

REPORT TO THE
BOARD OF SUPERVISORS OF LOS ANGELES COUNTY
ON
VARIOUS ROUTES FOR A HIGHWAY BETWEEN
LOS ANGELES AND PALMDALE.

Los Angeles, Cal.,
June 1914.

FOR MAP SHOWING ROUTE NUMBERS REFERRED TO IN
THIS REPORT, SEE COUNTY SURVEYOR'S MAP NO. 5352.

Los Angeles, Cal.

June 8th, 1914.

To the Hon. Board of Supervisors,

Gentlemen:-

By your order for us to make a preliminary reconnaissance survey for a road south from Antelope Valley to connect the existing system of good roads we would beg to submit the following report:

In the choice of routes for a road the initial cost should be of paramount importance where there is a great difference, but where the difference in cost of two routes is less than twenty five per cent, we believe other factors of great importance should receive careful attention.

Since roads are built for the transportation of passengers, and freight, the cost of transportation must necessarily play a very important part, in the selection of one out of several prospective routes. Transportation expenses resolve themselves into two classes, the cost of maintenance of roads, and cost of operation of vehicles.

The cost of maintenance is affected by many agencies, most important is the matter of protection from streams, rivers and surface water. The amount of rainfall varying, and the different formations and composition of the various drainage areas, greatly change the amount of water to contend with.

The most important item in the cost of operation of vehicles, is the cost of fuel or energy necessary to expend in the moving of passengers or freight from one place to another. In other words, it requires a certain pull or tractive force to overcome the resistances which vary with different conditions. While the amount of tractive force required to pull a given load is affected to a more or less extent by the friction of the different parts of the vehicle, and the roughness or

smoothness of the road, it is affected to a much greater extent by the grades. According to best authorities a load requiring but one horse to draw on a level stretch of good macadamized road, will require four horses on a six per cent grade, other conditions being alike. Therefore one mile of six per cent grade is approximately equivalent to four miles of level road when we consider this important item in the cost of operation. All grades have been reduced to equivalent miles of level grades to assist in the selection of the most feasible route. The aggregate lengths of sharp curves on any route affect the resistance offered to traffic, limit the speed at such places and make operation more dangerous. The actual difference of mileage, considering a uniform rate of speed, also affects the operation costs in matters of time for drivers and passengers and the amount of lubricants and depreciation charges.

The maximum grade used in the compiling of this report is six per cent, and the smallest center line radius used is one hundred feet in length. On the final location of one of these routes it may be deemed wise to use a radius of less than one hundred feet. The width of roadway has been assumed as twenty-two feet.

All mileages given in the tables in this report have the following terminals: Los Angeles refers to the Court House. All lines terminate at Palmdale on Pacific Avenue, or Atlantic Avenue opposite the S.P. R.R. depot.

The number one (1) used in this report (see map) refers to a point on the improved road one-half mile north of Newhall where the present travelled road to Placeritas Canyon crosses the S.P. R.R. tracks. Number eight (8) is the northerly end of the improved road just north of Saugus where the branch line of the S.P. R.R. crosses the road. Number fourteen (14) is at the intersection of Michigan Avenue, and School Street, about one-half mile southeast of La Canada. Tropico refers to the intersection of San Fernando Road and Glendale Avenue.

The mileage of improved roads given in tables has been taken via North Broadway, Avenue Twenty and San Fernando Road, between the Court House and Saugus. For the Glendale Arroyo Seco route it has been taken via North Broadway, Avenue Twenty, San Fernando Road, Glendale Avenue, Verdugo Road and Homewood Avenue to Michigan Avenue and School Street. For the Pasadena Arroyo Seco Route it has been taken via North Broadway, Huntington Drive, Fair Oaks, Lincoln Avenue, and Michigan Avenue to School Street. The mileages of the proposed routes were compiled from the field notes in the County Surveyor's Office.

The estimate of costs are but approximate and are given briefly for comparisons, although we believe they will be close enough to the actual cost to determine if it is feasible to go ahead with the project. The estimates include only the grading and larger bridges, etc., but in no case include the cost of macadamizing the road. From your order we concluded that there were two general routes to consider (see accompanying maps and profiles), one by way of Newhall and the other by the Arroyo Seco.

By way of Newhall we found three routes offered themselves for our consideration, one by Bouquet Canyon, one by way of Soledad Canyon, and the third via Mint Canyon.

The present Bouquet Canyon road, after crossing the Santa Clara River one mile north of Saugus, enters Deadman Canyon and follows practically along the bottom of that canyon for more than twenty miles, to the summit of the range, and then descends to the floor of Antelope Valley at Palmdale, through the Llanos Verde Valley. For over one-half of its entire length the travelled road traverses the bottom of a narrow canyon, crossing and paralleling the stream which runs generally in a bed of rocky formation. In the inspection of this route shortly after the recent floods of the winter we found about a dozen bridges wrecked, and the whole road washed away in several places. To locate a permanent road on this route, it would be necessary to place it well above high water cutting the roadway out of the steep rocky side slopes. To follow these slopes, irregular as they

are, winding in and out of each branch canyon would lengthen the road quite materially, and could be done only at a great expense.

●The present Soledad Canyon road traverses the Santa Clara River bottom for more than twenty-five miles above Saugus, makes many crossings of the river, and the bridges were practically all destroyed this year. The travelled road also crosses the S.P. R.R. tracks a great many times, and nearly every one is at a dangerous place. A permanent road could not be constructed through this canyon without an enormous expense, and the maintenance would be great.

Therefore, for our reconnaissance survey, for the Newhall route, we picked the Mint Canyon route as being the most feasible for several reasons.

First, it will be the shortest, and the most direct. Second, it can be built for much less money. Third, the maintenance will be far less on this route than on either of the other two. The geological formation of Mint Canyon for the first eight miles above its mouth at the Junction with the Santa Clara River, is of such a character that very little water appears on the floor of the canyon, although the canyon has a large drainage area. During the recent floods, the entire stream passed through a four by thirteen foot opening, at the mouth of the canyon, with no difficulty.

In comparing the cut off route (Nos. 1-2-3) from Newhall northeasterly to near the mouth of Mint Canyon (3) with the route via Saugus (Nos. 1-8-9-3) we find that the cost of construction of these routes would be approximately the same, about fifty-five thousand dollars. That on the cutoff route we would have to cross the main line of the Southern Pacific twice, while on the Saugus route, we have to cross only a branch line.

But the two main factors that have appeared to us to stand out above all other considerations, is the difference of length, and the general permanency of the two lines.

The cutoff route (1-2-3) is 5.33 miles in length. The Saugus route (1-8-9-3) to the same point is 7.97 miles, a difference of 2.64 miles in favor of the cutoff line, or a saving of 33% in the distance between the two points (1 and 3).

As shown in the accompanying table there are a less number of miles of heavy grades on the Saugus route than on the cut-off route. However, there is but one-half mile of the maximum six per cent grade on the cut-off line, and that is against south bound traffic. Considering the fact that the road is already constructed from Newhall to Saugus, there is one half mile less of road to build and surface via the cut-off route. In comparing the equivalent lengths of these grades in miles of level road, we find the Saugus route will require fifteen per cent more tractive effort for north-bound traffic, and eleven per cent more for south bound.

As to the matter of permanency the County has had to expend several thousand dollars in building and maintaining retaining walls between Newhall and Saugus to protect the improved road from the Placerita Creek, and even then the road was considerably damaged from floods of the past winter. From Saugus northerly and easterly to a point one-half mile east of Honby, the present traveled road follows approximately the Southern Pacific Railroad right of way along the south side of the Santa Clara River bottom between the railroad tracks, and the river, and after considerable study we find no better place on this route to build a road than where it is now, with some minor changes, without greatly increasing its length and cost. The Southern Pacific Company has had to abandon entirely its first located and constructed line throughout this section and in some parts have occupied three different locations in an attempt to evade the destructive floods of the Santa Clara River. Many places in the first three miles northeasterly from Saugus the present traveled road was inundated during times of flood water, and in some places for many hundred feet at a stretch. The road has been crowded by the river against the railroad until it is, in one or two places, within the railroad right of way. To build a macadamized road this section would necessitate laying the grade line ten to twelve ft. above along the bed of the river with a long haul fill or borrowing the dirt on either side of the road. At least three thousand feet of road would have to be protected with a retaining wall or something similar, and the river might at any future time change its channel and endanger another mile, if left unprotected

By choosing the cut-off route, after crossing the Placerita Wash, nearly at right angles to the stream a crossing that can be made with a hundred foot pile trestle bridge and possibly some minor protection to upper side of road, the roadway can be constructed in a country free from water courses of any size whatever, and hence the road will be permanent and the maintenance low.

Probably one of the most important problems to consider in the location of any road between either Newhall or Saugus and Palmdale, is the crossing of the Santa Clara River. The river has always been forded, the crossing being very difficult to make during the rainy season.

Two important points to consider in the selection of a bridge site, are first: a place where the channel is the narrowest, and second, a place where the structure can be placed as nearly at right angles to the stream as possible. The only available site that in any sense meets these requirements, is the one selected for the crossing of the river, or the cutoff line. At that point the south bank is of a sandstone formation, that confines the channel to its present position. The north bank can be securely protected at a normal expense, by raising and protecting the abandoned embankment of the railroad, thus confining the river definitely in a channel one thousand feet wide, which can be entirely bridged or partly bridged, and partly filled and well riprapped to make the crossing very permanent. The channel of river on the Saugus route wanders about from place to place, and could not be confined to as narrow a channel without the expenditure of considerable money and even then would never be as permanent. The bridge at that point would have to be on a great skew with the channel. The fact that the Southern Pacific Company has had to abandon its location which occupied approximately the same place that the road would have to traverse, if built via Saugus, is sufficient evidence that the County should not attempt to maintain a road in that vicinity.

From point (3) entering Mint Canyon there is practically no other feasible route than thru this canyon relocating the present travelled road to secure better alignment, grades, crossings of streams, and protection from them,

until we get to No. 4, the mouth of a small canyon, one-half mile south of Mr. Wright's residence. This distance is 5.56 miles, and will cost approximately \$23000.00, including several small trestle bridges.

From this point to Palmdale the choice of two routes offer themselves one route (4-10-7) follows approximately the traveled road up Mint Canyon to a point one mile east of "The Oaks" where it swings off to the north of the present road following the canyon up to Mr. Schuller's ranch and crosses the summit of the range in the pass northeast of Mr. Houser's ranch, descending in a canyon near Mr. Linberger's ranch and thence to Palmdale as shown on map. The other route entering the small canyon at (4), runs east crossing the head of Tick Canyon, less than one mile above the Borax Mills passes a small summit, and crosses the flat Aqua Dulce canyon floor to the old Forest Reserve Station at number five (5).

Here again a choice of routes was available, one route (5-6-7) continues on in a northeasterly direction crossing the present Mint Canyon Road, near Mr. Johnson's home. From there it goes in as direct a line as possible to Palmdale, as it is shown on the map. Returning to the Forest Reserve Station (5), the other route considered, climbs the south slope of the valley for two and one-half miles, crosses over a small summit and descends gradually to a crossing of the present main road to Acton, at about the center of section 22, Township 5 north, range 13 west, then skirting the foot of the hills nearly two miles north of Acton, to point number eleven(11) a low saddle about two miles west of Vincent.

At that point (11), it was decided to investigate two routes, one (-11-12-7), going as direct as possible over the saddle (12) to Palmdale, and one (11-13-7) going via Vincent following closely the present road from there to Palmdale.

In comparing these four routes entering Palmdale, we wish first to call your attention to the fact that there is little difference in the estimated initial cost of the routes. The approximate estimated costs and mileage between Newhall and Palmdale are as follows:

Route.	Estimated cost.	Total length.
1-2-3-4-5-6-7	\$195,000.00	31.81
1-2-3-4-10-7	180,000.00	33.65
1-2-3-4-5-11-12-7	210,000.00	33.33
1-2-3-4-5-11-13-7	200,000.00	34.62

Equivalating the various Newhall routes to miles of level grade, we find but a little over two per cent difference between any of the lines, so this consideration should be given little weight.

The first eight miles to the northeast of number four, the 4-10-7 route follows Mint Canyon nearly to its head. Part of this distance is in the bottom of a narrow canyon. Taken as a whole this line would need more maintenance than any of the other three. It is 1.84 miles longer than the 4-5-6-7 route. The 4-5-6-7 and 4-10-7 route reach practically the same elevation at their highest points. Route 4-5-11-13-7 has the least number of miles of heavy grades, and the best alignment. Its cost per mile, considered as a whole, would be less than any other route, but its total cost would not be the least, on account of its greater mileage. The route 4-5-11-12-7, altho being second in length, would be the most expensive to build, on account of the heavy grading between No.1287. The route 4-5-6-7, is believed by us to be the most feasible one, because it is the shortest and most direct route.

The maintenance along this route will be less than on any of the other routes, for this route crosses the main drainage lines rather than paralleling them, making less trouble with surface water than on the other routes.

Although the cost of grading of the 4-10-7 route is less than the 4-5-6-7 route, the additional cost of macadamizing the extra 1.84 miles will make the cost of either one of these lines practically the same.

In considering the Arroyo Seco route, we wish to state that the natural scenery would make a most beautiful scenic drive for miles, and the total distance from Los Angeles would be 5.83 miles shorter than by the Newhall route, but on account of the greater number of curves on the Arroyo Seco route, we doubt if there would be much of a saving of time to any vehicle

other than wagons. The length of road to be newly constructed would be over 12 miles or nearly 40 per cent greater by the Arroyo Seco route, and this together with the much heavier class of work to be done, makes the estimated cost of the work, not including the macadam, about \$850000, or four times as much as the Mint Canyon Road.

Over twenty miles of the Arroyo Seco route would have to be constructed along the steep sides of mountains in practically solid rock where the roadway would have to be constructed entirely in cut, wasting a greater part of the material excavated, five miles of which would probably average \$40000, per mile.

The Mint Canyon route will include less than two miles of such work and the heaviest work would not cost over \$25000 per mile.

The amount of annual rainfall in the vicinity of the Big Tujunga River amounts to nearly forty inches, while that for the greater part of Mint Canyon probably averages less than 15 inches. The rainfall in the Mint Canyon soaks into the ground more readily and less water appears on the surface due to the natural formation of the region, hence it would be necessary to provide more waterway and drainage for the Arroyo Seco route.

Because of the steep side slopes, greater amount of rainfall, thinness of earth covering and action of frost, numerous slides take place each year in the higher mountains along the Arroyo Seco route. These generally start high up on the sides. Very often they carry with them large trees. Once started, these slides drop to the bottom of the canyon, carrying car loads of dirt with them. A slide of any size would at least block the traffic entirely, and in our survey, we crossed two or three such slides that would have entirely destroyed the roadway. There will be no trouble from this source in Mint Canyon. Thirty-three miles, or seventy-five per cent of the Arroyo Seco route, will lie over 3000 feet above sea level, and nine miles will lie above the 4000 foot contour. The macadamized pavement must certainly be constructed heavier, to withstand the action of snow and frost, especially in the higher altitudes, at an added cost of about thirty per cent. By the Mint Canyon route we have but eleven

miles, 33 per cent above 3000 feet, and only $2\frac{1}{2}$ miles above 4000 feet. The summit of the Arroyo Seco route will be 500 feet above that of the highest Mint Canyon route.

In respect to the tractive effort, reducing all grades to equivalent level mileage, we find practically no difference in their equivalent lengths, assuming the lines both straight. The resistance due to curvature on the Arroyo Seco route, would raise the cost of transporting freight between Los Angeles and Palmdale considerably above that of the Mint Canyon route, even considering that automobiles traveling at a higher rate of speed over the Mint Canyon road would require a slightly higher tractive force for any given load.

Referring to the Table No.1, at the end of this report, showing mileage of different percentages of grades, we find that the Mint Canyon route has seven miles less grades above four per cent, between Los Angeles and Palmdale, than has the Arroyo Seco route. Also we call your attention ^{to} the large excess of grades below two per cent, on the Mint Canyon route, the Arroyo Seco route being less than sixty per cent as many as the Mint Canyon route.

In summarizing this report, we beg to state that we consider the best route for the County to build at this time, is the Mint Canyon route, following the route shown on the map by Nos.1-2-3-4-5-6-7, for the following reasons:

First-, That a road can be built from Los Angeles to Palmdale via the Newhall and Mint Canyon for about one fourth what it will cost to build a road through the Arroyo Seco and Big Tujunga Canyons.

Second: That a road via Mint Canyon could be more easily maintained at a much less cost than through the Arroyo Seco.

Yours very truly,

I. B. Noble County Surveyor

By _____
Deputy.