

REPORT  
OF THE  
CHIEF ENGINEER  
UPON  
RECENT SURVEYS,  
PROGRESS OF CONSTRUCTION,  
AND AN  
APPROXIMATE ESTIMATE  
OF  
RECEIPTS  
OF THE  
Central Pacific Railroad  
OF CALIFORNIA,  
OCTOBER 8th, 1864.

x

**REPORT**  
**OF THE**  
**CHIEF ENGINEER**  
**UPON**  
**RECENT SURVEYS,**  
**PROGRESS OF CONSTRUCTION,**  
**AND AN**  
**APPROXIMATE ESTIMATE**  
**OF**  
**RECEIPTS**  
**OF THE**  
**Central Pacific Railroad**  
**OF CALIFORNIA,**  
**OCTOBER 8th, 1864.**

Central Pacific Railroad Photographic History Museum  
Property of CPRR.org © 2006 - Use by permission only.  
Use constitutes acceptance of the CPRR.org User Agreement.  
Modified from content made available courtesy  
Google Book Search <<http://books.google.com>>

## REPORT OF THE CHIEF ENGINEER.

---

ENGINEER'S OFFICE, C. P. R. R. OF CAL., }  
SACRAMENTO, OCTOBER 8th, 1864. }

*To the President and Directors of the  
Central Pacific Railroad Company of California :*

GENTLEMEN—I present herewith a report upon the progress of the surveys, work of construction, and equipment of your Road to the present date; and also an estimate of the business and revenue of the Road when complete to "Stout's Crossing of Truckee River"—a distance of one hundred and fifty-five miles from Sacramento.

As the Report of your Chief Engineer, the late T. D. Judah, Esq., made in July, 1863, contained a detailed description of the several lines surveyed up to that time, I have deemed it unnecessary to embody a similar description in this Report.

I append, however, a few notes of the general topographical features of the country over which the line passes, and also notes of such surveys as have been made since the date referred to.

The practicability of a railroad route across the Sierras, was for many years a question of serious doubt, even among the warmest advocates of a Pacific Railroad; and previous to the surveys made by Mr. Judah, in 1861, under the auspices of your Company, but little reliable information on the subject had been placed before the public.

The result of his survey was the developement of a feasible line for a railroad, with maximum grades of one hundred and five (105) feet per mile.

Before commencing the survey, careful and extended examinations were made of five of the most prominent routes across the mountains, distances measured, and the altitudes of the different "Passes" ascertained by barometrical observations. The conclusions based upon these examinations were fully confirmed



by the subsequent instrumental survey, made, as before stated, in 1861.

Before the final adoption of this route for the location of your road, still further explorations and examinations were made, but without satisfactory results, save the evidence afforded that the route selected for the experimental survey was beyond question the best, if not indeed the only practicable, route for a railroad across the mountains; and it is gratifying to be able to state, that as far as the location survey has been extended, its entire practicability has been fully proven.

The Pass selected is believed to be the lowest of any across the Sierras, which are attainable by a practicable railroad line. In fact, I think that upon no other route (with perhaps one exception,) has a continuous line of levels been carried from tide water to the Summit, and I am not aware of the result of that survey having been placed before the public.

The route selected for your Road is the most direct in its general course of any proposed across the mountains—the distance from the city of Sacramento to the foot of the maximum grade upon the Eastern Slope being but 118 miles, which is much less than a corresponding point can be reached by any other route.

A careful examination of the map of Central California, will convince any one of the many important advantages of location which your Road possesses. Following one of the main spurs of the Sierras, which forms the Divide between the waters of Bear river and the Yubas on the north, and the American river on the south, the crossing of the deep cañons formed by those streams is entirely avoided, and you are enabled to make the ascent of the Western Slope of the mountains, attaining an altitude of 7,000 feet without any loss of grade, beyond the first eighteen miles.

Another important feature of your route is, that the *Second Summit* of the Sierras is avoided. As can be seen by reference to the map, that portion of the Sierras lying between latitude  $38^{\circ} 30'$  and  $41^{\circ}$  north, consists of two parallel ranges, of nearly equal altitude, enclosing an immense basin of from ten to thirty miles in width. Lake Tahoe, which is the great reservoir for the waters of the upper or southern end of this basin, finds its outlet through the Truckee river, to which Mr. Judah, in his Report of 1862, refers as follows:

“Running at first northeasterly about eight miles, thence northerly about ten, and thence northeasterly about twelve miles, the Truckee passes down between these two summits, with a nearly uniform fall of about thirty-five feet per mile; thence sweeping round to the eastward, it passes *through* the second range or summit at a depression where it seems to be

entirely worn away down to the level of the river; thence pursuing its way through an extensive plain, known as the Truckee Meadows; thence through the Washoe mountains to the Big Bend; thence northerly about twenty miles, finds its way into Pyramid Lake.

"At the Donner Lake Pass, sometimes called the 'Truckee Pass,' where our line crosses the first Summit of the Sierra Nevada, the altitude of the line is about 1,200 feet above the Truckee river.

"Donner Lake lies immediately beneath at a depth of 1,100 feet. Two long ranges or spurs enclose the lake and its valley, declining in height gradually to the Truckee river, about eight miles below. Our line is carried down along the side-hill of the spur or range immediately above the lake and upon its south side, to the Truckee river, which point it reaches in a distance of eleven and a half miles of line, with a uniformly descending grade of 105 feet per mile from the Summit.

"The Truckee, thus reached, all further difficulty of location ceases, as it pierces its way through all obstructions, with a uniform descent of not over forty feet per mile, to the Humboldt Desert, which forms the Sink of the Humboldt and Carson rivers.

*Thus the Second Summit of the Sierras, and the crossing of the Washoe mountains, are entirely avoided, and from the western base to the Summit of the Sierra Nevada, the grade is uniformly ascending or level (there being no descending grade going eastward); while from the Summit to the Big Bend of Truckee, or Humboldt Desert, a continuous descending grade is maintained."*

These important advantages of location will not be underrated by those who are conversant with the difficulties attending the construction and working of mountain roads.

By avoiding the Second Summit of the Sierras and Washoe mountains, you are not only enabled to save the grades required to overcome those ranges, but also encounter a much narrower snow-belt—the eastern limit of deep snow upon this line being the Truckee river, at a distance of but twelve miles from the Summit.

#### GRADIENTS.

The objection which has been so often urged against the successful operation of a railroad across the Sierras, viz: the heavy gradients to be overcome, has been so fully answered in the previous reports of your Chief Engineer, that it is unnecessary to discuss the matter at length here.

With the practical examples furnished by the Baltimore and Ohio, the Virginia Central, and other important roads in the Eastern States and Europe which might be cited, the question of

## WORK OF CONSTRUCTION.

As no portion of your Road was fully completed at the date of the last report of your Chief Engineer, it may not be inappropriate to refer here to the progress and manner of construction of the first division.

That portion of your Road lying between the foot of K street, in the City of Sacramento, and the California Central Railroad, comprising Sections 1 to 18 inclusive, was placed under contract to Chas. Crocker & Co., December 27th, 1862, but active operations were not commenced until the month of February following, from which time the work steadily and rapidly progressed, and on the 29th day of February, 1864, their contract was fully completed, and the road ready for business from Sacramento to the junction with the California Central Railroad.

The second subdivision of the first division, comprising Sections 19 to 31 inclusive, was let in July, 1863, as follows:

Sections 19 and 20 to Cyrus Collins & Bro.; Sections 21, 22, 23 and 24 to Messrs. Turton, Knox & Ryan; Sections 25, 26 and 27 to Chas. D. Bates & Co.; Sections 28 and 29 to S. D. Smith; and Sections 30 and 31 to Chas Crocker. The work on this portion of the line was fully completed, the track laid, and the Road open to Newcastle on the 6th day of June last.

The Road has been constructed in the most permanent and durable manner, and the general character of the work will compare favorably with first class railroad work in the Eastern States.

The bridge across the American river, is the largest and most substantial structure of the kind in the State, comprising two spans of Howe's truss, of 100 feet each in the clear, with approaches of trestling, resting on pile foundations, of 2,400 feet in length on the south, and 600 feet on the north side of the river, making a total length of bridging of 3,400 feet.

The foundation of the piers are of piles, which are tenoned and capped with timbers twelve inches square, upon which are laid longitudinal timbers of the same dimensions as the caps, one foot apart and secured by bolts.

On these timbers a solid flooring of 10x12 inches is laid, projecting one foot beyond the footing course of the intended masonry.

One hundred and twenty-three piles, from 25 to 35 feet in length, were used in the foundation of each pier.

As a security against the action of floods, several hundred yards of cobbles were placed around the foundations of each pier, filling



Nevada, the altitude of the line is about 1,200 feet above the Truckee river.

"Donner Lake lies immediately beneath at a depth of 1,100 feet. Two long ranges or spurs enclose the lake and its valley, declining in height gradually to the Truckee river, about eight miles below. Our line is carried down along the side-hill of the spur or range immediately above the lake and upon its south side, to the Truckee river, which point it reaches in a distance of eleven and a half miles of line, with a uniformly descending grade of 105 feet per mile from the Summit.

"The Truckee thus reached, all further difficulty of location ceases, as it pierces its way through all obstructions, with a uniform descent of not over forty feet per mile, to the Humboldt Desert, which forms the Sink of the Humboldt and Carson rivers.

"Thus the Second Summit of the Sierras, and the crossing of the Washoe mountains, are entirely avoided, and from the western base to the Summit of the Sierra Nevada, the grade is uniformly ascending or level (there being no descending grade going eastward); while from the Summit to the Big Bend of Truckee, or Humboldt Desert, a continuous descending grade is maintained."

These important advantages of location will not be underrated by those who are conversant with the difficulties attending the construction and working of mountain roads.

By avoiding the Second Summit of the Sierras and Washoe mountains, you are not only enabled to save the grades required to overcome those ranges, but also encounter a much narrower snow-belt—the eastern limit of deep snow upon this line being the Truckee river, at a distance of but twelve miles from the Summit.

#### GRADIENTS.

The objection which has been so often urged against the successful operation of a railroad across the Sierras, viz: the heavy gradients to be overcome, has been so fully answered in the previous reports of your Chief Engineer, that it is unnecessary to discuss the matter at length here.

With the practical examples furnished by the Baltimore and Ohio, the Virginia Central, and other important roads in the Eastern States and Europe which might be cited, the question of the successful working of a railroad with gradients of 105 feet per mile, is neither doubtful or problematical. Upon that portion of your Road which is already completed, there occur four and one-half consecutive miles of maximum grade of 105 feet per mile, over which for more than four months, six trains have passed daily without accident or detention—the passenger trains

making a speed fully equal to the average speed of express trains on Eastern roads. The operating of a road of this character is of course more expensive than where lighter gradients can be obtained.

Besides requiring a superior class of machinery, an additional item of expense will be found in the increased consumption of fuel; yet the abundant supply of this article in the immediate vicinity of your Road, and the low price at which the same can be delivered, viz: from \$2 50 to \$3 00 per cord, renders this a less important item than would otherwise appear.

The maximum grade, which according to the Act of Congress, passed July 1st, 1862, you are allowed to use in the construction of your road, is one hundred and sixteen (116) feet per mile; the adopted maximum is, however, one hundred and five (105) feet, and at no point will it be necessary to exceed this grade. The location of the only portion of the line upon which the preliminary surveys indicated the necessity of using a higher grade than 105 feet, has already been accomplished with a grade of less than eighty feet per mile, and as *the levels have been carefully tested from tide water to the Summit*, the practicability of constructing your road upon the adopted maximum, is fully demonstrated.

A table of grades from Sacramento to the end of the located line, is appended, by which it will be seen that the location thus far has been made with a less distance of maximum grade than was contemplated by the original survey.

#### ALIGNMENT.

Although by the Act of Congress already referred to, you are allowed to use the maximum curves used on the Baltimore and Ohio Railroad, the adopted maximum is  $10^{\circ}$ , or a radius of 573 feet. But two curves of this radius, (with the exception of the curves used on temporary tracks in the City of Sacramento,) occur on the first division, and at those points the grade is comparatively light. It has been necessary in but few instances to introduce maximum curves upon maximum grades, and the alignment will be found to be more favorable than was originally anticipated.

By reference to the appended tabular statement of the alignment, it will be seen that more than sixty per cent. of the first division is *tangent* or straight line, while of the eight succeeding miles, in the very "heart of the mountains," more than twenty per cent. is *tangent* line.

This will, I think, bear a favorable comparison with the alignment of other roads constructed through mountainous regions.



## FIRST DIVISION OF FIFTY MILES.

For a general description of the located line of this division I would respectfully refer you to the report of your Chief Engineer, made July, 1863.

No changes were made in the line between Sacramento and Newcastle, but from the thirty-first to the forty-eighth section almost an entire relocation has been made, resulting in a material reduction in the cost of the work, and several important improvements in the alignment on Sections 35 and 43; the changes being made (with the exception of a single instance) without any increase of grade.

The most important changes were upon the line through Dutch Ravine (Sections 32—3—4—5), from Lime Point to the head of Rock Creek (Sections 38 to 40, inclusive), through Clipper Ravine to Wild Cat (Sections 44 and 45), and at Baney's Ranch, by which the contemplated tunnel at that point is avoided, reducing the cost of a single section (47) more than \$70,000.

By the present location no tunneling will be required on the first division.

## WORK OF CONSTRUCTION.

As no portion of your Road was fully completed at the date of the last report of your Chief Engineer, it may not be inappropriate to refer here to the progress and manner of construction of the first division.

That portion of your Road lying between the foot of K street, in the City of Sacramento, and the California Central Railroad, comprising Sections 1 to 18, inclusive, was placed under contract to Charles Crocker & Co., December 27, 1862, but active operations were not commenced until the month of February following, from which time the work steadily and rapidly progressed, and on the 29th day of February, 1864, their contract was fully completed, and the road ready for business from Sacramento to the junction with the California Central Railroad.

The second subdivision of the first division, comprising Sections 19 to 31, inclusive, was let in July, 1863, as follows:

Sections 19 and 20 to Cyrus Collins & Bro.; Sections 21, 22, 23 and 24 to Messrs. Turton, Knox & Ryan; Sections 25, 26 and 27 to Charles D. Bates & Co.; Sections 28 and 29 to S. D. Smith; and Sections 30 and 31 to Charles Crocker. The work on this portion of the line was fully completed, the track laid and the Road opened to Newcastle on the 6th day of June last.

The Road has been constructed in the most permanent and

durable manner, and the general character of the work will compare favorably with first-class railroad work in the Eastern States.

The bridge across the American river is the largest and most substantial structure of the kind in the State, comprising two spans of Howe's truss, of 192 feet each in the clear, with approaches of trestling, resting on pile foundations, of 2,400 feet in length on the south, and 600 feet on the north side of the river, making a total length of bridging of 3,400 feet.

The foundations of the piers are of piles, which are tenoned and capped with timbers twelve inches square, upon which are laid longitudinal timbers of the same dimensions as the caps, one foot apart and secured by bolts.

On these timbers a solid flooring of ten by twelve inches is laid, projecting one foot beyond the footing course of the intended masonry.

One hundred and twenty-three piles, from 25 to 35 feet in length, were used in the foundation of each pier.

As a security against the action of floods, several hundred yards of cobbles were placed around the foundations of each pier, filling the space between and around the piles, inside the coffer dam, up to low water mark. In addition to this, about sixty car loads of granite have recently been placed around the piers, in such a manner as is believed will render them perfectly secure from all action of high water.

The trestling at Arcade creek, is 200 feet in length, and similar in plan to that at the American river.

#### THE BRIDGE AT DRY CREEK

Consists of four spans of Burr's truss, of 54½ feet each, resting on stone piers, and connected with the embankment at each end by shore bents of trestling.

#### THE ANTELOPE CREEK BRIDGE

Consists of one span of Burr's truss, resting upon substantial granite piers.

The above are all the wooden structures that occur upon the first thirty-one miles of your road, and for full details respecting them, reference is made to the above mentioned Report of your Chief Engineer for 1863.

#### THE CULVERTS

On Sections 1 to 18, inclusive, thirty-six in number, are built in a thorough and substantial manner, of hard-burned brick, laid in



hydraulic cement, with parapet walls, coped with granite six inches in thickness, securely fastened to the walls with iron anchors.

On Sections 19 to 31 inclusive, the culverts are built exclusively of granite, with paving of the same material.

### THE TIES

Furnished by the contractors are of the best quality of *Coast* or *black* redwood, and there are now delivered, in addition to those already used, a sufficient number to lay twenty-two miles of track.

### THE TRACK

Has been laid in a thorough and workmanlike manner, and is ballasted with such material as could be obtained in the vicinity of the Road. The material composing the road bed on Sections 19 to 31, forms of itself an excellent ballast, being for the most part a decomposed granite, which, while forming an excellent support for the superstructure, is sufficiently porous to prevent the collection of water on the road bed.

Portions of the track, especially through the cement and clay cuts on the plains, will probably require a better quality of ballast than has yet been provided. Excellent material for this purpose can be obtained near the confluence of Secret and Miner's ravines, and within one-half mile of the road.

The cost of grading a track to the point named will be but trifling, and I would recommend its construction at an early day.

Good ballasting is found at various points on the line, and besides the inexhaustible quantities of decomposed granite already alluded to, extensive deposits of gravel, and various kinds of disintegrated rock are met with at convenient intervals, so that an adequate supply of ballasting can always be obtained.

### BUILDINGS.

Commodious freight and passenger depots have been erected at Sacramento and Newcastle, and at the former place an Engine house, with stalls for five engines has also been built.

Turn-tables have been built at both named places, and a Y track constructed at the Junction. Suitable watering places have also been provided at Sacramento, Junction and Pino.

A Fairbank's track scale of a capacity of sixty tons, has been landed from the ship, and will soon be erected at the Junction.

### A TELEGRAPH LINE

Has also been constructed along the line of your Road, from Sacramento to Newcastle, and offices established at both named places.

It may not be improper to state in this connection, that the Commissioners appointed by the President of the United States in accordance with the provisions of Section 4, of the Pacific Railroad Act, have made a careful and thorough examination of your Road and the Telegraph Line connected therewith, and their favorable report has already been transmitted to the proper authorities at Washington.

### ROLLING STOCK.

There have been purchased for use upon the first division, and are now in daily use upon the Road, 5 Locomotives; 6 First-Class Passenger cars; 2 Baggage cars; 25 Box Freight cars; and 25 Platform cars.

In addition to which there have been received one heavy Freight Locomotive, and 20 Freight cars not yet put together.

There have been purchased and shipped—4 First-Class Passenger cars; 2 Mail and Express cars; 24 Freight cars; 20 Dump (or Gravel) cars.

Two more heavy Freight Locomotives have been contracted for with Messrs. Danforth, Cook & Co., of Patterson, N. J., and are now in course of construction. Extra axles, car wheels, locomotive tires, etc., have been purchased and shipped.

The following table shows the size, weight, etc., of the engines now in use upon the road:

NAMES OF ENGINES.	Wt. of Engines, Tender with wood and water—tons.	No. of Drivers.	Di- am. —feet.	Di- am. of Cylin- der— inches.	Length of Stroke.	NAMES OF BUILDERS.	REMARKS.
Gov. Stanford.	46	4	4½	15	22	Norris & Son.....	
Pacific.....	47½	4	5	16	24	Wm. Mason & Co.....	
Atlantic.....	47	4	5	15	22	Wm. Mason & Co.....	
John Conness...	50	6	4	17	25	Wm. Mason & Co.....	Just received.
T. D. Judah.....	18	2	4½	11	15	Danforth, Cook & Co...	Tank Engine.
C.P. Huntington	18	2	4½	11	15	Danforth, Cook & Co...	Tank Engine.
	—	6	4	—	—	Danforth, Cook & Co...	} Now being constructed.
	—	6	4	—	—	Danforth, Cook & Co...	

The rolling stock is all of the best class used on eastern roads. The locomotives, with one exception, were built to order, and have thus far given perfect satisfaction. Those now under construction are designed particularly for service on heavy grades.

### CONSTRUCTION OF THIRD SUB-DIVISION.

The work of grading above Newcastle was commenced in April last, and has been steadily progressing since that time.

The cut through Bloomer Divide, which is the heaviest cut on the First Division, being 63 feet in depth, and 800 feet in length, through a hard indurated gravel, is now fully completed, and the grading on other portions of the line is in a favorable state of progress.

The culverts are built of the very best quality of granite, which is found in great abundance in convenient proximity to the work.

All of the unfinished work between Newcastle and Clipper Gap, a distance of twelve miles, is of such a character as to admit of its rapid prosecution, and the work upon this portion of the line can easily be completed within four months.

### TRESTLING.

As much of the heavy work on your Road (as has been noticed in former reports), occurs in crossing the depressions or gaps in the Divide along which the line runs, it has been deemed expedient in some instances to substitute trestling for embankments.

Trestling, properly constructed of Puget Sound pine and redwood, will last from eight to ten years, and can then be replaced with embankments, by transporting the material on the cars, at much less than the present cost.

At Newcastle Gap, Lovell's Gap, and at two points near Clipper Gap, trestling has been designed, and timber for the structure at the former place, is now arriving.

### SECOND DIVISION.

The work of location on this Division was commenced in July, 1863, but owing to the extremely rugged character of the country, the progress of the survey was necessarily slow, and but about eighteen and a half miles of permanent location were made. New experimental lines were run some eight miles further, and the preliminary location had been commenced, when owing to the lateness of the season, the party was withdrawn from the field.

The greatest difficulty encountered in the work of location, is that of maintaining a continuous ascending grade, which, were it possible to accomplish, the maximum grade from the foot hills to the Summit of the Sierras, could be reduced below 80 feet per mile; but as the frequent depressions or gaps in the Divide, along which the line passes, render a continuous grade impracticable,



they necessarily become commanding points in the problem of location.

Thus, in order to pass the Illinoistown and Long Ravine Gaps, we are compelled to maintain, for nearly eight miles, a very light average, and in many places a level grade, making in that distance an altitude of but 115 feet, while immediately following is a section of three and a half miles of maximum grade.

From the commencement of the second division, the line passes along near, and frequently upon, the summit of the Divide, about two miles, to the Lower Illinoistown Gap; thence along the American River slope for about one-half mile, when it recrosses the Divide through Bear River Gap, (where a tunnel 500 feet in length will be required,) and thence follows the Bear River slope of the Divide three and a half miles to Long Ravine. Some heavy work occurs on this portion of the line, but with the exception of the tunnel referred to, will not exceed the average of the work on the last five miles of the first division. The succeeding nine miles from Long Ravine to Gold Run, comprises some of the most formidable work encountered upon the Western slope of the mountains. Crossing Long Ravine at a height of one hundred and fifteen feet, the line curves sharply to the right, and passes with a maximum grade along the steep, and in many places precipitous side hill of Rice's Ravine, crossing a succession of short, steep side ravines and gulches, and intervening spurs, to Cape Horn; which is a precipitous, rocky bluff, about twelve hundred feet in height above the American river.

The construction of the Road around this point will involve much heavy work, though the material encountered is not of a very formidable character, being a soft friable slate, which yields readily to the pick or bar.

The dip of the ledge is about seventy-five degrees, or nearly perpendicular; but as our line at this point crosses the line of stratification nearly at right angles, the cuttings will admit of a much steeper slope than can be generally adopted for that class of material.

The road around this bluff will necessarily be mostly in excavation, as the construction of an embankment, even with a heavy retaining wall, would in many places be unsafe if not impracticable. Passing around the face of this bluff, with an aggregate curvature, in one direction, of one hundred and eighty-six degrees, the line enters Robbers' Ravine, the western slope of which it follows for about one and a half miles to Oak Summit, at the point where the old pack trail crosses the same.

Passing thence via Trail Summit, and along the side-hill above the North Fork of the American river, encountering a number of abrupt, deep ravines, (some of which it will probably be ne-

cessary to cross temporarily on trestling), the line enters Secret Ravine, which it follows for about three-fourths of a mile, and thence follows a tributary of the same to its source, near the Illinoistown and Dutch Flat stage road, about one and a half miles east of Madden's toll house. Thence the line runs near the stage road to Secret-town Gap, which it crosses at the height of fifty-five feet. The crest of the ridge, or divide (between the American and Bear rivers), is here so narrow as to barely admit of the construction of trestle work, and the sinuous course of the line precludes the possibility of using any other kind of wooden structure.

Trestling, strongly and substantially built of the best mountain timber, red fir, sugar pine, or tamarack, can safely be depended upon for five or six years, and in the meantime, with the facilities for transportation of material which your road will afford, such structures can be replaced either with embankments or stone viaducts, as may be deemed most advisable.

From Secret-town Gap to Gold Run, a distance of two and a half miles, the line passes around the northern or Bear river slope of Cold Spring mountain, encountering a succession of deep, abrupt ravines, where some of the heaviest work on this division occurs.

One tunnel of about three hundred feet in length will be required on this portion of the line.

At Gold Run the line attains and thence follows the summit of the divide, which presents a very uniform surface for nearly two miles, and the work will be comparatively light.

Leaving the summit of the ridge near Bradley's reservoir, the line bears to the left, and, following the Bear river slope of the hill, passes one half mile south of, and three hundred feet above, the town of Dutch Flat, to Toll's Mills, a distance of 67 miles from Sacramento, at which point the location survey was suspended. As before stated, the experimental and preliminary location surveys were extended several miles further, and I would suggest the propriety of resuming the surveys at an early day, as the labor required to prepare this division for the contractors will necessarily occupy several months.

As the line beyond this point cannot deviate materially from the line of Mr. Judah's preliminary survey, I would refer you for a general description of the same to his report, made October, 1862, pages 18 to 22.

The location surveys so far made have demonstrated the accuracy of the preliminary survey made by Mr. Judah, and from my own knowledge of the country east of the point to which the location has been completed, I am satisfied that there will not be any material deviation from the line established by him.

The peculiar location of your Road, passing as it necessarily does near the Summit of the Divide, and consequently crossing

the ravines and cañons near their sources, precludes the necessity for large and expensive culverts, or other structures for the passage of water, but few places occurring where more than forty or fifty feet area of water-way will be required.

It will, however, probably be found advisable, as before suggested, to adopt, as a matter of expediency, trestle or other bridging, for many of the deeper ravines or gulches.

Rock for culverts, foundations, etc., can be obtained within a reasonable distance, and frequently in the immediate vicinity of the work, and timber suitable for bridging, etc., is everywhere abundant.

The construction of over one hundred miles of mountain road, and that, too, across one of the most formidable ranges on the continent, where so few important streams are crossed, and so small an amount of expensive bridging actually required, will certainly present an anomaly in the history of railroad enterprises.

## GRADES.

The following table shows the distance (in miles) of the different grades used upon the First Division, and eighteen miles of the Second Division:

TABLE OF GRADES.

ON LOCATED LINE OF CENTRAL PACIFIC RAILROAD OF CALIFORNIA,  
FROM SACRAMENTO.

FIRST DIVISION.		FIRST DIVISION.		SECOND DIVISION.	
GR. PR. MILE.	NO. OF MIL'S.	GR. PR. MILE.	NO. OF MIL'S.	GR. PR. MILE.	NO. OF MILES
Level .....	9.33	42 ft.	.52	Level .....	4.32
3 ft.	3.32	45	.38	5 ft.	.95
5	.38	47	.38	13	.70
11	1.32	53	2.55	19	.21
13	.57	58	1.40	26	.36
14	.57	61	.32	40	.38
16	1.48	63	.57	42	.19
21	4.78	74	.19	61	.07
26	3.28	75	.24	65	.40
28	.51	79	1.34	66	.23
30	.21	82	.38	79	.57
32	.57	90	1.16	95	.32
37	.76	97	.31	100	.38
40	.19	105	12.99	105	9.33
			50.00		18.37



## TABLE OF ALIGNMENT,

SHOWING THE AGGREGATE LENGTH OF TANGENTS AND CURVES OF DIFFERENT RADII  
IN LOCATED LINES OF C. P. R. R. FROM SACRAMENTO TO STATION 3,610.

FIRST DIVISION.		FIRST DIVISION.		SECOND DIVISION.	
RADII IN FEET.	DISTANCE IN MILES.	RADII IN FEET.	DISTANCE IN MILES.	RADII IN FEET.	DISTANCE IN MILES.
15,000	.10	1,042	.09	5,730	.23
5,730	.62	955	4.75	2,865	.32
3,820	.44	882	.54	1,910	.21
2,865	1.39	819	.48	1,433	.85
2,292	.55	800	.17	1,146	1.67
1,910	.55	764	.14	955	1.98
1,637	.46	717	4.25	819	1.74
1,482	.08	714	.03	717	2.19
1,433	2.79	637	.36	637	1.94
1,338	.04	573	.21	573	2.19
1,146	1.28	Tangent.....	30.68	Tangent.....	5.05
			50.00		18.37.

## REVENUE.

In estimating the probable business of your Road, when completed across the mountains, the calculations are based upon actual statistics of the freight and passenger business between this city and Nevada Territory, during the last three years. Though during the present season there has been a marked depression of business in that direction, as compared with the two preceding ones, it is not considered that any apprehensions of a permanent decrease of the former business with that region need be entertained. On the contrary, those best acquainted with the resources of Nevada Territory, and the Great Basin towards Salt Lake, are confident in the opinion that another season will witness an animated revival of business in that direction, and that within two, or three years at the farthest, it will largely exceed the business of 1863.

The extent and character of the resources of the Territory occupying the Eastern slope of the Sierra Nevada and the Great Basin, are too well known to require an extended notice here. The evidence afforded by the daily shipments of bullion, is sufficient to convince the most skeptical of the richness and permanent value of the mineral deposits of that region.

Hardly second in importance to the famous Washoe district, are the Esmeralda, Silver Mountain, Humboldt and Reese River



districts, many portions of which are already yielding rich returns for the capital and labor expended in the development of their mines.

As the Eastern slope of the Sierras is but sparsely timbered, and together with the Great Basin is almost wholly unsuitable for agricultural purposes, it is evident that the principal supplies of lumber and fuel, as well as general merchandise and bread-stuffs, must be furnished by California. As illustrative of the immense consumption of lumber and fuel in the mining districts, the following extract from the Report of John F. Kidder, Esq., Chief Engineer of the Virginia and Truckee River Railroad Company, made in April, 1863, furnishes some valuable information.

Stating that the average price of fuel in Virginia City, is "\$15 per cord," he says, "At Virginia, Gold Hill and Silver City, there are at present two thousand houses, consuming daily forty cords of wood; forty-six steam quartz mills consuming daily two hundred and thirty cords; and nine hoisting engines with a daily consumption of twenty-seven cords, making an aggregate consumption of two hundred and ninety-seven cords.

There are daily used for mining and building purposes, one hundred and twenty-five thousand feet, BM., of lumber and square timber, the cost of transporting which costs twenty dollars per thousand, making an annual consumption of *one hundred and eight thousand cords* of wood, and *forty million feet of lumber*," which is more than three times the amount estimated by Mr. Judah, in his report of 1862, as a legitimate item of Washoe freight. Upon the above estimate of Mr. Kidder, the *Territorial Enterprise* makes the following remarks:

"In the report of Mr. Kidder, the Engineer of the Washoe Valley and Virginia City Railroad, that gentleman makes an estimate, which is altogether too low, of the consumption of firewood in this city, Gold Hill and Silver City, but which foots up one hundred and eight thousand cords. We think the quantity approaches much nearer two hundred thousand cords.

"Now where can this enormous quantity of firewood be obtained in a year or two from this time? At its present value here, which at a very low figure may be set down at \$16 to \$20 per cord, it makes a sum approaching \$350,000 for firewood actually paid out in cash, by but three towns, in a Territory but three years old. There is no denying the proposition that we will have to look beyond the limits of this Territory before many years shall have elapsed for fuel with which to keep in motion the countless number of mills that will eventually be in operation within our border.

"The importance of where our fuel is to come from cannot be overrated."

That this vast trade must be supplied from the inexhaustible forests of California, and pass over your Road, is too evident to require any argument for its demonstration. The road upon which Mr. Kidder reports, is designed to connect with your Road at the most eligible point on the Truckee, and will form a most important auxiliary to the business accruing thereto.

#### THROUGH FREIGHT FROM CALIFORNIA.

The statement made by Mr. Judah, in his report for 1862, of the amount paid for freight over one route alone, to Nevada Territory, viz: \$5,256,000, was received with incredulity by many who were unacquainted with the immense demands of the Washoe trade.

Yet reliable statistics show that the freight paid on shipments from California, across the mountains in the year 1863, amounted to fully two and a half times that sum, or \$13,000,000; which is twice the amount paid for freight received at San Francisco from domestic and foreign ports during the same year.

Estimating the average price of freight from California to Nevada, during the year (1863), at five cents per pound, we have 130,000 tons of freight transported by teams across the mountains, in one year, exclusive of westward bound freight, such as minerals, lumber, etc.

Full statistics of the business of 1864, to date, have not been obtained, but from the data at hand, it is fair to assume that freights for the years 1862-3 and 4, will average 72,500 tons.

It is also safe to assume that within three years this average will be more than doubled, which amount, it will be seen, will but slightly exceed the business of 1863, and that your road will, when completed, command fully four-fifths of the Nevada freight and travel, as competition by teams and stages will be entirely out of the question.

This gives as a perfectly safe basis for an estimate, 116,000 tons of freight per annum.

#### PASSENGERS.

The following extracts from published statistics are given to show the data upon which the estimates of revenue from this source are based:

"During the months of August, September, and October, 1862, the average number of passengers over one route across the mountains was—

Stage passengers.....	37
In carriages and on foot.....	68
Total per diem.....	105

"In the months of February, March, and April, 1863, the number of persons who crossed the mountains on one route, is estimated as follows:

Footmen .....	6,607
Horsemen .....	833
Stage passengers .....	3,154

Total.....10,594  
Or an average amount of 119 per diem.

"For the six months ending January 1, 1864, the stages on one route alone carried 10,500 through passengers," or an average of 58 per day.

Allowing one-half this number for other routes, and we have 87 through passengers per day. Add for those traveling by private conveyances, 87, and we have a total of 174 passengers per day. This is believed to be a low estimate, and not exceeding the average for the last three years.

It is a well established fact that travel is everywhere proportionate to the facilities afforded for its accommodation, and were a railroad completed across the mountains to-day, the travel between California and Nevada Territory would (with the present amount of business) be increased at least fifty per cent. It is, then, safe to assume that with the prospective increase of business, there will, at the end of three years, be fully double the present amount of travel, or 350 passengers per day.

Allowing one-fourth of this number to go by other routes, there still remains an average of 263 passengers per day, or a total of 95,995 per annum.

#### ESTIMATED ANNUAL RECEIPTS IN GOLD COIN FROM PASSENGERS IN CALIFORNIA.

Junction and other way passengers per day, both ways.....	40
Auburn passengers—including those from the lower portion of Nevada county, per day, both ways.....	25
Illinoistown passengers, including those from Nevada Grass Valley and Sierra county, per day.....	40
Dutch Flat, including upper portion of Placer and Nevada counties, per day.....	30

#### SUMMARY.

14,600 Junction and way passengers average \$1 50...	\$21,900 00
9,125 Auburn " 3 50...	31,937 50
14,600 Illinoistown " 5 50...	80,300 00
10,950 Dutch Flat " 6 75...	73,912 50
Total, in gold coin.....	\$208,050 00

### ESTIMATED ANNUAL RECEIPTS FOR FREIGHT IN CALIFORNIA—IN GOLD COIN.

10,000 Tons Auburn and way average	\$4 00...	\$40,000 00
27,000 " Ill'town	{ including Neva- da, Grass Valley, Sierra Co., Iowa } \$8.....	216,000 00
	{ Hill, Forest Hill, etc., etc., }	
10,000 " Dutch Flat and vicinity.....	10 00..	100,000 00
20,000 " Return freight, including stone.....	1 50..	30,000 00
20,000 Cords wood.....	2 50..	50,000 00
10,000,000 Feet B.M. lumber .....	6 00..	60,000 00
Total receipts for freight.....		\$496,000 00
Add passengers.....		208,050 00
Total annual receipts from Cal. business		\$704,050 00

### ESTIMATED ANNUAL RECEIPTS FROM THROUGH BUSINESS TO AND FROM NEVADA TERRITORY.

116,000 Tons merchandise.....	\$22 50..	\$2,610,000 00
100,000 Cords of wood.....	5 00..	500,000 00
30,000,000 Feet B. M. lumber.....	10 00..	300,000 00
16,000 Tons return freight.....	10 00..	160,000 00
96,000 Passengers both ways.....	12 00..	1,152,000 00
Express and mails.....		30,000 00
Total.....		\$4,752,000 00
Add for business in California.....		704,050 00
Total annual receipts in gold coin.....		\$5,456,050 00
Deduct for expenses for operating, etc.....		1,636,800 00
Leaves net revenue of.....		\$3,819,250 00
Or 25 per cent per annum on a capital of.....		\$15,200,000 00

### ESTIMATED RECEIPTS TO DUTCH FLAT.

Your road will, when completed to Dutch Flat, command all the local business of Placer, Nevada, Sierra, and a portion of El Dorado counties, as well as the greater portion of the Nevada freight and passenger business, which is estimated as follows:



Annual receipts from passenger business in California (see foregoing estimate).....	\$208,050 00
Annual receipts from freight in California (see foregoing estimate).....	496,000 00
77,500 tons Nevada freight, \$10.. .....	775,000 00
48,000 Nevada passengers (both ways), \$6 75.....	324,000 00
Express and mails.....	20,000 00
<hr/>	
Total annual receipts in gold coin.....	\$1,823,050 00
Deduct expenses of operating, etc.....	546,000 00
<hr/>	
Leaves net revenue per annum.....	\$1,277,050 00
Or 25 per cent. upon a capital of.....	\$5,100,000 00

### LOCAL RESOURCES OF PLACER AND ADJOINING COUNTIES.

The development of the mineral resources of Placer and the adjoining counties, which embrace the richest mining district of the State, will add largely to the local business of your Road.

Besides the placer diggings of the foothills, and the heavier gravel deposits through the central and upper portions of the counties referred to, which have heretofore occupied almost exclusively the attention of the gold miner, the large and valuable veins of quartz which traverse the whole western slope of the mountains, are being prospected and worked with success. Recent discoveries of quartz of unusual richness have been made in the vicinity of Illinoistown, and also on Diamond Creek, Nevada county, within five miles of Bear Valley. Mills have been erected and extensive preparations made for the reduction of the rock. The development of the vein at the latter places indicates that it will prove one of the richest yet discovered in that county. At numerous other points in the vicinity of the line, important and promising veins of quartz have been discovered, and with the fine water privileges in the vicinity of these ledges, it only needs capital and enterprise to develop a source of immense wealth to the country. The opening of your road is already calling public attention to these facts.

At Gold Run, and Dutch Flat, the railroad line crosses the rich vein of auriferous gravel which stretches from Quincy and Pilot Peak on the north, through Downieville, Forest City, Moore's Flat, Alpha, Dutch Flat, Iowa Hill, Forest Hill, Georgetown, and so on to the southern mines, and in which the richest deposits of gold are found. At those places, and at Red Dog, Wadlounpa, Little York, You Bet, Yankee Jim's, Michigan Bluffs, and other important mining towns in the vicinity of the railroad, the

mines are worked by the hydraulic process, and are yielding rich returns.

Copper ore is also found in the immediate vicinity of Auburn, and between that place and Grass Valley. Some of these mines afford evidence of great richness, and will undoubtedly, in time, be a source of revenue to the Road.

Soapstone of an excellent quality, and in inexhaustible quantities, is also found near Rattlesnake Bar, but a few miles from Newcastle. This rock is an excellent substitute for fire-brick.

Limestone of a superior quality is also found at numerous points in the vicinity of the Road. A large portion of the lime brought to this market is from the kilns at Alabaster Cave, Lime Point (two miles from Auburn) and the American river quarries, about one mile from Neilsburg.

### IRON.

Extensive beds of iron ore are found in the vicinity of Neilsburg, and about one mile from the line of your Road. This ore is of a superior quality, and will yield from seventy to ninety per cent. of metal.

The high price of labor in this State, has hitherto precluded the working of these ores with economy, and as yet no efforts have been made to develop these mines, or even to bring them into public notice.

With the facilities afforded for the reduction of this ore, viz.: the cheap production of charcoal in the forests of the Sierras, and of stone coal from the Truckee river mines, and cheap and abundant water power, it is believed that within a few years, capitalists will find this a profitable field for investment, and that the transportation of this ore and its products will form an important item in the business of your Road.

### COAL.

The recent discovery and working of the coal mines at Crystal Peak, near the Truckee river, and in the immediate vicinity of your Road, is an important fact for consideration in connection with your future business. From accounts received, it is believed that coal of a superior quality, and in inexhaustible quantity, has been discovered at the eastern base of the mountains at the point named.

The lack of fuel between the Sierras and Salt Lake, has always been considered one of the greatest difficulties attending the working of that division of the Pacific Railroad. These discoveries will remove that obstacle, and will also furnish a large amount of return freight to California.

declination of these streams renders them available at almost any point; and the dense forests of pine, fir and tamarack growing upon their slopes, suggest a ready means of securing the advantages which they offer. Abundant power can also be obtained by using the water of the mining ditches, which, until transit by rail is supplied, are in some localities more convenient of access than the natural streams.

This water can be used without wastage, and consequently at but trifling cost, as it will in no case be necessary to divert it from its present channel, except for the short distance required to gain the desired elevation.

Thus the Bear River ditch, which in the Winter season carries 3,500 inches of water, (miner's measure) and at its lowest Summer stage never has less than 500 inches, can at numerous points be used for the purposes mentioned.

Near Clipper Gap the water of this ditch runs for about three-fourths of a mile in the natural bed of a ravine, falling in that distance nearly three hundred feet. At the head of Auburn Ravine, and within three miles of the town of Auburn, it has in about a mile, a fall of 200 feet, and again about one mile above Newcastle, it crosses the line of the road and runs into Dutch Ravine, falling 200 feet in one-fourth of a mile.

There are other points also convenient to the line of your Road, where the same water can be used, with a fall of from 20 to 40 feet.

Other ditches in the vicinity of Gold Run and Dutch Flat, with a larger supply of water, also present similar advantages.

The abundant power thus afforded may be considered permanent, as the mining and agricultural interests will always demand a supply of water fully equal to the present capacity of these ditches.

### WOOD, LUMBER, ETC.

The importance of the wood and lumber trade that must eventually accrue to your Company, can hardly be over-estimated.

The completion of the first fifty miles of your Road, will render available a large amount of the timber lands adjacent to the line, which are now comparatively valueless; and besides the importance of the carrying trade already alluded to, an important item in the construction of the road will be saved by procuring the timber and ties needed, in the immediate vicinity of the line.

For general use, the red fir is probably the best timber that can be obtained until the Road reaches the Yuba, where tamarack is found in abundance. The latter is, in my opinion, the



best timber produced in this State for ties and other railroad purposes. It will resist decay as well as redwood, and in point of strength and elasticity, is probably equal to the Puget Sound pine. The completion of the Road to Newcastle has placed within reach of the Sacramento market, large quantities of the live oak, white oak, etc., growing upon the foot hills, which, for lack of facilities for transportation, has hitherto borne but a nominal value.

### LANDS.

The lands granted to your Company by the National Government, viz. twenty sections, or 12,800 acres for each mile of road, is an important source of revenue for its construction. You are now entitled to these lands for thirty-one miles, or a total of 396,800 acres, which, at the minimum Government price, may be estimated as worth \$496,000.

Many of these lands bordering on the Sacramento, American and Bear rivers are among the most fertile in the State. The value of the timber products of the foothill lands, has already been alluded to. Many of the latter are also susceptible of a high state of cultivation. From their peculiarity of soil, they are particularly adapted to the cultivation of fruit, and in ordinary seasons, the cereals are grown with success. With a proper system of irrigation, these lands may be made highly productive. For the production of the vine, they are considered as far superior to the low lands of the valley, and this fact is already attested by the successful cultivation of numerous and extensive vineyards. That the wine-producing districts of this coast will in future be confined almost exclusively to the foothills, there can be no doubt.

### FACILITIES FOR TRAVEL.

The present facilities afforded by your Road, and the connecting Stage Lines for the accommodation of travel across the mountains, are unequalled upon any other route.

Persons traveling via the Central Pacific Railroad, and the Dutch Flat and Donner Lake Wagon Road, reach Virginia City in from four to six hours less time than by any other line. Since the California Stage Company placed their coaches upon this line in July last, the average time for the trips from Sacramento to Virginia has been but seventeen hours.

This road, which was commenced in 1863, and completed in June last, is by far the best road yet constructed across the mountains. It accomplishes the ascent of the Western slope of the Sierras with a much lighter maximum grade than has here-

tofore been deemed possible to attain within the limits of expense which such an enterprise would justify.

The maximum ascending grade, (eastward) is but ten inches to the rod, or less than one-half the maximum grade on the other most important roads crossing the mountains.

It is constructed in the best possible manner, and is everywhere wide enough for teams to pass each other without difficulty.

Commodious hotels have been erected along the route, and preparations are being made to keep the road open during the Winter.

No difficulty is apprehended in doing this, as the snow-fall is believed to be much lighter upon this, than upon the other routes, via the Henness and Johnson Passes.

This comparative immunity from heavy snows, which frequently form a serious obstruction to travel across the mountains during the Winter months, is chiefly due to the difference in altitude between this and the other routes named, there being several hundred feet in favor of this route.

The question of the obstruction of a railroad by snow, and the practicability of keeping the line open for business during the Winter months, is a very interesting and important one, and cannot be better answered than has already been done by Mr. Judah in his report for 1862, from which the following extract is taken:

"The argument of obstruction from snow being frequently urged against the Central route for the Pacific Railroad, I have taken much pains to arrive at correct conclusions upon this subject, and feel warranted in the statement that a railroad line upon this route can be kept open during the entire year for the transaction of its business.

It is true that snow falls to a greater depth upon the elevated portions of this line than upon the lines of railroads in the Atlantic States.

The depth at which snow lies upon this route is plainly distinguishable at any season.

The trees are generally covered with moss down to the level of the snow, and thousands of them can be seen entirely free from moss up to a certain height, and almost entirely covered with moss from that height.

Frequent marks have also been made by persons who have traversed the route on snow-shoes during the Winter, by axe-marks chopped in the trees at the level of the snow.

The limbs of the small trees also afford indications of the height of snow; those limbs lying beneath the snow maintaining their natural or original position, while those above the snow-line are almost universally bent downward, and not unfrequently broken by the weight of snow.

These observations lead to the conclusion that the greatest depth of undisturbed snow is thirteen feet at the summit.

In places where drifts occur, the depth is of course greater and at corresponding points, less than the average level.

This may, at first, seem to be a serious obstacle to the passage of railroad trains. But this depth of thirteen feet is not the result of a single storm, but the *accumulation of a number of successive storms, occurring during the Winter.*

Snow does not melt very rapidly at this elevation during the Winter.

A storm will occur, and snow fall to the depth, perhaps, of three or four feet.

Another storm will, perhaps, add two or three, or four feet to this depth.

Successive storms add to its depth; but it is believed that its highest level is not over thirteen feet.

The town of Dutch Flat, 67 miles from Sacramento, and 35 miles from the summit, may be considered the foot of snow-line on western side—snow seldom falling more than two feet there, and melting off in a day or two.

The average depth of snow at lower end of Donner Lake is about six feet.

At Neil's Ranch, on the Truckee River, 28 miles easterly from the summit, I am assured by Mr. Neil, that the greatest depth of snow last Winter was eighteen inches, and that during the five years he has lived there, it has not exceeded three feet in depth.

It may be safely concluded that the line of deep snows terminates where our line strikes the Truckee River, or say 12 miles from the summit, making 47 miles of snow line.

It will also be remembered that our line is almost exclusively a *side-hill line*, from which the snow can be more easily removed than from a level surface.

It is only necessary, then, to start an engine with snow-plows, from the summit each way, at the commencement of a storm, clearing the snow as it falls. A similar course of procedure at each successive storm, will keep the track open during the entire Winter.

It is also stated that a crust soon forms upon the snow, which prevents its drifting badly.

The only point where we shall encounter a level surface of snow is in Summit Valley, for about two miles.

By elevating the track at this point, no trouble need be anticipated.

The great dread, and real danger of a storm in the mountains does not arise from the depth of snow, but from the entire absence of shelter and relief in the mountains, there being no houses or accommodations, excepting upon the wagon roads across to Washoe."



The "deep snow-line" does not extend more than twenty miles westerly from the summit, so that the distance will not exceed thirty-two miles where any greater difficulties need be apprehended than are ordinarily encountered upon Eastern roads during the winter months. In further illustration of this subject, reference is made to the above mentioned report, pages 25 to 27.

### SURVEYS IN NEVADA TERRITORY.

An experimental survey was made in November and December last, from the terminus of Mr. Judah's line, near the eastern boundary of California, to a point five miles east of the Big Bend of the Truckee, a distance of fifty-three miles. The result of this survey was highly satisfactory, developing a line with easy grades and curves, and for the greater portion of the distance, with very light work. At three points on the experimental line, grades of seventy-nine feet per mile were introduced, for short distances, but a careful location will reduce the maximum to fifty feet per mile. The maximum curves will probably not exceed six degrees, or a radius of 955 feet. The only heavy work occurring on the line, will be through the Cañon below the Big Meadows, and for a distance of about five miles, and even there a large portion of the heavy cutting shown upon the profile, may be avoided by crossing the river two or three times at its narrowest points. From the lower end of this cañon to the Big Bend, the slightly undulating surface of the country, will admit of a rapid and easy construction of the road.

At the Big Bend the line leaves the river, and bears eastward across what is known as the Truckee Desert, towards the Sink of the Humboldt. Beyond the terminal point of the line, no explorations were made, as from the well known character of the country to the eastward, no doubts exist as to the practicability of the route to the Sink of the Humboldt, and from that point to Salt Lake, the choice of routes must be hereafter determined by proper explorations and surveys.

The present Engineer force in the field consists of one party on construction of First Division, in charge of Mr. Chas. Cadwalader, and one party employed on location of Second Division, in charge of Mr. L. M. Clement.

Respectfully submitted,

SAM. S. MONTAGUE,

Acting Chief Engineer C. P. R. R. of Cal.

## SECRETARY'S REPORT.

OFFICE OF THE CENTRAL PACIFIC R. R. Co., }  
December 1st, 1864.

The total amount of the capital stock of the Company issued and subscribed, is 14,987 shares.....\$1,498,700 00

The total indebtedness of the Company is as follows, viz:

First mortgage bonds issued.....	1,394,000 00
Individual accounts.....	159,226 14
Unadjusted accounts, and November pay-rolls.....	20,000 00
Bills payable.....	20,859 79
	\$1,594,085 93

The assets of the Company are:

Amount due from stockholders.....	\$138,596 68
Placer county bonds.....	75,000 00
Sacramento County bonds.....	163,500 00
Amount due from the City and County of San Francisco in 7 per cent. bonds, principal and interest payable in gold.....	400,000 00
Amount due from the Government of the United States, in 30 year 6 per cent. bonds, (on the 30 miles of road completed and accepted by the Government.).....	1,264,000 00

Every alternate section of public land, (except mineral land,) for twenty miles on each side of the road, granted to the Company by the United States.

Under authority of an Act of the Legislature of the State of California, the Company has executed and holds one million and a half of bonds, on which the State pays interest at 7 per cent. in gold coin, for twenty years, from the 1st of July, 1864.

Thirty-one miles of railroad and telegraph line completed, with all necessary depot buildings, etc.

Grading beyond Newcastle has been done to an amount exceeding one hundred thousand dollars.

Eight locomotives, ten passenger cars, four mail and express cars, one hundred and twenty-four freight cars, five hand cars and three construction cars, extra axles, wheels, tires, etc.

Six thousand tons of iron, about three thousand tons of which are laid, the greater part of the balance has arrived; there is

also purchased, but not yet shipped, two thousand tons additional.

Chairs and spikes sufficient to lay all the iron, and ties enough for twenty-two miles of road beyond Newcastle, are on hand.

### BUSINESS OF THE ROAD.

On the 26th of April, 1864, the track was completed from Sacramento to Junction, a distance of 18½ miles, and trains were run daily over the road to that point. Little freight, however, passed over the road until the 10th of the following June, when it was opened to Newcastle, 31 miles from Sacramento, and regular freight and passenger trains commenced running to that point.

The following is a statement of the number of passengers transported each month, and the amount received therefor:

	PASSENGERS.	AM'T REC'D.
April 26 to 30.....	298.....	\$ 354 25
May.....	8,906.....	4,291 25
June.....	7,329.....	9,364 80
July.....	7,687.....	11,047 35
August.....	6,508.....	10,107 14
September.....	4,726.....	8,801 22
October.....	7,615.....	10,089 90
November.....	6,870.....	9,347 74
Total.....	48,941.....	\$68,408 15

The following statement shows the amount received for transportation of freight each month:

April 26th to 30th.....	\$ 188 25
May.....	160 50
June.....	3,993 86
July.....	5,002 70
August.....	6,393 72
September.....	7,668 04
October.....	8,110 82
November.....	7,154 00
Total.....	\$38,666 89

There has been received for transportation of Express matter and Messengers..... \$ 1,487 50

The expenses of operating the Road from April 25th to December 1st have been as follows, viz.:

For repairs of Locomotives.....	\$ 3,089 95
For repairs of Cars.....	3,234 47
For repairs of Track.....	9,520 41
For repairs of Buildings.....	251 95

For repairs of Bridges.....	1,343 64
For Locomotive service.....	3,666 78
For Train service.....	3,634 49
For Station service.....	6,953 54
For Fuel and Water.....	5,746 12
For Oil, Waste, etc.....	842 38
For Stationery and Printing.....	565 00
For Advertising.....	836 75
For Office expenses.....	75 95
For Damage to freight.....	141 67
For Miscellaneous damage.....	137 00
For Taxes.....	10,051 61
For United States Revenue Tax.....	1,060 14
For Incidentals (fixtures for trains, depots, etc.).....	449 18
For Telegraph Expenses.....	8 00

Total.....	\$51,608 98
November Pay Rolls not yet distributed.....	4,680 19

Total operating expenses.....	\$56,289 17
-------------------------------	-------------

## RECAPITULATION.

Passengers.....	\$ 63,403 15
Freight.....	38,666 89
Express.....	1,487 50

Gross receipts.....	\$103,557 54
Operating expenses.....	\$56,289 17

Net earnings in gold coin.....	\$47,268 37
--------------------------------	-------------

Miles run by passenger trains, 14,016; miles run by freight trains, 19,468.

Average rate of speed of passenger trains, including stoppages, has been 22 miles an hour. Average rate of speed of freight trains, including stoppages, has been 15½ miles an hour.

There has been but one accident to persons on the road during seven months running. Frank Brady, an employee of the Company, in attempting to get on a construction train in motion, was injured so as to cause his death in a few days.

The earnings will be increased fully 50 per cent. by the further extension of the road, soon to be completed to Rock Creek or Neilsburg station, 42 miles from Sacramento, while the expenses for operating the road to that point will not be materially increased.

E. H. MILLER, JR., Secretary.