remote from the path of our advancing civilization, useless to the present, possibly to future generations? Shall we turn away from the silver mines and copper-bearing mountains of the south, until those of a more northern latitude shall have been exhausted? Shall the Indian of the northwest be compelled to retire from the lands desired for occupancy, and the more unruly savage of the south be permitted to desolate the southern frontier with impunity, and to beat back the adventurous pioneer who seeks the distant plains of that fertile region for a new home? The minority of the committee respectfully submit that there are considerations of justice which persuade the statesman to open at the same time both these outlets for the population of this country, and to do so by equal favor extended to each. Though these arguments may be said to attach rather to a proposition to construct the roads than to a proposition to contract for transportation over them when constructed, still it is not to be denied that Congress is now approached with the view of inducing the body to lend such facilities as may be legitimate to assure the ultimate success of the enterprise which they have undertaken who will engage in the building of the Pacific railways. The considerations which have been submitted deserve the serious thought of statesmen who would exert their legitimate powers with the view of producing the maximum good, even though it must flow collaterally rather than directly from their action. We are persuaded that Congress desires to encourage, in every way it can, the production of such beneficent and grand results as must flow from the completion of our main continental thoroughfares, and that Congress cannot be blind to the fact that the progress of these roads will constantly tend to lighten the public burdens, at the same time that they give material and important aid, both to a well devised system of frontier defence and to the nation's development. We do not imagine that it can be seriously contended, in a military point of view, that the route favored by the majority of the committee is so important as the route along the southern frontier. The route along the parallel of 41° can be of military importance to the interior only so long as the Mormons may repeat the scenes of last year, when their alleged insurrectionary spirit demanded an outlay of money to prepare to quell it, which would nearly have put a railroad communication with their part of the country into working order. That necessity may arise again, and that extravagance of expenditure is best to be avoided by the timely preparation of means of rapid and secure transportation. The government cannot fail to remember the perils to which a gallant little army was exposed, which was hutted for a whole winter in the mountain region inhospitable climate, and which could not arrive in time on the theatre of expected hostilities to perform any satisfactory service. Then the Congress would have congratulated itself had the rail and the telegraph been at the command of the Executive. A similar con-

tingency may easily arise to vindicate at a future day the policy we now advocate. We are not unmindful of the decided influence such a road, bearing westward from the Missouri, will have in diminishing the present enormous expenditures for postal and military transportation, yet we think it cannot equal, or, at any rate, surpass the ameliorations in the same particulars which the road on the parallel of 32° would afford, while in other points of view it is not nearly so important.

On the Mexican frontier we have more than a thousand miles exposed to outrage by the Indian and the foreign bandit. The want of protection, and the cry for help from the American citizens along the line, daily appeal to the sympathies of Congress, which yet shrinks from marching regiments to that distant field, because of the vast expenditures such movements necessarily involve in the present condition of the country. Government appears almost unequal to its just responsibilities; and the people, so remote from Congress, begin to feel that they are no longer objects of national care. The most careless must observe that, if this state of affairs continues to exist, there is no alternative but to abandon the women and children of that frontier to a hard fate, or to meet such expenditures, however vast, as may be demanded by the exigencies to which the frontier is exposed.

The true remedy for these evils is the construction of railroads, by which space is rapidly overcome, and military energy most speedily concentrated at a given point.

The two routes indicated herein as proper objects of public encouragement, lie through countries which are already traversed by the emigrant, by troops of the United States, by mail stages and transportation trains. Every foot of transportation afforded by railroads on either line, would be an amelioration of *existing public burdens*, and will substitute a superior conveyance for that which government already uses, albeit at a most tardy and limping gait. There will be no clashing of interests between the two routes—indeed there would be none were three routes instead of two selected. They penetrate different sections of a great country—the one cannot supply the wants to which the other ministers—the conditions of their prosperity have no relation to each other—they do not touch the same States, or pass through the same communities—they will develop the differing capacities of different regions; yet they will, one and all, assist to bring together, from east to west and north to south, that great whole which is *our country*, whether it lies under the tropical sun, or in eternal snows.

We will not argue the proposition that Congress may, in the exercise of a wise discretion, enter upon contracts for the transportation of mails, munitions of war, troops and public agents, with railroad companies, even in advance of the completion of their roads; we think that power is indisputable and the exercise of it limited only by the sound discretion of Congress.

But in the nature of the contracts now proposed there seems to be involved a very large expenditure of the public treasure, from which the prudent shrinks, though the necessities which call for it are admitted to be urgent. We humbly offer some answers to the objections.

tions on this score which are, in our own opinions, sufficient to allay these fears.

1. *The credit to be employed is never to be in advance of the work actually completed upon the road; so that the government will never be without security in hand for every cent of credit it will have advanced.*

We assume that the capital exhibited, by way of credit to the company, is amply secured when the road in working order is held in lieu by the government, and there are no prior incumbrances upon it.

Fifty miles of finished railroad in working order upon a line which develops the latent energies of a rich country, and which will become the accustomed vehicle of a great commerce, affords always perfect security to a capital that is not equal to two-thirds of the cost of its construction. In market overt it should always bring the money for which it stands pledged, and we have no doubt that under a fair sale capitalists would be found ready to invest at that rate under ordinary circumstances. Banks discount upon shipments seeking markets upon less security, because the markets are always uncertain; here the work of the road in question cannot be regarded as uncertain.

It is not proposed to advance a dollar or to engage the credit of the government in any way, until the company with whom the contract is made shall have completed fifty miles of their road, and the commissioner appointed by the President to inspect it shall return the fact that the road is in complete working order. The issue of the bond of the United States will then bear in its amount only a certain percentage upon the cost of the road on which the government takes first lien. Were the credit advanced to amount to \$20,000 per mile, the bond would only be a million of dollars, payable at thirty years after date, with coupons attached paying an interest at the rate of five per cent. per annum. Before the government would again open a credit for another million, the company would have to complete another section of fifty miles contiguous to the first; so that a delay in the work of this road would dispense with additional expenditure by the government, and, within a limitation expressed in the act, would operate as an abandonment of the contract and property of the government, which would then have in the road ample means with which to meet the bond before its maturity, by sale or transfer of the road to other parties.

But if the company shall continue the work to completion, then the credit becomes *immobile* and *invested perpetually*; the government depending upon the security of the road to assure its capital, and relying that the service it will demand of the road will annually equal the interest the government will be called on to pay upon its bond. It is plain that if the annual service rendered by the road discharges the amount of the annual coupon, the government will have done no more in the operation than to exhibit a capital which it is already using every year as upon an investment. What difference to a government or an individual is there between raising \$5,000 per year upon a concealed capital, and lending that capital upon undoubted security to another, in consideration that he will secure the capital and pay the \$5,000 per year?

The result is exactly the same; only in the one case the capital is

retained whose interest is expended, and in the other the capital is exhibited whose interest is expended, and, in the hands of a third party, may, meanwhile, be used as an active credit. If the owner of the capital, always secure, has a necessity for the expenditure of the interest, it is a familiar fiscal operation to convert it into an annuity. This problem has just that extent—no more.

In this operation the government advances to a company a limited credit, upon a contract which secures several great advantages without any risk.

1st. The advantage of developing a valuable commerce with a neighboring people, and at the same time of developing to our own industry new and extensive fields, now closed against enterprise on account of their distance from market.

2d. The advantage of securing the means of rapid transition for men and supplies to any point of our extensive frontier, and the capacity to concentrate masses of men upon any point of a long exposed coast; for it cannot be doubted that the means of transferring sailors and soldiers to the Pacific shore in a few days is a substantial equivalent for an army ready for the field, or a naval squadron ready for the sea.

3d. The government secures the advantage of stipulating, now, that the rates of transportation shall always be fair, since it is to have the right to arrange them through its own officers, and the further advantage that it shall, at fair rates now arranged, have the exclusive use of the road whenever the public exigencies shall, in the opinion of the President, require such exclusive use of the road. Any one conversant with the unmerciful speculations made out of the government when a sudden emergency demands prompt action without regard to expense, will realize the fact that these stipulations may be accepted with perfect prudence, and indicate a wise forecast. The terms of contract are indeed very advantageous, provided the government is likely to have so constant a demand upon the road that the interest upon its coupons shall not become an additional charge upon the capital it employs.

It will be observed, in regard to the interest account, that the road is to commence service the instant the coupon begins to draw interest; wherefore, if the service equals the amount of the coupon in the course of the year, the government will have done no more than to exhibit the capital, which, being secure, the government has not expended an additional dollar to those it now expends.

We remarked above that the business of the southern road, at least, would not be uncertain, and we believe that the remark is true of both the roads presented for the favorable consideration of Congress. That conviction rests upon the fact that the advancing population of this country has already established systems of railroad improvement by which the true location for the extension of our continental thoroughfares may be as readily ascertained to-day as a century hence. There must be axes as well of populations as improvements. They will be carriers of a magnificent commerce to be poured upon them by a collateral system of works in which already a thousand millions of dollars are invested, and in which a thousand millions more will be invested before a century elapses.

There is no longer any uncertainty in this matter. The history and the prospect of our country point to where these axes are and must be. Take the section of the Union bounded on the north by the lakes, on the west by the Mississippi, on the east by the Alleghenies, and on the south by the Gulf of Mexico. It is bisected by the Ohio river navigation from Pittsburg to Cairo. In the northern half lies the broad plain from the Ohio to the lakes, divided by the railroad system, whose *axis is the central line from Pittsburg to St. Louis*. Other lines meet other conditions; the lake shore roads run parallel to this axis, yet this line passes through the heart and centre of the population and improvements of the country, and points westward, unerringly, to the true extension of this system beyond the Mississippi. There can be no mistake that a line extending the lake shore roads to the mouth of the Platte, and a line joining the St. Louis roads to the west, embrace between them the artery through which the prolongation of the true axis of the future system of railroads west of the Mississippi should run. Lines connecting from Omaha and Leavenworth would meet the widest conditions necessary for a wise solution of the problem of extension. It will be met to-day as well or better than thirty years hence, for to-day foreign wars or civil broils exist to stay our energies or waste the substance of the nation. The clouds upon our horizon are not charged with storms; the sun of peace and liberty shines gloriously upon the land we are contemplating, and no fear for its magnificent future can inhabit the breasts of men who are fitted to shape its destinies.

Take the country south of the Ohio to the Gulf. Here is another great *belt*—staples, institutions, social and domestic, differing from that first noticed—an agricultural people, more sparse than their northern brethren, but following just as surely and steadily the belt of country *they* are destined to populate. Their railroad system, too, has *its axis*. It is plainly the parallel of 32° beyond the Mississippi. Already the keen and discerning eyes of judicious capitalists have marked out the initial point of the future proper extension. Already New Orleans sends her Opelousas road up towards this point, Vicksburg her road across to it, Memphis her road by way of Little Rock, Cairo hers from the mouth of the Ohio through Fulton, and St. Louis connects with this centre also by the southwest branch through Fort Smith. The apex of the cone *is about the intersection of these pointers to the true line*, and the Southern Pacific Railroad Company has already engaged in the work of constructing that line, generously seconded by the State of Texas, through whose broad domain it will extend nearly eight hundred miles. There may be other feasible and practical routes across the continent, but there can be none to meet all the conditions which render the route along the parallel of 32° so valuable. It is the true axis, to which southern populations and the southern system of railroad improvements will gather, and it is destined to be the vehicle of a splendid national commerce. Looking upon these exponents of the enterprize of the American people, the friend of the Union must regard with satisfaction the fact that from the axis of the northern system to that of the southern system other lines of railroads will traverse and interlace the intervening country, tapping the Ohio at

Wheeling, Marietta, Cincinnati, Madison, Louisville, Evansville and Cairo, and showing by their inclining that they lead towards great trunk-lines which—the aortas of the continent—pass the life-blood of commerce and civilization from the Atlantic to the Pacific shores. These are better than the silken bands of ephemeral political sentiment: they are solid contributions by manly enterprise to gird together the foundations of our common country by ties of mutual interest and dependence. They establish the union of the American people upon the broad basis of a facility of intercommunication, a prosperous internal commerce, and a fraternal civilization which, admitting some peculiarities attributable to climate, established interests, and educational eccentricities, still holds fast to the main inheritance which is the pride of every patriotic American heart.

In the judgment of the minority of this committee, the proposition to push forward to the far west one of these main lines, and not the other, is eminently unwise under the circumstances by which the Congress is now surrounded. Congress, by its adoption of the single line recommended by the majority, may impress the public mind painfully with an idea that the domination of a sectional representation has begun already to become oppressive, and that the power of numbers will be exerted in these halls without regard to even-handed justice. Nature has established the several feeders for both these lines. We may gnarl the tree: we cannot prevent the separate growth, where nature has decreed it. A wise forecast, accepting her conditions, will, by judicious and equal legislation, so encourage both these lines, that a thorough conviction shall pervade all men and all sections, that in providing for the settlement and development of this country Congress has an equal care for the wants and the real interests of every part of it.

Still the question recurs: Will the service to be rendered by these roads to government equal the amount of the coupons for the year? The answer to this material question triumphantly vindicates the policy we advocate.

It may be assumed as true that the government will not be called on within thirty years, *without the roads*, to pay less for postal accommodation and military transportation than is paid this year. The mail contracts for service to the Pacific alone amounts to two millions of dollars. The quartermaster general has a transportation account exceeding five millions of dollars, of which three-fourths arises from the necessity of sending men and supplies to the distant western posts and to the shores of the Pacific. Discard all consideration of time, insurance for safety of transit, military security, efficiency in war, and commercial ameliorations, and it must be perceived that in the items we have quoted—two items—government is now spending more annually than the coupons which would attach to a hundred millions of dollars, were that sum at once advanced in aid of these great national enterprises. It is not proposed to engage the credit of the government for both roads more than a hundred millions, and the bonds will scarcely exceed two millions in any one year. The redemption of these bonds will be scattered through as many years as their issue, and in no one year can they be onerous to the government, were gov-

ment disposed to compel the company to their redemption, which it is presumed that the government will never be willing to do. Of the ability of the company to redeem the bonds before their maturity there need be little doubt; indeed, the minority believe firmly that the business of the government itself will pay the coupons and enable the company to create a fund to redeem the principal before the maturity of the paper; but if not, at least to pay the interest perpetually.

Under these views, the minority recommend the House to pass the amendment, which they submit herewith, authorizing and directing a contract with the Southern Pacific Railroad Company for the transportation, through future years, of the mails and troops of the United States upon the terms therein specified. All of which is respectfully submitted to the consideration of the House.

A. J. HAMILTON,
One of the Committee.

APPENDIX A.

CAPTAIN HUMPHREY'S LETTER.

Routes for a railroad to the Pacific.

MESSRS. EDITORS: I have just seen, for the first time, in your paper of the 3d instant, a correspondence between the Hon. R. E. Fenton, member of the House committee on the Pacific railroad, and F. W. Lander, esq., relative to the different routes proposed for a railroad to the Pacific ocean.

As I have for a considerable time, under the direction of the War Department, a general charge of the exploration and surveys ordered by Congress to ascertain the relative feasibility of these different routes, and as some of the conclusions of Mr. Lander are directly the reverse of those promulgated by the department, after a careful examination of the results of the labors of the various parties engaged upon that work, I think it incumbent upon me to indicate to you in what respects these conclusions differ from those of Mr. Lander, and upon what information they are based.

Before proceeding to do this I would remark that, if there is to be but one railroad to the Pacific—and I think but one can be built for many years—I should regard it as unfortunate, in a military point of view, should that road pass through the Mormon settlements. They are and probably will continue, so long as they exist as a separate community, hostile to the United States; and, in the event of a war with a great maritime power, when we should probably be entirely dependent upon that railroad for communication with the Pacific States and Territories, they could and very probably would interrupt this line of communication. Their location upon the so-called central route (forty-first parallel route) is to my mind a serious military objection to it.

There are two conclusions of Mr. Lander to which I wish particularly to call your attention, namely, that the *southern route is seven hundred miles longer than the central route, and that in the "wild interior;"* and that the character of the country through which it passes is such, both as to form and productions, that it will require *twice as much aid to construct and maintain a railroad over it as over the central route.*

As Mr. Lander has not passed over any portion of the southern line, his opinion as to the character and cost of that route is not based upon personal observation. All the routes have been examined by well organized parties, and the results of their observations, instrumental and personal, have been published by Congress. The means of ascertaining what are the great characteristics of each line that has been examined are thus within the reach of those who desire to compare them. From these publications the following figures are taken:

Considering first the distance from the Mississippi river to the Pacific Ocean, we find by the so-called central route (that of the forty-first

parallel) that the distance from Rock Island to Benicia is 2,299 miles. By the southern route (that of the thirty-second parallel) the distance from Gaines' Landing to San Diego is 1,683 miles; and from Gaines' Landing to San Francisco 2,174 miles. The southern route is, therefore, *one hundred miles the shorter of the two, even if the necessary length be increased five hundred miles in order to make San Francisco the terminus of the road.*

But it may be objected to this view of the subject that, for a proper comparison of relative lengths, the routes should start from a common central point on the Mississippi river. If so, St. Louis may fairly be the point selected. Whether viewed geographically or in connexion with the lines of railroad travel and traffic east of the Mississippi, no position further north can justly be assumed. If it be claimed that the route named the central starts from a point on the Missouri near Westport, some two hundred and fifty miles west of St. Louis, the relative length of the two routes is not affected thereby, for the southern line may here diverge from a common trunk to St. Louis with an equal reduction of length. By the so-called central route from St. Louis to San Francisco the distance is 2,415 miles. By the southern route the distance from St. Louis to San Francisco is 2,484 miles. Under the conditions, then, that the Pacific railroad shall start from a point on the Mississippi, central both geographically and in connexion with the lines of travel and trade east of that river, we find the southern route *sixty-nine miles, and not seven hundred miles, longer than the so-called central; and this additional length is not through the barren interior region, but through a fertile country, within one hundred miles of the Mississippi river.*

But it may be said that the true distance for comparison is that which separates San Francisco from the great centres of trade on the eastern coast. Estimating the distances thus to be added by the lengths of railroads built, building, and projected, as laid down on the best "railroad maps," we find:

	Miles.
New York to San Francisco, by so-called central route, (41st parallel) - - - - -	3,284
New York to San Francisco, by southern route, (32d parallel) - - - - -	3,359
	75
	75
Charleston to San Francisco, by so-called central route, (41st parallel) - - - - -	3,227
Charleston to San Francisco, by southern route, (32d parallel) - - - - -	2,974
	253
	253

	Miles.
New Orleans to San Francisco, by so-called central route, (41st parallel) - - - - -	3,107
New Orleans to San Francisco, by southern route, (32d parallel) - - - - -	2,426
Difference in favor of southern route - - - - -	681

Thus we see that the sum of the distances by the so-called central route from the *three great ports of the east to San Francisco* is 859 miles more than that by the southern route. If San Diego be made the western terminus of the line for the southern route, and San Francisco that for the so-called central route, *this difference in favor of the southern route becomes over 2,300 miles.*

Moreover, the length across the great uncultivable belt of the interior (so called because the fertile portions are comparatively small in extent) is 210 miles less in the latitude of 32° than in the latitude of 41°.

How, then, considered from any point of view, can it be said that the southern route is 700 miles longer than the central, and especially that these additional 700 miles lie in the "wild interior."

The question of comparative cost of the two routes is evidently much more intricate one than that of their respective lengths. This subject must be examined with a detail which would extend this letter beyond all reasonable limits were I to attempt to demonstrate the truth of my opinion, formed in the winter of 1854-'55, after a careful study of the great characteristic features of these two routes, of their lengths, of the nature of the ground they pass over, of the obstacles they present, of the facilities they afford, of their natural productions and population, &c. The reasons in support of this opinion are given in full in Vol. 1 Pacific Railroad Reports; and I may add that all subsequent information has tended to confirm the conclusions therein stated, namely, that *the cost of construction on the southern route, from the Mississippi river to the Pacific ocean, would be but little more than one-half of that upon the route of the 41st parallel, (the so-called central route,) from the Missouri river to Benicia; and that the cost of the named route extended to San Francisco would be but about two-thirds that of the so-called central route from the Missouri river to Benicia; and, further, that the travel, freight, and cost of maintenance of each would not be materially different.*

With respect to the recent development of the resources of the country on the so-called central route, it may fairly be considered that, granting that the Platte valley will have the aid of the Pike's Peak and Utah population to aid in its construction, the southern route will have that of New Mexico, Arizona, and Sonora. If the mineral and agricultural wealth of Pike's Peak, Utah, and Washoe will contribute to the support of the Platte valley route, so will the mineral and agricultural wealth of New Mexico, Arizona, and Sonora assist in maintaining the southern route. The settlements that would precede accompany, and follow the construction of a railroad to the Pacific

would not, in my opinion, be less numerous nor less extensive on the one route than on the other.

With these few and hasty remarks, I have the honor to remain, very respectfully, your obedient servant,

A. A. HUMPHREYS,
Captain Topographical Engineers.

NEW YORK, *April 9, 1860.*

Table showing the lengths, sums of ascents and descents, equated lengths, cost &c., of the several routes explored for a railroad from the Mississippi to the Pacific.

	Distance by air line.		Sums of ascents and descents.	Length of level route of equal working expense.	Comparative cost of different routes.	No. of miles of route through arable land.	No. of miles of route through land generally uncultivable, arable soil being found in small areas.	Number of miles at an elevation above the sea between—											Altitude above the sea of the highest point on the route.						
	Miles.	Miles.						Feet.	Miles.	Comparative cost of different routes.	No. of miles of route through arable land.	No. of miles of route through land generally uncultivable, arable soil being found in small areas.	Number of miles at an elevation above the sea between—											Feet.	
													0 and 1,000 feet.	1,000 and 2,000 feet.	2,000 and 3,000 feet.	3,000 and 4,000 feet.	4,000 and 5,000 feet.	5,000 and 6,000 feet.		6,000 and 7,000 feet.	7,000 and 8,000 feet.	8,000 and 9,000 feet.	9,000 and 10,000 feet.		
Route near forty-first and forty-second parallels, from Council Bluffs, via South Pass, to Benicia	1,410	2,032	29,120	2,583	\$116,095,000	632	1,400	220	170	210	160	590	285	270	107	20	....	8,373						
* Route near thirty-eighth and thirty-ninth parallels, from Westport, via Coo-che-to-pa and Tah-ee-chay-pah Passes, to San Francisco	1,740	2,080	49,985	3,026	Impracticable.	620	1,460	340	276	165	348	466	170	60	155	80	20	10,032	Tunnel at elevation of 9,540 feet.						
Route near thirty-eighth & thirty-ninth parallels, from Westport, via Coo-che-to-pa and Madelin Passes, to Benicia.	1,740	2,290	56,514	3,360	Impracticable.	670	1,620	275	308	190	143	725	284	110	155	80	20	10,032	Tunnel at elevation of 9,540 feet.						
Route near thirty-fifth parallel, from Fort Smith to San Francisco	1,550	2,096	48,521	3,015	106,000,000	646	1,450	585	290	261	236	181	295	232	26	....	....	7,550					
Route near thirty-fifth parallel, from Fort Smith to San Pedro	1,360	1,820	48,862	2,745	92,000,000	420	1,400	354	292	236	210	185	295	232	26	....	....	7,550	Tunnel at elevation of 4,179 feet.				
Route near thirty-second parallel, from Fulton to San Francisco, by coast route	1,630	2,024	38,200	2,747	190,000,000	834	1,190	893	347	120	342	271	50	....	....	....	....	5,717			
Route near thirty-second parallel, from Fulton to San Pedro	1,400	1,598	30,181	2,169	68,000,000	408	1,190	478	337	120	342	271	50	....	....	....	....	5,717			
Route near thirty-second parallel, from Fulton to San Diego	1,360	1,533	33,454	2,167	168,000,000	374	1,159	420	305	125	362	271	50	....	....	....	....	5,717			

* Supposing the route to be a straight line, with uniform descent, from the Un-kuk-oo-ap mountains (near Sevier river) to the entrance of the Tah-ee-chay-pah Pass—the most favorable supposition possible.

† The estimate of Lieutenant Parke for the construction of a railroad by this route, from Fulton to San José, is \$32,812,750. Adding \$2,025,000, the office estimate for the route from San José to San Francisco, Lieutenant Parke's total estimate from Fulton to San Francisco would be \$34,837,750.

‡ The estimate of Lieutenant Parke for this route is \$59,005,500.

§ The sum of the minor undulations (not included in the sum of ascents and descents here given) will probably be greater for the routes near the 47th and 49th parallels than for the other routes.

¶ With the amount of work estimated for the roads in this report, the equated lengths, corresponding to the sums of ascents and descents, have but little practical value. With a full equipment and heavy freight business, the sum of ascents and descents becomes important.

APPENDIX C.

LIEUTENANT MAURY'S LETTER.

[Communicated for the National Intelligencer.]

*Pacific Railroad.*OBSERVATORY, WASHINGTON, *January 4, 1859.*

MY DEAR SIR: My last was dated about two weeks ago.

I have often wished that the question, pure and simple, railroad or no railroad to the Pacific, could be put to the popular vote of the nation. Never, since the Memphis convention of 1849, should I have had any doubt as to the result: the vote would be largely for the road.

While all admit the importance of one or more such railways, there has been such a diversity of opinion as to routes and plans that no one route has as yet met with friends enough to carry it through in spite of its rivals, and I do not think ever will.

Two roads at least are necessary. At least two roads, one at the north and one at the south, are required for the common defence. At least two roads, one at the south and the other at the north, are necessary socially and commercially; for by two roads so placed the markets of China, Japan, and the Amoor will be brought nearer to us by many days' sail than it is possible for one road to bring them. This may sound paradoxical, yet I hope, before I am done, to explain the paradox to your satisfaction.

Let us first consider the importance of two roads in their military aspect.

Vancouver island commands the shores of Washington and Oregon territories; and whether the terminus of the northern road be at Puget's sound or at the mouth of the Columbia river, the munitions sent there in war could be used for no other part of the coast, for Vancouver overlooks them.

They could not, on account of Vancouver in its military aspects, be sent from the northern terminus to San Francisco and the south; nor could the southern road, supposing only one, and that at the south, send supplies in war from its terminus, whether at San Diego, San Pedro, or San Francisco, by sea either to Oregon or Washington. Vancouver would prevent; for Vancouver commands their coasts as completely as England commands those of France on the Atlantic. So complete is the military curtain which a juxta island affords to a coast, that you never heard of France on the Atlantic sending succor by sea to France on the Mediterranean, or the reverse, in a war with England. The Straits of France are as close as the Straits of Gibraltar.

In preparing for the national defences of the Pacific, this fact, and the circumstance that Vancouver's island is in the hands of a foreign

power, are well calculated to impress peculiar features upon any system that may be adopted for that coast.

But I promised to explain why two roads, one at the south, the other at the north, will bring the markets of Asia much nearer to us than either road singly would make them. Before, however, I go into that explanation, let us clear away some of the ideal obstacles which error has placed in the way of a northern route to the Pacific.

Most men of our age were educated under the belief that parallels of latitude and terrestrial climates are correlatives; that we might tell the temperature of any unknown country or region of country if we knew its latitude. Humboldt and Dové exploded this idea with their isothermal lines. For example, they show that the mean annual temperature of North Cape, latitude 70° in Europe, is the same as that along the north shore of Lake Superior, in latitude 50° . So here is a difference of twenty degrees of latitude without any difference in the average annual temperature of the two places. There is a difference in the length of day and night at the two places; and, so far as climate is affected by difference in the length of day and night, climate is to that extent and no further an affair of latitude. But with differences in length of day and night, the relations between climate and latitude cease; the thermometer and hygrometer then become the true exponents of climate. Every region, indeed, tells the whole story of its climate by its flora.

Let us get rid, then, of our old notions concerning the relation of latitude to climate, and with unbiased minds lay out this north temperate zone which we inhabit into two grand thermal bands, and then study the flora of these bands. After we shall have done this, then I think we will be able to agree, at least among ourselves, as to the necessity of two routes to the Pacific. Moreover, we can, by so dividing, select those routes that will be the best agriculturally and commercially; and when we shall have finished with their investigation, you will find that these two routes lie exactly where the best plan of national defences requires them—the northern route commencing at the western boundary of Minnesota and going to Puget's sound, with a branch in the course of time to the mouth of the Columbia; the southern route commencing at El Paso, in Texas, and going thence to San Pedro or San Diego and San Francisco.

I speak of these routes as the routes which commerce and agriculture as well as war require. The elements indicate them, the country needs them, and the people will have them. I place the climate of these routes, the agricultural and commercial resources of the regions through which they pass, in the same category, because commerce is based on difference of agricultural productions, and difference of production is an affair of climate altogether. Therefore, in studying climates and routes, we must study variety of production, and cannot help looking at them in their commercial aspects.

The Army Meteorological Observations, Blodget's Climatology of the United States, and Dové's Isothermal Maps, enable us to divide that portion of the northern temperate zone occupied by the United States into two grand and characteristic thermal bands. The fauna

and the flora of these two bands differ. The people differ, the climates differ, the industrial pursuits in them differ, and therefore I call them grand and striking subdivisions. Speaking in a general way, the United States lie between the mean annual isotherms of 35° and 70° . Take a school map of the world, and let us draw, with a pencil, these isotherms across Europe, Asia, and Africa also.

Beginning on the west coast with the pencil at Sitka, draw it with a free hand thence through the mouth of the Red River of the North, reaching the north shore of Lake Superior, crossing the St. Lawrence below Quebec, and thence to St. John's, Newfoundland. Now, beginning in Europe, near Christiania, draw your pencil up towards the Gulf of Onega, then draw through Orcaberg to Kiachta, Marghen, and the mouth of the Amoor. You can now see sufficiently near, for our present purpose, how the isotherm of 35° runs. The mean temperature of all places south of this line is more than 35° .

In like manner we may sketch off roughly the annual isotherm of 70° through the New World and the Old. It starts from San Diego, crossing the Colorado at its mouth, and then passing down through Mihuahua City to Austin, in Texas, it goes by New Orleans and Pensacola to the sea. Striking the African coast near Mogador, it goes through Cairo, Ispahan, Delhi, to Canton. The mean temperature of all places to the north of this line is less than 70° .

Now, let us divide the belt included between these two isotherms into two nearly equal thermal bands, by tracing likewise, with a free hand, the isotherm of 52° , the mean (nearly) between 35° and 70° .

Beginning near Cape Orford, on the west coast, this isotherm passes up towards the Dalles, then down a little to the west of Salt Lake to Santa Fé, then up to Council Bluff, on the Missouri, and then through St. Louis and Louisville to Baltimore. Taking it up in England, it passes thence through Belgium towards Zurich, then up towards Olmutz, and so on through Varna, Derbent, Kokan, and Pekin.

This line divides this belt thermally and geographically into two bands of nearly the same size. They include the garden spots of the earth. In them man laid his first hearthstone, and from them the lights of civilization and Christianity have shed their first and their brightest rays.

Let us, for the convenience of reference, call the northern band the upper band, and the southern one the lower. We are now prepared to cast the eye over them, and to generalize concerning the commercial and agricultural aspects of the two routes.

The plants which give physiognomy to the fields and forests of these bands are for the upper bands, conifers, the willow, the beech, the larch, fir, alder, elm, hickory, birch, cranberries, and pasture grasses. For the lower band, the characteristic plants are thick-leaved evergreens and arborescent grasses, the cypress, cedar, ash, and magnolia, with roses.

The chief commercial plants, besides the cereals, which are common to both, are for the lower band: the orange, the vine, the fig, peach, date, pomegranate, citron, the melon, St. John's bread, the sweet potato, rice, indigo, tobacco, hemp, cotton, tea, sugar, and naval stores.

For the upper band : buckwheat, hay, Irish potatoes, turnips, apples, pears, plums, with herds and flocks among its fauna.

With these two grand divisions of the temperate zone thus delineated, and with this description of their characteristics, we may now proceed to cast the horoscope for that portion of the country which lies between the Mississippi river and the Pacific ocean. To read its future for present purposes, we have only to glance the eye over the well-developed parts of each band, both in the Old World and New ; then we shall see that an upper band railway to the Pacific is a "fact" which philosophy, teaching by example, compels us to regard as "fixed."

A mere glance at a map of the world will show you that most of the railways, both in Europe and America, are in this upper band ; that in it are the great commercial centres of the world, as New York, Liverpool, London, and the German ports of Europe ; that it is to the cities of this band, as Leipsic, Nigni, Novgorod, Kiachta, &c., that the people both of Europe and Asia annually resort to hold their great fairs.

Contemplate also the people of this band in their industrial aspect, and you will see that it is the ship-building and seafaring region, the home of the fisherman, the sailor's father-land, and the place for factors, factories, and operatives.

The industry of this band is marked by minute subdivisions of labor and great diversity of pursuit among its inhabitants—a sure sign that their occupations are, to say the least, not so exclusively agricultural as are the occupations of those who inhabit the lower band.

After thus drawing our lines and consulting the lights displayed within them, it will, I am persuaded, require no great art of divination to satisfy you that a railroad along this upper band to the Pacific may be looked upon as a "fixed fact." I tell you, one is *obliged to be built there*.

By thus passing these two bands in review, we are further reminded that the people of the north temperate zone, in spite of legislative enactments, tariffs, and protection, have obeyed the laws enacted by nature for the geographical distribution of labor ; that according to these laws each band has been occupied and replenished ; and that man, though the same in both bands, has in each heeded those physical conditions by which he finds himself surrounded, and directed his labors to those pursuits which promise the best returns.

This circumstance reminds us that railways feeding given areas in the upper band should be much more apt to have full freights both ways than are railways feeding like areas in the lower band. The latter carry away tobacco, hemp, cotton, rice, sugar, &c., and may bring back in a single car the manufactured articles for which a whole train load of cotton has been exchanged. Hence, as a rule, railroads in this band carry more than they fetch. The same raw and bulky articles go into the upper band to be manufactured, and when manufactured they are put on the rails for distribution and for market, thus increasing freights for this band both ways.

Each one of these thermal bands in the United States wants its

road from sea to sea, and each must have it. Each wanted its system of roads between the Atlantic ocean and the Mississippi river, and each has it, whether Congress would or not; and so it will be between the "Grand Ocean" and the Mississippi.

Look at the steel engraved map in Appleton's Railroad Guide, and you will see how these systems of roads have been formed. Until last summer Virginia would stretch no railway line from any of her fine harbors into the valley of the west. North Carolina had no harbors, whence the blank space on that map between Ohio and Georgia.

On the other hand, there was the great chain of the lakes. Then there was the Baltimore and Ohio and the Pennsylvania Central railroads, which were commenced at a very early day, and pushed forward with vigor. Now see what a network of roads those have called out, reaching to and beyond the Mississippi, and stretching due east to connect with these.

While Virginia would not and North Carolina could not, South Carolina and Georgia went to work with their system of roads, which has already stretched itself towards the setting sun, far beyond the Mississippi.

Texas has given a most magnificent grant of lands and loan of money to her South Pacific railway, which will extend the southern system as far as El Paso, within 600 miles* of the Pacific.

Roads from New Orleans, Vicksburg, Memphis, and other points, are to join the Texas road. Memphis and El Paso are in the middle of the lower band; hence, you perceive, this band has its roads well under way, and it is high time Uncle Sam should take hold and extend it westward.

Unfortunately, this road has had troubles to an extraordinary degree. "but it is a long night that has no day," and it now begins for the first time to see the light of real day. The dawn is promising.

So, too, in Minnesota. St. Paul is in the centre of the upper band, and there is a railroad already under way from St. Paul to Pembina. A branch from this road leading to the Pacific will most fairly represent the system in the upper band. St. Paul is in the middle of it, and the distance by an air-line from the western limits of Minnesota to Puget's Sound is 870 miles, making only (say) 1,500 miles of road to be provided for by the general government in order to secure both of these roads. Indeed, if the southern road be taken to the California line, California will take care of it thence to San Francisco; so that, by providing for the construction of some five hundred miles, government can now secure one at the south.

Ten years ago, when this question of a road to the Pacific began first to be agitated, government would have had to provide for it all the way from the Mississippi to the Pacific. So it was held; and that would have required a single road about 2,000 miles long. Now government aid along 1,500 miles will give us two.

These bands give a complete quietus to all objections to the northern road on the score of climate. In other parts of the world roads abound

* Geographical miles of 60 to a degree of latitude.

in just such climates. The road from St. Petersburg to Moscow, and the Prussian roads, with others in the same band, in Europe, are even in a higher latitude than the St. Paul will be. Yet, climate is no objection to them. Neither is it to the Canada railways, nor to any others as far north as the rails have been laid. We all expect to see the day when Russia will be extending her system of rails into Siberia; and none of us—for in that matter all of us have unbiased minds—anticipate any difficulty on the score of climate.

Rain maps for these bands show that the average annual amount of rain along this northern route, and until you pass the Rocky mountain range—after which the climate is mild, like that of England—less than it is along any railway in the Atlantic States, or in the Mississippi valley, or, indeed, in any part of the world. They show that the average amount of precipitations, both snow and rain, in winter, for that part of the route which lies between the Pacific range of mountains and St. Paul, is less than three inches. Thus, I think, the question of climate, of terrific snow-storms, and impassable drifts along this route, may be considered as disposed of.

We return now to the paradox that by these two roads to the Pacific the markets of Asia will be much nearer to those of the Mississippi valley than either road alone could bring them. To explain this it is only necessary to remind you how the winds blow and the currents set that control the routes of the sailing vessels—the burden-carry of the sea—between the eastern shores of Asia and our west coast.

The route to Asia lies through the northeast trade-winds. These winds blow between the parallel 30° north and the equator, and vessels that take this route usually run across the broad Pacific between the parallel of 18° and 25° north, where the trades are strongest. Returning, they take the great circle route—the shortest distance—and keep well up to the north, for now the “brave west winds” of those extra-tropical regions, which would have been adverse for the outward voyage, are fresh and fair for the homeward run. So you perceive that a vessel trading under canvas between our Pacific States and China describes on every round voyage an ellipse. Coming out of the Straits of Fuca or the Columbia river, for instance, her course is first to the southward, as though she were bound round Cape Horn, and until she gets into the northeast trade-winds. Her course is then west until she enters the waters of the China seas. She then hauls up to the northward and westward for her port. On the return voyage her course, on coming out of her Asiatic port, is to the northward and eastward until she gets fairly within the “brave west winds.” With these she steers to the eastward, following the great circle route, gradually shaping her course to the south of east, until she reaches our own shores again. If she be bound to San Francisco her route, until she gains the offing of the Straits of Fuca, would be the same as though she were bound into Puget’s Sound or the Columbia river.

Thus you perceive that, on the eastward voyage, San Francisco is on the wayside from Puget’s Sound and Columbia river to China, whereas Puget’s Sound and Astoria are on the wayside of the route from China and Japan to California.

To see how one road only would work, let us first suppose it at the

north, running from St. Paul to Puget's Sound. Let us now follow a package of merchandise, say of ginseng, that is sent over this road from Memphis to be bartered in China for tea. The ginseng would first go north up the Mississippi to get to the road; thence it would cross to the Pacific; arriving at Puget' Sound, it would then be shipped for China. Now it must come *back to the south again to get into the trade-winds' region*. Thus you observe it would have to go more than a thousand miles up the Mississippi out of the way, and when it reached the Pacific it would have to return again as far to the south and further than it was when it started. Being exchanged for tea in China, it would be nearest for the tea to stop at Puget's Sound, take the northern railway and come south on the Mississippi, instead of coming south by sea along the Pacific coast.

Now, let us, in imagination, place the road at the south instead of at the north, and take a bale of furs to illustrate the route of trade, and travel from the upper band. The fur, we will suppose, is sent from St. Paul. It comes down the Mississippi to get to the road; that would not be out of the way for the fur, for it is bound south for the northeast trade-winds at any rate, and it would be, in a national point of view, perhaps more desirable to have it go south by the Mississippi than by sea on the Pacific. But when the silk, for which it has been exchanged in China on St. Paul account, arrives on its return off the entrance of the Straits of Fuca, it has to turn out of its way: Instead of finding railway transportation to take it through from Puget's Sound across to Minnesota, it has to run away to the south. Perhaps a week after it might have been in St. Paul by a northern road, it arrives by sea in California and is carried by rails to Memphis. Now it has to *double upon itself to go north and recross every parallel of latitude that it crossed after turning out of its way from Juan de Fuca*. This doubling will require two or three weeks of time, besides much additional risk and expense.

With two roads there will be no *doubling*; hence two roads will bring China and Japan and Russia very much nearer to the Mississippi valley than one can do. The distance saved will be in furlongs nearly twice the length of the Mississippi river, and in time some two or three weeks. Whether the government, therefore, aids in the building of these roads or not, these circumstances will of themselves call for the construction of at least two roads to the Pacific—one at the north, the other at the south. Northern capital and southern capital will assist in both.

I have thus endeavored to make clear the paradox with which I set out; and I hope I have succeeded in showing to your satisfaction that at least two railways—one at the north, the other at the south—are required to the Pacific. They are commercial necessities.

There are no toll-houses on the lakes, and none on the Gulf of Mexico. The commercial voice of these two waters, could it be heard, would be raised, each trumpet-tongued, in favor of these two roads.

The nearest way from Brazil and the Amazon, as well as from the West Indies, to China would then be by the South Pacific railway.

I did not intend to write you so long a letter, but the interest I feel in the subject of it has carried me away.

I intended to pass with you the compliments of the season, and to wish you and yours a happy new year, and ask you to believe me yours truly,

M. F. MAURY.

D. A. ROBERTSON, Esq.,
St. Paul, Minnesota.

APPENDIX D.

A. H. Campbell's letter.

DEPARTMENT OF THE INTERIOR,
Pacific Wagon-road Office, April 26, 1860.

SIR: In reply to your letter of the 25th instant, requesting my opinion as to the most practicable route for a railroad from Fort Yuma to San Francisco, I will briefly state that, regarding *directness* as one of the most essential requisites in the location of a railroad, in my opinion the proper route from Fort Yuma to San Francisco, in point of directness and cheapness of construction, is *via* the San Gorgon Pass, San Bernadino valley, the Cajon Pass, along the edge of the Mohave basin, the Cañada de las Uvas, head of Tulare plains, Estero plain, San Miguel Mission, Rio Salinas, Rio Pajaro, San José or Santa Clara valley, thence along the proposed road to San Francisco. By reference to the accompanying map of Lieut. Parke, United States topographical engineers, and the general map of Lieut. Williamson topographical engineers, it will be perceived that this route is the shortest practicable one between the above points. I have personally examined nearly this entire distance, and consider it the most economical route along which the proposed railroad can be built. The distance is just 600 miles by the combined surveys of Lieut. Parke and Lieut. Williamson, shorter by fifty-four miles than Lieut. Williamson's route, and fifty miles shorter than Lieut. Parke's route. The only important points along this route which present any serious obstacles to a favorable location are the Cajon Pass and the Cañada de las Uvas. Through the former I have passed three times, and the latter once, and I am confident that a location can be made through each of these passes with grades less than 100 feet per mile, at reasonable cost. The side slopes are favorable, and no tunnelling may be necessary.

For my views in full upon the merits at the 32d parallel route to San Francisco, I would refer you to a letter addressed to the Hon. Guy M. Bryon, of Texas, February 15, 1858. In that letter I compiled the distance from New York, *via* Faltere and El Paso, to San Francisco at 3,359 miles. This distance includes the route of Lieut. Parke from Los Angeles, *via* the coast route, to San Francisco. By adopting the route above described, from Fort Yuma to San Francisco, as the

most direct and practicable, this distance becomes fifty miles shorter, viz, 3,309 miles.

The route which I have above recommended, particularly from San Bernardino through the Cajon and Cañada de las Uvas, has not, that I am aware of, been specifically reported upon or recommended by the War Department, under whose supervision the most reliable explorations and reconnaissances have been made in relation to the practicability of a Pacific railroad ; but on a careful review of my observations while connected with these surveys under Captain Whipple and Lieut. Parke, in 1853-'54-'55, I am satisfied, in my own mind, that this is the most practicable and most economical and direct route.

I am, sir, respectfully, your obedient servant,

ALBERT H. CAMPBELL.

R. V. RICHARDSON, Esq.