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Evolution of Transportation in Novato During the 1930s

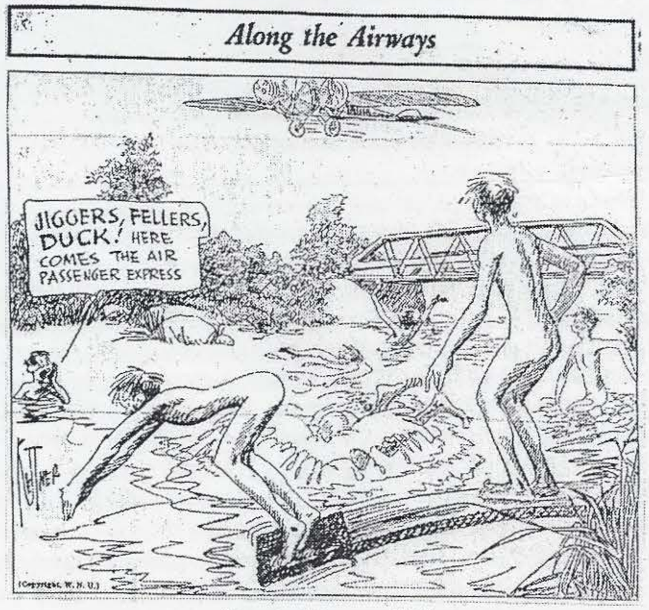
By John A. Trumbull

When Henry Jones was our first postmaster, in 1856, Novato was a way station on the road between the commercial centers of San Rafael and Petaluma. The wagon road came north from San Rafael over the hill at St. Vincents. It proceeded along Novato Boulevard past the Novato Estero (where the bay schooners docked to service what was then Novato's commercial center) and past Henry Jones' store/pub (named 'Our House') to about where the Diablo Ave. intersection is now. There the track zigged east across the creek and then headed north again along the general line of the present Redwood Boulevard, skirting the bay marsh just east of the Burdell ranch on its way out of the valley. In those days the land route from San Rafael to Sacramento looped around through Novato, Petaluma, Sonoma, and Napa. Commuting from the North Bay to San Francisco was done by ferry or barge schooner.

In the late 1870's the railroad got around to serving the north bay. Its arrival (together with the continuing silting of the north end of the bay) diverted bulk freight traffic off the water. This resulted in the relocation of the commercial center of Novato to the present location of the east end of Grant Avenue. However the railroad did not greatly alter the local passenger transportation. It was still a major outing to go to San Francisco or Oakland or the resorts of Sonoma County.

It was during the decade of the 1930's in which the real revolution in transportation took place. Not only was the horse and carriage permanently replaced by the automobile, and the roads graded and paved, but major new traffic routes were established in and out of Marin. Considering that this was the time we call the "Great Depression" it is amazing that such heavy capital investment was made in our infrastructure.

There was an explosive development of military aircraft. In Palo Alto, Moffit Field was built for military dirigibles, Alameda Naval Air Station on Alameda Island was built for fighter aircraft, and Hamilton Field in Novato was built for bombers. All this construction was done simultaneously in the mid 1930s to supplement the military air activity at Crissy Field in the San Francisco Presidio. None of this aided civilian transportation, but civilian air transportation was coming. A consortium of Japanese and Americans investigated establishing a dirigible field at St. Vincents in June 1930 for a service to operate between San Francisco and Tokyo.



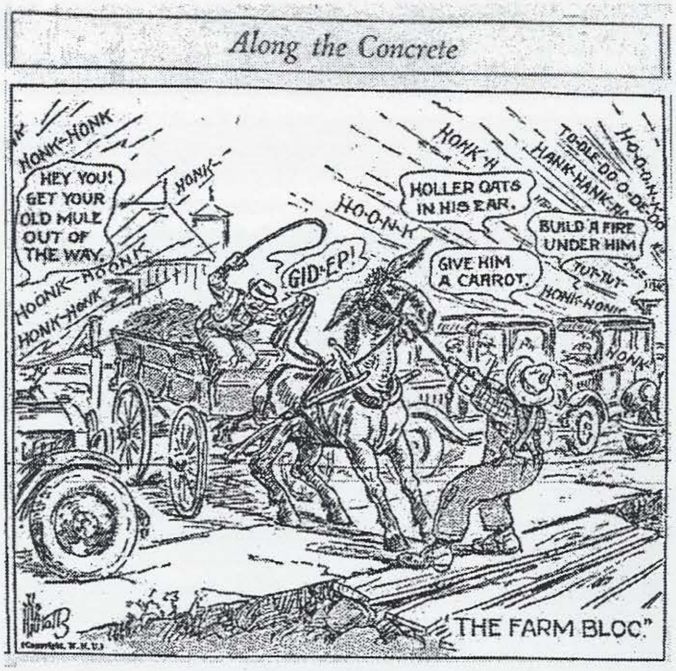
Novato Advance 1928

In April 1930 Sonoma County started the bridge construction boom by pledging $85,000 toward erection of a bridge on Highway 1 at Jenner. This project was contingent upon San Francisco, Marin, Mendocino and Humbolt counties raising $45,000 between them to add to the State of California's promise of $65,000. This span eliminated the small ferry at Markhams, which was at that time the sole connection between the banks at the mouth of the Russian River.

The two projects that did the most to alter traffic in Novato, however, were the construction of the Golden Gate Bridge and of the Highway 37 road to Vallejo. It is these two projects upon which I will concentrate in this article.

Highway 37

Initially called the "Sears Point Toll Road" or the "Sacramento-Vallejo Cut-off", this road first opened to traffic on July 4, 1928. The new alignment shortened the driving distance from Novato to the Vallejo "Y" by 12 miles. A toll of 35 cents was charged for crossing the 2 bridges on the route. The Vallejo Chamber of Commerce invited the Marvelous Marin booster group to help open the road with *"... a monster celebration" ... marked by appropriate speeches, music and aerial innovations ...* [which will be] *long remembered by those in attendance."* [Marin Journal, June 21, 1923] This road was built and owned by a private corporation. On September 6, 1928, the Marin Journal reported that *"Including the big run of automobiles on Labor Day..." to the State Fair at Sacramento, the roadway's traffic was averaging 550 cars per day according to the operators."* The editor noted that an additional savings in time and mileage would result when the road through American Canyon near Napa was completed by the state.



Novato Advance, December 8, 1928

As with all things, success creates its own problems, and for the Sears Point Cut-off, the construction of the Golden Gate Bridge increased the expected usage of the road to the point that the State of California moved to acquire it. In November 1932, California governor James Rolph Jr. was quoted as saying: *"I will gladly recommend to the highway commission that a meeting or meetings be held with the owners of the Sears Point toll road to see if an amicable and advantageous purchase can be negotiated. I will be glad personally to assist in such a conference whenever they decide to hold it."* [Marin Journal Nov. 24, 1932] At this time with the Golden Gate bridge under construction *"Expectations are that between 500,000 and 600,000 cars will be going annually over this road by 1936."* [Ibid] In 1934, the State completed purchase of the road for $418,000. The Highway 37 today follows the original line of the private toll road. It is our major route to the east from Novato.

The Golden Gate Bridge

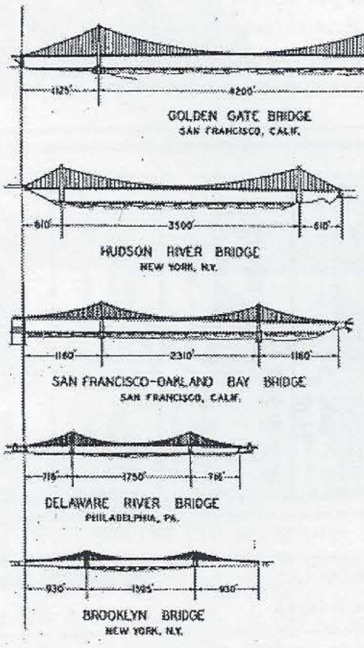
The span opened for vehicular traffic May 28, 1937, but the story of the efforts preceding that event are worthy of an entire book. I will just summarize them as they appear in the Report of the Chief Engineer (Joseph B. Strauss) to the Board of Directors of the Golden Gate Bridge and Highway District to peak your interest. (All following page references are to that volume, which was published by the Bridge District in January 1938.)

In 1930 the area to be served by this toll bridge, which would require the world's largest bridge span, was described as follows: *"The San Francisco Bay Region is topographically unique. It consists of 463 square miles of saltwater-flooded basin, largest land-locked harbor in the world, the marginal occupiable lands about its shores, and the mountains round about, rising at some places to the maximum elevation of 3000 feet. The nine counties tributary to the bay, with their combined area of 4,750,000 acres, are embraced within the compass of this circumferential rim of mountains,* [This is the bay plain area] *and the present-day population of these counties is nearly 2,000,000 persons, owning 550,000 automobiles."* [Report page 16] *"The entire occupiable area within the bay region, including plain and upland,* [This is the total potentially habitable area] *is nearly 9,000,000 acres, or an area easily capable of supporting a future population of some 6,000,000 persons. Omitting lands not now strictly urban or suburban in character the district contracts to about 6,000,000 acres, and this contracted area is truly susceptible of development as San Francisco's tributary metropolitan district."* [Report page 17]

While San Francisco was evolving into a major commercial city, transportation around the bay was struggling to keep up. In 1919 there were no bridges, and only 2 ferry routes, both owned by the railroad, which was using boats of ancient vintage. One route ran to Sausalito, the other to the foot of Broadway in Oakland. In 1921 some enterprising outsiders introduced fast diesel ferry service, and they prospered. This prompted the railroad to buy one competing line, to upgrade its own ferry fleet and to lower its rates. By 1929 the demand for ferry service had increased 7 fold, and the railroad had acquired all its ferry competitors. Demand increased faster than service, and while the ferry fleet could accommodate up to 1000 cars per hour on each route, on heavy use weekends the demand could reach 3000 cars per hour. *"The highways leading to the Sausalito ferry plaza, therefore, were often jammed for miles by lines of irate motorists returning of a Sunday night from an outing in the northern counties."* [Report page 25]

The first study of the possibility of bridging the Gate was done in 1918 as the result of a resolution introduced by San Francisco Supervisor Richard J. Welch, who would later become a director of the bridge board and a Congressman. The San Francisco city engineer, M. M. O'Shaughnessy contacted Joseph B. Strauss, a Chicago based engineer, to perform the study, including in his letter the comment *"Everyone says it can't be done and that it would cost over $100,000,000 if it could be done."* [Report page 25] At this time the only bridge over any part of the bay was the single track, low level, railroad bridge the Southern Pacific had built across the Dumbarton Narrows.

Strauss assessed his problem as follows: *"Old precedents would have to be set aside, new ones established. We have seen that the channel is more than three hundred feet deep, and 5357 feet wide at its narrowest part, where, for cogent physical reasons having to do with foundation conditions and length of bridge, the structure would have to be located, leaving little room to spare for* *adjustments of alignment. The conditions indicated a main span of about 4000 feet, and at that time spans of such great length had not been contemplated. In addition, the locality is subject to fog and high prevailing winds. It is exposed to the sweep of ocean storms and heavy swells from the Pacific, and the tidal current*



reaches the velocity of seven knots." [Report page 25] The approach to both ends lay within a military reservation. *"The entrance to a great harbor had never been bridged, and there was a deep-seated objection to the establishment of such a precedent. There were strong military and naval objections on the ground that an enemy might by bombing the structure bottle up the harbor. The minimum permissible vertical clearance would be greater than that of any other bridge over navigable waters. These considerations and the unprecedented size of the various component units of the structure, the vast quantities of materials to be assembled and routed to their rather inaccessible place of use, the new and original methods of construction to be devised for building a structure of such great magnitude virtually in the open sea, and finally, the question of doing all this within practical limits of cost – all made the challenge to the engineer a formidable one."* [Report page 26]

In May 1920, San Francisco indicated it would consider a cost ceiling of about $25,000,000 for a feasible project, and it sent out a request for proposal (ROP) for the design and construction of the bridge. Of the three engineers receiving the 1920 study and the ROP, one never responded, one replied two years later with a bid range between $60,000,000 and $77,000,000, and Strauss' firm bid $27,000,000 (which included $4,500,000 for highways and structural approaches).

With this feasible bid, the Golden Gate Bridge and Highway District was incorporated pursuant to Act #936 of the California Legislature, passed on May 25, 1923. The corporation was granted power to issue bonds and to *"cause a tax to be levied upon all of the taxable property in the district, in addition to all other taxes levied for the county or city and county purposes."* [Report page 30] By an act passed April 10, 1929, the legislature specifically validated the District a second time. Again, by Act #938 passed March 12, 1931, the legislature validated the formation and organization of all the bridge and highway districts.

Now it seemed that all that remained to be done was to get a bond passed and to persuade the Secretary of War to let public road approaches be constructed through two military bases. The Southern Pacific R.R. Co. didn't agree. To perpetuate its ferry monopoly the railroad filed and/or financed a number of lawsuits challenging the formation of the district and the legality of its powers. Those suits would keep the District in court for 6 years. This litigation did succeed in persuading Humboldt county and parts of Mendocino county to withdraw from the district.

Nevertheless in November 1929 Strauss opened an auxiliary office in San Francisco and started associating his required experts. The first meeting of the Board of Engineers in August had resulted in a concept revision that led to construction of a simple suspension design instead of the cantilever-suspension concept initially proposed. After intervention by Senator Shortridge and Congressman Welch, General Lytle Brown, then Chief of Engineers of the U. S. Engineer Corps, accepted Strauss' engineering opinion as to costs and feasibility (over the contrary testimony of several distinguished specialists) and issued a permit to construct the bridge and its approaches on August 11, 1930.

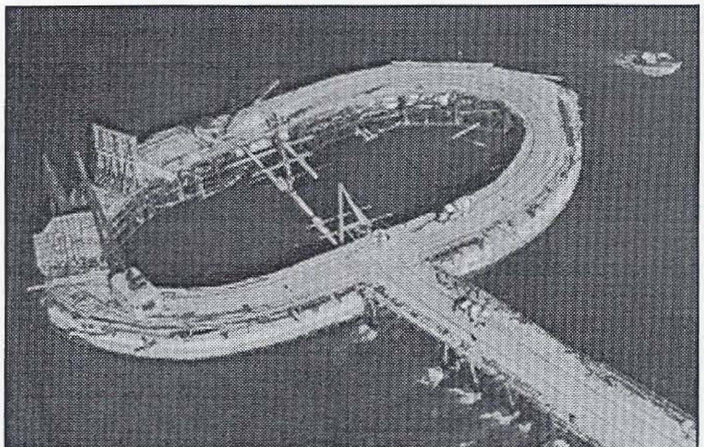
Despite public charges that the bridge was *"an outrage and a wildcat scheme"* the District's Finance Committee, headed by Robert H. Trumbull, who was the Marin representative and Vice President of the Bridge Board, succeeded in getting a $35,000,000 bond passed by a majority *"well over the two thirds required by law"* in the election of November 4, 1930. [Report pages 40–42] This victory was tarnished immediately by the filing of another law suit by the Del Norte Company and the Garland Company challenging the constitutionality of granting the district taxation powers . The suit went to a trial and the Plaintiffs lost, but they filed an appeal. Due to public pressure however the appeal was withdrawn and the suit terminated in July 1932.

Thereafter the Bank of America, heading the syndicate to finance the district, made a bid to buy the new bonds at a price that provided a 5.25% interest rate. This became another crisis when the District's New York legal advisors informed the District that the bond legislation only authorized a 5% interest rate. It looked like another legal delay was in store. Engineer Strauss and a strong committee from the Bridge Board met with A. P. Giannini, founder and then chairman of the board of Bank of America, and presented their problem. Mr. Giannini pledged his bank's support, and Will F. Moorish, the bank's president at the time, formed a new syndicate, which, despite an unfavorable bond market, purchased the first $3,000,000 of the bonds at a 5% interest yield and then advanced $184,600 against $200,000 of the not yet validated bonds to apply to current board expenses.

Now construction contracts could be legally awarded to the low bidders, but all except the contractor for the steel superstructure of the main span had been released from their estimated bids due to the time delay since their initial submission in July 1931. New bids were opened October 14, 1932, and they totaled $23,843,905 without the toll terminal and final painting. Of this sum, $1,055,780 was for building the two approach roads. Contracts were awarded in November 1932 and construction began officially on January 5, 1933.

I will not recount the construction details except to note that the use of a suspended safety net was new and controversial, but resulted in an unusually low loss of life. Standard calculations at the time were one fatality per million dollars of construction cost. The Golden Gate final total was 11 fatalities, ten of whom were killed in the same accident when a paving contractor's scaffolding occupied by 12 men fell, carrying away 2100 feet of the safety net. Considering the amount of excavation and cement work done in the channel tide, this is an amazing safety record, and at odds with legends which have bodies buried in the bridge footings.

An example of the unique challenges facing contractors is the story of the San Francisco towers access trestle. This pier to the tower's footing was 22 feet wide and 1100 feet long from the shore into the channel. It was anchored in the solid rock of the ocean floor. Shortly after initial completion it was damaged by a vessel sent off course by a thick fog. Very shortly after repair of this damage, 800 feet of it was carried away in a storm. The engineer ordered the top surface raised 5 feet and the whole structure to be guyed at intervals by steel cables anchored in the bedrock. The improved trestle served the project for the next 4 years, not only for the construction of the tower footing, but as access for the structural steel superstructure as well.



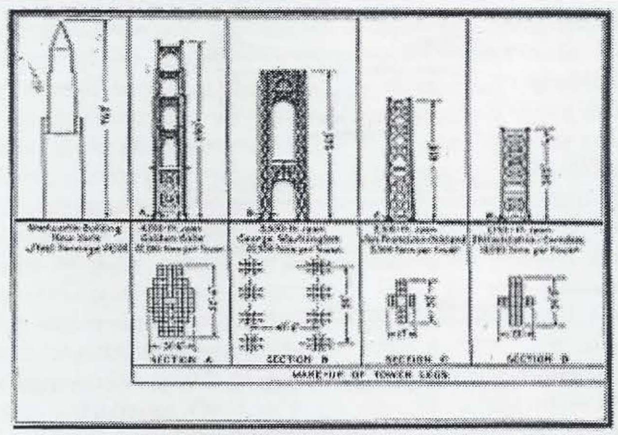
The access. trestle and the coffer dam to build the tower footing.

During construction the bridge consumed 389,000 cubic yards of specially formulated concrete and 83,000 tons of structural steel. The concrete was made in two specially constructed batch plants and moved to the site of construction in barges from two specially constructed piers, one on each side of the Gate. The steel was fabricated at Pottstown and at Steelton, Pennsylvania, shipped by rail to Philadelphia, then by water through the Panama Canal to Alameda where it was stored. It was barged to the construction site in 500 ton loads.

The towers are only 100 feet shorter than the Woolworth building in New York City, and they each contain 10% more steel than the towers of the George Washington Bridge in New York. *"The Golden Gate tower shafts are thus by far the largest structural steel members ever assembled."* [Report page 90]

The final accounting, including construction of the approach roads and the toll plaza, came in at $27,125,000; despite the time lag and some cost overruns just $125,000 over Strauss' estimate in 1929. After paying the inspection, administration and finance costs, the District still had $1,334,000 left from its $35,000,000 bond.

Since the headlines today trumpet the potential for disaster, let's see what the engineers contemplated when they designed the bridge. *"Wind pressures used in design were 30 pounds per square foot on the cables and suspended structure and 50 pounds per square foot on the towers."* [Report page 81] The footings for the towers when fully loaded were designed to have, on the Marin side a maximum of 17.1 tons per square foot and a minimum of 4.0 tons per square foot. On the San Francisco side the figures are 10.8 maximum and 9.6 with average loading. *"An earthquake acceleration equal to 10 percent of the acceleration of gravity, which is greater than can reasonably be anticipated, would increase the maximum bearing pressure on the Marin Pier by not more than four tons per square foot and that on the San Francisco Pier by not more than three tons per square foot."* [Report page 87] *"The towers, homogeneous, flexible shafts of steel, are anchored to massive concrete piers which are founded on rock.*



Comparison of Golden Gate Bridge towers with the towers of other notable suspension bridges.

Although no one can predict just how a flexible shaft of this character will respond to an earthquake, some conclusions can be drawn as to its stability under these forces. In the judgment of engineers who have investigated destructive effects of earthquakes, these towers may be subjected to earthquake vibrations of very small amplitude (a fraction of an inch) and accelerating forces amounting to possibly 5 per cent of gravity. In the completed structure the transverse deflection of the towers under the design wind load is more than ten times any expected movement of the pier tops, and the stresses from transverse wind will be more than double the stresses due to transverse earthquake forces. Due to the great flexibility of the towers in the longitudinal direction, stresses from longitudinal earthquake forces (5 per cent gravity) will not exceed 50 per cent of the longitudinal wind stresses." [Report page 104] This structural flexibility was graphically demonstrated when the bridge celebrated its 50 year anniversary in 1989 and it was actually covered by standing people – the only recorded event that literally flattened the arch engineered into the deck of the bridge.

In conclusion I am in awe of the imagination and accomplishment that occurred in the decade of the 1930's, a time of severe economic and political stress. Remember that Hitler was beginning the conquest of Europe which would flash into World War II on September 9, 1939. In Russia the Bolsheviks under Lenin and Stalin were consolidating their revolution and executing thousands of their soldiers and peasants. In China the Japanese were waging war in Manchuria and Singapore, slaughtering thousands of civilians in widely publicized atrocities such as the rape of Nanking. At home Hoover had ordered Douglas MacArthur to use the army to demolish the veteran's camp on the Washington DC mall. Franklin D. Roosevelt's ensuing election initiated the days of the depression busting "New Deal". Despite all these distractions the "can do" attitude of our ancestors has changed our lives far more than many of us now appreciate.