REPORT OF PETER A. DEY,

Engineer in Charge of Preliminary Surveys.

To the President and Board of Directors of the Union Pacific Railroad Company:

Previous to the organization of your Company, I made a report of a hasty examination of the country lying between the Missouri River and the Great Salt Lake Valley.

I then marked out a route, passing through the Cheyenne and Bridger Passes, and entering the valley either by the Limpopo, or the Weber, rivers, and expressed the opinion, that it would be found, on examination, more favorable for building a railroad than any other.

In the months of November and December, 1863, Mr. Brayton, a civil engineer sent out by the Company, ran a set of levels through the Bridger Pass, and over the Black Hills. His report was published in the proceedings of the Company, with his estimates, early in the spring of 1864.

Under the instructions of your Executive Committee, I located the Iowa branch of your road, from its starting point, on the Missouri River near Omaha, for a distance of one hundred miles west, and forwarded copy of map of location, for filing in the land department at Washington.

The grading of this portion of the road was started in the month of March, and has continued, without interruption, since that time. The difficulty of procuring labor, however, has prevented the work from being pushed as rapidly as the officers of the road desired. Still, in addition to the means ordinarily used in grading, two different kinds of excavators have been worked with considerable success, and nearly four
miles of road in the valley have been graded by the Pawnee Indians. This latter experiment, although only a partial success, has made it a serious question whether that kind of labor may not, to a certain extent, be made available in the prosecution of the enterprise.

The heavy excavations between Omaha and the Elkhorn River are progressing favorably, and the probabilities are, that if the expenditures the Company are now making are continued, this portion of the road will be completed sometime in June, or as soon as the iron can be delivered at Omaha.

West of the Elkhorn River, the grading may be pushed as rapidly as is desired, it being, in the main, a light embankment thrown up from favorable material. The distance from the starting point, to the end of the work done, is forty-four miles.

From the end of the first division of one hundred miles, the surveys were continued as far west as the one hundredth meridian of longitude, two hundred and thirty-six miles from the Missouri.

From the Loupe fork, eighty-four miles, a tangent of one hundred miles was laid to the point of Bluffs, four miles west of a point north of Fort Kearney.

This point of Bluffs will, probably, be common to any lines running west, as a glance at the map herewith submitted will show, to any person at all familiar with the topography either of the plains or the western prairies, that the crossing over to the Republican River must be at some point not far from the continuation of this tangent.

I regret that I am compelled to submit this without a survey connecting these valleys. We have three times attempted to do this work, but the large bodies of hostile Indians that were congregated on the Republican, near this point, have prevented. The large force required to keep the overland stage route open employed all the spare troops in the district, the commanding officer, General Mitchel, always manifesting a disposition to further our plans, when in his power.

I apprehend less difficulty in crossing from the Republican to the Platte than from the Missouri to the Platte.

The Executive Committee understood that the difficulties in building the road lay between the base of the Rocky Moun-
tains and the Salt Lake basin, and my instructions were, as early as the season would permit, to examine the route I had marked out as the most favorable, and also any or all the passes in the snowy range, that had attracted attention, or might be found, between the Cache a Poudre and the heads of the Arkansas.

Unfortunately for the success of the work, the starting of the parties, after they were ready, was delayed by orders from the New York office; and the Indian depredations in the latter part of the year were so serious, that all that had been marked out was not accomplished by the parties in the field.

Mr. Evans' survey from the Black Hills to Green River, (a full and complete report accompanies this, as well as profiles and maps) shows, with the exception of the crossing of the Black Hills, a line remarkably free from difficulties of construction. That crossing is formidable. In the fourteen miles from Camp Walbach the ascent is fifteen hundred feet, and the descent to the Laramie plains, which are about the same elevation as the starting point, equally rapid.

A crossing of the Black Hills, south of the Cheyenne Pass, through what Mr. Case calls Antelope Pass, may be reached through from either the muddy fork of Lodge Pole Creek, or the South Platte. This point is five hundred feet lower than the former, and from it the descent to the Laramie plains is easy. To reach it would require considerable sacrifice of distance. The early snows prevented Mr. Case giving this region the attention it deserved. His Cache a Poudre line would unite with Mr. Evans', not far from the Lamarie River.

The profiles of the Hoosier and Berthade Passes, that accompany his report, show that it is idle to attempt to cross the snowy range, with any line in the building of which economy of construction is an element and, when it is remembered that the summit of the Black Hills is lower than the parks, it cannot seriously be urged that the road should cross a range, higher above these parks, than those hills are above the plains.

The comparison of this portion of the road, then, must be between the Antelope and the Cheyenne, and the South Pass, routes. Against the latter there are two serious objections.

The first, an increased distance of seventy miles; the other,
that you avoid altogether the pine timber regions, from the Black Hills to the North Platte, a supply that is almost unlimited, and that can be floated down almost every stream, from the Cache a Poudre to the western extremity of the Medicine Bow Mountains, a resource from which the road must draw its supplies of timber, to all time. To balance this, are easier gradients, and a summit five hundred feet lower than the former, one thousand feet lower than the latter.

A divergence from Mr. Evans' line may be made, in the vicinity of Muddy Creek, crossing Green River south of Brown's Hole, and keeping south of the Uintah Mountains, until it strikes the Spanish Fork. I have not been able to understand whether this stream, like the Weber and Limpanagos, cuts through the Wasatche range, and would thus furnish an inlet into the valley of Salt Lake, or whether, like the stream Mr. Berthude followed from Strawberry Valley into Round Prairie, it rises in the range. If it does, a survey would be useless.

In any event, I do not anticipate as favorable a route as Mr. Reed found north of the Uintah Mountains, but from the reports of Governor Doty and Secretary Reed, of Utah, and explorers whose representations are entitled to respect, and from the fact that this chain of mountains must break off the north and west winds, conclude that this region is warmer, earlier, better adapted to cultivation, equally well supplied with water, and probably capable of furnishing the same amount of coal and timber.

It would be a question for the board to decide, whether any increased distance, and increase of cost of construction, would be justified, in order to reach a milder climate, possibly a more productive region, for part of the distance.

Mr. Reed's survey, as is shown by his report, crosses Green River about twenty miles north of the mouth of Bitter Creek, following nearly the overland mail route, leaving Bridger to the south, and from the mouth of Echo following the Weber to the Valley. His profiles are the result of an extended and critical examination of the country, and, in the main, are not susceptible of much improvement, the governing points being too clearly marked to have much doubt of this.

I would respectfully advise that, early next spring, the further
examination of the Black Hills and the heads of the Spanish Fork be made, the balance of the route, as far as Salt Lake, requiring little, if any, further surveys, except in detail.

For timber, after leaving the Missouri, the road must rely upon the Platte, the Medicine Bow Mountain region, Green, Bear, and Weber Rivers, and such points of the Wasatch and Uintah Mountains as are within practical distance.

For coal, the indications are, that a supply well adapted to use of locomotives will be found from some point not far west of the mouth of Lodge Pole Creek, at many points, over the entire distance to Salt Lake.

Magnetic iron ore, as in specimen sent to the general office, is found in abundance, on the heads of the Chug water, and it is represented to have been found, in places, at several points in the Black Hills. Of this, however, our surveys furnish us no definite information. Had I been at liberty to have done so, I should have employed Dr. Perry to have accompanied Mr. Evans’ party, and thus have been enabled to furnish a pretty full geological report. My suggestions, and his letter, were not noticed at the general office, and, as it was an expenditure not properly belonging to engineering, I was reluctantly obliged to deprive the company of information that would have been invaluable. The elevation of some of the prominent points above tide-water were as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low water in the Missouri at Omaha</td>
<td>972</td>
</tr>
<tr>
<td>Fort Kearney</td>
<td>2,250</td>
</tr>
<tr>
<td>Mouth of Lodge Pole Creek</td>
<td>3,703</td>
</tr>
<tr>
<td>Denver</td>
<td>5,303</td>
</tr>
<tr>
<td>La Porte</td>
<td>5,139</td>
</tr>
<tr>
<td>Camp Walbach</td>
<td>7,092</td>
</tr>
<tr>
<td>Antelope Pass</td>
<td>8,109</td>
</tr>
<tr>
<td>Summit of Black Hills</td>
<td>8,702</td>
</tr>
<tr>
<td>Grade in Tunnel “</td>
<td>7,583</td>
</tr>
<tr>
<td>Berthude Pass (about)</td>
<td>11,500</td>
</tr>
<tr>
<td>Big Laramie River</td>
<td>7,219</td>
</tr>
<tr>
<td>Rattlesnake Pass</td>
<td>7,501</td>
</tr>
<tr>
<td>Water in North Platte</td>
<td>6,730</td>
</tr>
<tr>
<td>Bridger Pass</td>
<td>7,535</td>
</tr>
</tbody>
</table>
Evans' Crossing of Green River.................. 6,128
Reed's " " (15 miles above)........... 6,245
Summit between Bear and Muddy................. 7,567
Bear river Crossing (Echo Line)........... 7,042
Summit between Echo and Bear............... 6,889
Surface of water Great Salt Lake............. 1,238

The time since the return of the parties has been so short, that I have as yet been unable to furnish more than general maps. Others, more complete and full, with estimates, will be made during the winter, and forwarded as soon as complete.

The efficiency and success of Mr. Reed's surveys have, to a great degree, been the result (independent of his own exertions) of the cordial co-operation and assistance of President Brigham Young, whose good will and aid I trust the officers of the road will appreciate.

All which is respectfully submitted.

PETER A. DEY,
Engineer in charge of Surveys
Union Pacific Railroad.

December 30th, 1864.