THE
WOODSIDE
CONSULTING
GROUP

A VALUATION STUDY OF THE TRACK, SIGNALS, STRUCTURES AND OTHER RAILROAD IMPROVEMENTS LOCATED ON THE UNION PACIFIC RAILROAD COMPANY'S SANTA CRUZ SUBDIVISION BETWEEN WATSONVILLE JUNCTION AND DAVENPORT CALIFORNIA

Prepared For:

The Santa Cruz County
Regional Transportation Commission

Prepared By:

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Physical Conditions, Costs and Values
As of March 2004
Study Revised September 2004

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Summary
Of
The Net Liquidation Value (NLV) and In Place Depreciated Value for Alternative Rail Purposes for Union Pacific Railroad Company's Santa Cruz Subdivision
Railroad Assets Located on the Subdivision Land

A. The Results of The Valuation Study as Prescribed by the SCCRTC

• The estimated payment that a landowner can expect to receive from a contractor if the bridges and trestles remain in place and all other assets are salvaged.	$419,000
• The estimated payment by the landowner to the contractor if the bridges and trestles are removed by the contractor and all other assets are salvaged.	$217,000
• The estimated depreciated value of the Subdivision if the alternative rail purpose is to Operate with Class 1 Track, prescribed by FRA Track Safety Standards, Part 213.	$33,300,000
• The estimated depreciated value of the Subdivision if the alternative rail purpose is to Operate with Class 2 track, prescribed by FRA Track Safety Standards, Part 213.	$22,200,000

B. Summary of Values and Costs for Determining the NLV

1. Estimated Gross Value for the Landowner of the Railroad Assets (Pages 29 to 35)

- Rail and Other Track Material (OTM)	$1,578,000
- Crossties	598,000
- Turnouts	239,000
- Roadway At-Grade Crossings	126,000
- Grade Crossing Signal Warning Systems	164,000
- Bridges, Trestles and Culverts	---
- Ballast	---
- Train Control Signal Systems	---
Total Gross Value of Assets	$2,705,000

2. Estimated Cost to Remove Railroad Assets from the Right of Way, Sort Materials, Classify and Load Materials into Trucks or Rail Cars (Pages 35 to 39)

	Cost to Remove
- Remove Rail, OTM and Turnouts	$395,000
- Remove Crossties	233,000
- Repair and Restore Roadway At-Grade Crossings and City Streets	292,000
- Cost to Remove At-Grade Roadway Crossing Signal Warning Systems	33,000
- Cost to Remove and Dispose of Ballast	984,000
Subtotal Cost to Remove	1,937,000
Plus Salvage Contractor's Profit for the Salvage Work	349,000
Total Cost to Salvage Railroad Assets with Bridges and Trestles Remaining in Place	$2,286,000

3. Estimated Payment to the Landowner by the Contractor if Bridges and Trestles are not Removed (Page 40)

- Gross Value of Salvaged Railroad Assets for the Landowner	$2,705,000
- Less Cost to Remove Salvaged Railroad Assets with Bridges and Trestles Remaining in Place	2,286,000
Estimated Payment to the Landowner	$419,000

4. Estimated Payment by the Landowner to the Contractor with Bridges and Trestles Removed (Pages 40 and 41)

- Estimated Cost to Remove Bridges and Trestles	$636,000
- Estimated Payment to the Landowner with Bridges and Trestles in place	419,000
Estimated Payment by the Landowner to the Contractor if Bridges and Trestles are Removed	$217,000

C. Summary of Costs and Depreciated Values for Determining In Place Depreciated Value of the Subdivision for Alternative Railroad Purposes

1. Estimated Cost to Replace 32.38 TM of Existing Railroad Assets with New Materials. (Pages 42 to 51)

Trackage	$32,735,000
Grading	23,210,000
Bridges, Trestles and Culverts	39,882,000
Total	$95,827,000

2. The Depreciated Value of Railroad Assets Based Upon Two (2) Assumed Scenarios for Railroad Service Requirements (Pages 52 to 61)

		$ (Millions)
(a)	FRA Class 1 Track Safety Standards	$33.3
(b)	FRA Class 2 Track Safety Standards	22.2

The Detail of the Depreciated Value of Railroad Assets Shown Below is Taken From Page 60.

Asset	Cost ($ Millions)	Depreciated Value FRA Class 1 Track ($ Millions)	Depreciated Value FRA Class 2 Track ($ Millions)	Reference (See Pages)
Track	21.9	5.6	4.0	55
Turnouts	1.5	0.7	0.5	56
Crossings and Streets	0.7	0.3	0.3	57
Crossing Warning System	8.6	3.2	2.0	58
Grading	23.2	9.3	4.6	59
Bridges, Trestles and Culverts	39.9	14.2	10.8	59
Total	$95.8	$33.3	$22.2	

Our Assignment

The Woodside Consulting Group (WCG) was requested by the Santa Cruz County Regional Transportation Commission (SCCRTC) to complete an appraisal of the Net Liquation Value (NLV) of the Union Pacific Railroad Company's Santa Cruz Subdivision within the limits of the SCCRTC proposed acquisition of that Line.

The Scope of Work prepared by the SCCRTC for this assignment is attached as Appendix C of this Report. The assumptions and conditions are summarized below.

1. Effective date of value: current.

2. Track structure, including signals, to be categorized by type, condition and value for reuse or scrap.

3. Assume that the land (right of way) is to be purchased by one private party.

4. The buyer solicits offers from rail asset salvage contractors.

5. The salvage contractor must remove all of the track structure and leave the right of way clean.

6. The contractor assumes all costs of removal and salvage of the track and signal materials, including transport to market and disposal of contaminated materials. The contractor receives all revenues from the sale of reusable and scrap track and signal materials and realizes a profit for assuming the responsibility for salvaging the track materials.

7. The new landowner is not involved and does not participate in the contractor's salvage activities.

8. This Study must answer these two questions: Upon awarding of the contract, (a) how much would the contractor pay the landowner or the landowner pay the contractor for the right and obligation to remove and salvage the track and signals if the trestles and bridges can remain standing? and (b) the same question raised in (a) above but assume that the trestles and bridges are required to be removed in a manner conforming to law?

9. Separately, determine the in-place, depreciated value of the rail assets if a private buyer intended to acquire and use them for alternative rail purposes. (The depreciated value is obtained by estimating the Replacement Cost New [RCN] and deducting the estimated depreciation, or "Less Depreciation," all of which becomes RCNLD.)

The SCCRTC requested that the NLV Consultant's estimated cost of salvage and profit be detailed and explained and that the sources for all costs or values in the Report be provided.

Included with the SCCRTC's Scope of Work are copies of Union Pacific's valuation maps and the State of California's "Valuations Procedures and Guidelines for Public Acquisition of Railroad Rights of Way pursuant to Public Utilities Code, Section 7551.3."

Methods of Investigation and Valuation

The following methodology is used in this NLV Study.

(a) By physical inspection and use of current records, maps and charts, determine the inventory of the materials and improvements on the railroad line under study including but not limited to the following:

1) Track Structure, including rail, ballast, crossties, fastenings (OTM) turnouts, track crossings, signage, etc. by location, type, weight, age, etc.

2) Bridges, Trestles, Culverts and Tunnels, by type, location, length, documented capacity, etc.

3) Highway Overpasses or Overheads, by location, name and maintenance responsibility if assigned to the railroad company.

4) Highway At-Grade Crossings, by location, name, type of surface and type of grade crossing warning system.

5) Train Signal System, if any, including automatic block systems (ABS), centralized traffic control systems (CTC) and interlocking plants known as Control Points (CP).

6) Buildings, Shops, Fuel Facilities, Tanks, Platforms, Stations, Warehouses, Radio Towers, Transmitters, and Communication Lines.

7) Roadbed, Drainage, Gradient, Curvature, Vegetation, Fencing, private at-grade crossings and including but not limited to

boundaries of national forests, game preserves, endangered species habitats and locations of unstable subgrades, slides and washouts.

(b) By physical inspection and current railroad records determine the condition and quantities of materials and improvements listed in (a), above, by type, weight, length, age, quantities, design, capacity, etc.

(c) Based on experience and current market data, classify the materials and improvements listed in (a) above in accordance with their highest and best use and, thus, determine the quantities or units of assets that are (1) reusable, (2) scrap with a market value or (3) scrap with no market value and with possible disposal liabilities.

(d) Determine the Most Likely Wholesale Value of the materials and improvements listed in (a) above, and using the quantities of classified materials in (c) above, determine the wholesale Gross Value of all of materials and improvements on the railroad line under study. The wholesale value is defined as the cash amount a salvage contractor would pay the landowner.

(e) Estimate the cost to remove, sort, classify, stockpile and load the materials and improvements for shipment to the point of sale or inventory.

(f) Subtract the cost to remove from the estimated gross wholesale value to obtain the NLV.

The RCNLD methodology used in this Study is outlined below:

(a) Estimate the present day cost to replace all of the existing roadbed, track structure, bridges, trestles, culverts, signals, at-grade crossings etc., using unit costs per track foot (TF), cubic yard (CY) linear foot (LF), etc, based on current costs which are developed from contractors' bids and railroad company's estimates and cost of materials. (See Table 11)

(b) Determine the planned service requirement for all of the assets in terms of Federal Railroad Administration (FRA) regulations under 49 CFR, Part 200 to Part 268 and with particular reference to Part 213, Track Safety Standards. These regulations determine the types of trains and train speeds that can operate over the Line. Experience and judgment must also be exercised when determining the type of train service permitted over any given segment of track since FRA regulations are the "minimum standards."

(c) Based on experience, the physical condition of the existing assets and the service requirements determined in (b) above, estimate the percent of life remaining in each asset. Since some of the assets in this Study are 75 to 100 years old and since service requirements in terms of weights of loaded rail cars have more than doubled in that time span, some assets have become obsolete even though they have some utility under current operational constraints on the Santa Cruz Subdivision.

For further clarification, the estimator considers the following factors:

- How much longer can the Line under study continue to operate at a given level of service within the limits of the railroad's annual normalized maintenance expense per track mile?

- Do annual inspections of the railroad assets such as visual inspections, ultrasonic testing of metals, geometric testing of track surface and gage and recorded service failure rates call for the replacement of assets by a prudent manager?

- Does the railroad asset have the physical strength to safely withstand the imposition of heavier car loads, higher train speeds or the liabilities of passenger train service?

(d) Estimate the RCNLD by applying the appropriate physical depreciation or obsolescence factor to each asset based upon experience, the service requirement and the physical condition of the railroad asset. For further discussion, see Table 11.

The WCG prepared an NLV of railroad improvements on the Santa Cruz Subdivision for the SCCRTC in December of 1995, at which time that branch line was owned by the Southern Pacific Transportation Company (SPT). Subsequently, the Union Pacific Railroad Company acquired SPT on September 11, 1996, as provided by Surface Transportation Board Finance Docket #32760.

In preparing this NLV Study, we followed the same basic steps as performed in preparing the previous appraisal:

1. Review all relevant records from Union Pacific Railroad Company, including track charts, operating timetables, right of way maps, and any

other records that are available such as at-grade crossing inventories (including warning systems), bridge inspection reports and other inventory reports. Specifically determine any changes or improvements made by Union Pacific since acquiring the Santa Cruz Subdivision in 1996.

2. Perform a field inspection of the Santa Cruz Subdivision by use of an on-track hyrail vehicle accompanied by Union Pacific track maintenance and staff officers as well as other SCCRTC consultants in order to evaluate the current condition of the track structure and other assets on the right of way and to determine from Union Pacific representatives both the nature of physical improvements that Union Pacific has made to the Subdivision since the acquisition and what operating or physical problems may exist at the present time. This inspection trip was accomplished on January 30, 2004. The track inspection made in 1995, included a walking inspection where track structure did not conform to Common Standard Drawings (see Table 10) or was different in physical detail from the track chart provided by Southern Pacific. The same attention to detail was paid during the January and February 2004 inspection of track structure, grade crossings, grade crossing warning systems, bridges, trestles and culverts. Visual inspection from a Hyrail vehicle can detect irregularity in standards for tieplates, joint bars, continuous welded rail, rail anchor patterns, etc. Since some irregularities were observed, a second and third inspection was made of the Santa Cruz Subdivision during this Study which determined both deviations from Southern Pacific's standards and from Union Pacific's Track Chart data. Also, the subsequent walking inspections revealed the improvements made by Union Pacific to certain at-grade crossings, the installation of 37,000 new crossties and resurfacing the track using 550 carloads of crushed rock ballast.

3. Estimate what a contractor would pay the landowner for the railroad assets on the Santa Cruz Subdivision under the conditions prescribed in the SCCRTC Scope of Work. Then, determine the in-place depreciated value of the rail assets for a continuing rail operation. The term railroad assets includes all rail, crossties, ballast, fastenings (OTM), turnouts including frog section, switch section and switch ties and signals, at-grade crossings (including passive and automatic grade crossings warning systems) as well as bridges, trestles and culverts and the roadbed. The source for the quantities of track structure materials is found in Table 10 and the source for values of railroad assets for the NLV Study, and new materials and construction costs for the RCNLD Study are found in Table 11.

4. It should be noted that NLV and RCNLD studies produce "order of magnitude" estimates and are subject to change with time since the demand and price for scrap as well as for new and reusable materials is in a state of flux. The railroad transportation industry is a cyclical business in which maintenance expenses and capital investments vary sharply with changes in the economy of the Country. Also, the scrap steel market prices rise and fall rapidly not only with U.S. economic conditions but, also, world market conditions. The same is true for new steel products and timber for crossties and bridges.

<u>A Description of the Santa Cruz Subdivision</u>

The Union Pacific's Santa Cruz Subdivision is located in Santa Cruz County, California as shown on the map in Figure 1. The Union Pacific has renumbered the former mileposts of SPT by starting at Watsonville Junction with Milepost 0.00, which equates to Southern Pacific's milepost 100.38, the distance from West Oakland. The Union

Pacific milepost numbers are assigned to all stations, at-grade highway crossings and structures.

1. Property to be Evaluated

The property beginning at 50 ft. north of Salinas Road (MP 0.43) at the tail of the Watsonville Jct. wye track to the derail on the Davenport side track at MP 31.39, or 30.96 route miles of main branch track, has been defined by Union Pacific as the proposed limits of sale. The Santa Cruz Big Trees and Pacific Railway (SCBT&P) purchased 8.8 miles of the Southern Pacific's Felton Branch from Santa Cruz to Olympia in 1985, beginning at SPT milepost 120.96 (UP milepost 20.54) near Maple Street, not far from the tail of the Santa Cruz wye track. In addition to 30.96 TM of main branch track, there are 1.42 TM of side tracks and spur tracks for a total of 32.38 miles of single track on the Santa Cruz Subdivision.

2. Current Operations

Table 1, a portion of Union Pacific's Roseville area Timetable #3, shows that the Santa Cruz Subdivision has a maximum authorized train speed of 10 mph. All track is classified by Union Pacific as "FRA Excepted Track." Thus, all operations are subject to the conditions of the Federal Railroad Administration's 49 CFR Track Safety Standards, Subpart A, Part 213.4, (a) thru (f) which, in summary, requires weekly inspections, restricts maximum train speed to 10 mph, permits no occupied passenger trains, permits a maximum of 5 cars of hazardous material on one train and specifies that track gage must not exceed 4'-10 1/2". Also, milepost 0.0 to 15.0 is within a "Remote Control Area," where the locomotive is controlled remotely, particularly from the ground during switching.

The Union Pacific, like all western railroads, operates under the General Code of Operating Rules (GCOR). Rules governing Track Warrant Control (TWC) apply to train movements on the entire subdivision, except from MP 0.0 to 3.3 and from MP 19.3 to 20.9, where Yard Limit (YL) rules apply at Watsonville and Santa Cruz, respectively. There are no train control signals on the line and 6-axle locomotives are prohibited.

Train operation is round trip, tri-weekly between Watsonville Jct. and Davenport, with about 30 to 40 cars per train, mostly inbound coal for the Davenport Cement Plant and outbound cement from the plant. There is no passenger train operation on the Subdivision except the excursion train operated by the Santa Cruz Big Trees and Pacific Railroad from the tail of the Santa Cruz wye track (MP 20.54) to the Boardwalk at Santa Cruz (about MP 19.7) on which Union Pacific maintains track at FRA Class I condition.

3. Physical Description of the Santa Cruz Subdivision

Table 8 is a seven (7) page track chart which describes the Santa Cruz Subdivision in terms of gradient, elevation above sea level, curvature in terms of degree and central angle, stations by mileposts, schematics of track sidings and spur tracks, yard limits, drainage structures and highway grade separations by milepost, at-grade crossings by milepost and type of warning systems, and the type of rail in track by weight of rail, jointed or continuous welded rail (CWR) and the year that the rail was laid. The allowable train speeds shown on the track chart are superceded by Union Pacific's Timetable No. 3.

The line between Watsonville and Santa Cruz was originally constructed by the Santa Cruz Railroad in 1876-77 and the line from Santa Cruz to Davenport was constructed by the Coast Line Railroad in1906. Southern Pacific was consolidated with the Santa Cruz Railroad in 1888 and with the Coastline Railroad in 1917. The width of the right of way between Watsonville and Santa Cruz is generally about 50 to 80 ft wide and the Santa Cruz to Davenport segment ranges from about 100 to 350 ft. wide.

Starting at Watsonville, the gradient is almost level for about 4 miles, with curvature ranging from 2 to 6 degrees and with two long tangents each about one mile in length. This stretch is characterized by level agricultural fields of strawberries and other crops and no serious roadbed or flooding problems. For the next 2.5 miles, the line ascends on a gradient of about 1.2 to 2.1 percent, with about 14 curves ranging from about 2 to 10 degrees, to an elevation of 161 ft above sea level. This territory is characterized by unstable subgrade. The loose, sandy soil has caused washouts in the past on the side-hill cut section and an extensive retaining wall about 80 ft long was constructed in the 1980's using steel "I" beam piling and timber bulkhead. Currently, there is evidence of further flooding in this area, which is near the Long-Toed Salamander Ecological Reserve. Union Pacific has reconstructed some culverts and lined uphill stream channels with hand-placed rock.

For the next 13 miles, the line skirts the Pacific Ocean and encounters a series of "barrancas," or deep ravines with streams, which results in an undulating gradient ascending and descending at about 1.6 percent and requiring ten (10) railroad bridges constructed of steel, timber or reinforced concrete which range from 165 ft. to 582 ft. in length. This stretch is also characterized by many county and city at-grade highway crossings with a variety of automatic warning devices. There are some small shopping centers adjacent to the right of way. Curvature ranges from 2 to 10 degrees, but is mostly 6 to 8 degrees. Persistent flooding occurs on the right of way at about Milepost 8 from adjacent irrigated brussel sprout fields.

Beginning at the San Lorenzo River in Santa Cruz, the line meanders through and along Santa Cruz city streets for about 2.5 miles, and then, for the next 9 miles running to Davenport, the line is nearly level for the most part with no major bridges except for

Moore Creek at MP 22.15 near Natural Bridges Street in Santa Cruz. Curvature ranges from 1 to 3 degrees except for 10 degree curves within the Santa Cruz city limits. Between Santa Cruz and Davenport, there are several stretches of roadbed subjected to flooding from adjacent irrigated field of brussel sprouts.

This NLV Study presumes that SCCRTC will acquire the wye track in downtown Santa Cruz, ending at Milepost 20.54. Recent inspection indicates that only the wye track remains, with the former team track and double-ended yard track being retired and removed. We also presume that the Union Pacific ownership at the tail of the wye track extends to Milepost 20.54, and the Santa Cruz Big Trees and Pacific Railway ownership begins at that point. It is unknown what trackage rights the SCBT&P may have on Union Pacific tracks at this location except for the previously described short movement of an excursion passenger train to the "boardwalk," and interchange of freight cars at Santa Cruz. Union Pacific maintains track to FRA Class I condition between MP 20.54 and the "boardwalk" at MP 19.7 for the SCBT&P excursion passenger train.

The NLV Study

A field inspection revealed that the Union Pacific track chart shown in Appendix B is sufficiently accurate for this Study except for two locations and the recent improvements made by Union Pacific.

One exception is the rail in the middle of Walker Street in downtown Watsonville between the Pajaro River Bridge near West Front Street (about MP 1.0) to Beach Street (about MP 1.5), which shows 90 lb jointed rail on the track chart, but a field inspection shows 113 lb HF CWR that is imbedded in the asphalt in the street. The other exception is the rail between about MP 22.3 near Natural Bridges at-grade crossing and about MP 30.9 near Davenport. Where the track chart shows relay 113 lb CWR in this 8.6 mile segment, we found 112 lb CWR rolled in the 1934 to 1936 era and for the most part it is not control cooled (CC).

1. Physical Changes Made on the Santa Cruz Subdivision that are Not Reflected in the Track Chart

a. Approximately 37,000 new, treated-timber 7"x9"x8' hardwood crossties were installed in 2003 between Watsonville Junction and Davenport.

b. Five hundred fifty (550) hopper cars of crushed rock ballast were unloaded on track between Watsonville Jct. and Davenport and, thereafter, the track was resurfaced, lined and dressed (regulated).

c. Approximately 9 TM of relay-Class I12 lb CWR was unloaded between Watsonville Jct. and Spring Valley Road in preparation for a rail relay project prior to our hyrail inspection of 1/30/04. Subsequently, Union Pacific reloaded that rail and shipped it to another location. Thus, it is not included in this NLV Study.

d. Union Pacific has rehabilitated some public at-grade roadway crossings by installing continuous welded rail (CWR) through the crossings, renewing the crossties under the rail and replacing the tie plates and spikes with "pandrol"-type plates, clips and lag screws. The old timber or asphalt crossing materials were replaced with reinforced concrete panels. Those crossings with concrete panels are noted in Table 7, which is a list of all public at-grade crossings. Also, see photo 23, page 12, of Appendix A.

2. Definitions, Classification, Costs and Values

a. Rail – Rail is described by its weight, type, rolling or manufacture dates, year laid, and millions of gross tons of traffic over the rail, if available.

- Weight – is measured in pounds per yard. See Table 2 for weights of rail, net tons (NT) per track mile (TM) and wear factors and conversion to gross tons (GT) for scrap sales. The weight of rail is shown on the "brand side" of the web of rail.

- Type of Rail – includes cross section (RE or HF), control cooled vs. non-control cooled, high carbon, silicon and a variety of hardened steel, jointed (usually 39 ft. long but with some older 33 ft. rail on the branch) or continuous welded (CWR) with no rail joints, except for some turnouts and at insulated joints for track signal circuits. Steel mill, year rolled (manufactured) is also shown on the "brand side" web of the rail. Non-controlled cooled rail was manufactured generally before 1936 and is subject to transverse fissures. Thus, all rails such as 60 lb, 62, lb, 70 lb, 75 lb, 80 lb, 85 lb, 90 lb, and 110 lb are generally classified as scrap except for small quantities used for repairs on spur tracks or branch lines. Some 112 lb rails are controlled cooled and some are not.

- Rail Traffic – is measured as the total millions of gross tons of locomotives, rail cars and their loads that have passed over the rail. Since the traffic to which the rail is subjected determines the wear and stresses on the rail, it is a factor in the value. Although the Santa Cruz branch is a "light-tonnage" line, the 90 lb rail laid 80 to 100 years ago is classified as scrap because it is worn, corroded and obsolete. The rail, ranging from 110 lb to 136 lb rail laid in more recent years on the line, has an unknown history of the tonnage that it might have incurred at previous locations, perhaps in high speed, heavy tonnage main track.

- Classification – of salvaged rail falls into two broad categories: Scrap and Relay or reusable.

- Scrap Rail - is defined by its service wear, corrosion, obsolescence, lack of control cooling, service failures, etc. Scrap rail and OTM has a salvage value for use in basic oxygen steel mills and electric arc furnace steel mills. Table 3 shows the published price for ferrous scrap metals FOB at the steel mills or brokers' buying-price as of 2/23/04, from the Iron Age Scrap Price Bulletin. Table 3 is excerpted from the Bulletin to include west coast destinations as well as Houston, St. Louis and Chicago. Traditionally, the west coast ferrous scrap price has been relatively low because of the lack of steel mills nearby and the shipping cost to reach the Mississippi River, where steel mills are more abundant. Thus, west coast ferrous scrap metal prices gravitate to the lower values of the export market to Asia.

West coast destinations define ferrous scrap as No. 1 or No. 2 Heavy Melting, but eastern destinations have more refined definitions, such as No. 1 Railroad Heavy Melting, Reroller Rails, Rails 2 ft and Under and Scrap Rail-Random Length. Since the Santa Cruz Branch scrap rail is mostly 33 ft or 39 ft in length, it is not "prepared" for steel furnaces and thus must be cut up into smaller pieces, which represents a cost. Other track material (OTM) such as tie plates, spikes, joint bars, bolts, nuts, lock washers and rail anchors do not have to be "prepared".

It should be noted that, while new rail is purchased and defined by railroads in terms of net tons (2,000 lb), the steel scrap markets classify ferrous materials in terms of gross tons (2,240 lbs). The cost of transporting scrap steel to market can be significant. The Association of American Railroad (AAR) latest publication shows that the average rail revenue for all commodities is 2.263 cents per ton mile. Scrap metal and other recyclables are known as low rated traffic. Thus, as a rule of thumb, the freight rate usually assigned to scrap steel is about 2.0 cents per ton mile.

Relay Rail – unlike scrap steel has no published market information. Sales are made on a contract-by-contract basis and price lists are not available to the general public. However, based on the estimator's past experience which purchasing and selling relay rail, as well as on several discussions with current railroad and broker sources, the following is a general wholesale range of values from known transactions.

		$/NT
A. Class1, Control Cooled Rail, 112 lb to 140 lb		
Suitable for main tracks		
-	Continuous Welded Rail	300 to 340
-	Jointed Rail	275 to 300
B. Class 2, 90 lb to 140 lb		
Suitable for Secondary Tracks and Branch Lines		
-	Continuous Welded Rail	275 to 300
-	Jointed Rail	250 to 275
C. Class 3 and Class 4		
Suitable for light branch lines, yards, sidings, industrial leads, spur tracks		200 to 250

Note: Relay rail classification depends upon many factors, including top and side wear on the ball of the rail, straightness of the rail (i.e., with minimum vertical or lateral bending), extent of corrosion or pitting on the web or base, extent of corrugations, engine burns or shell spots on the ball, rail-end and bolt-hole conditions if not intended for cropping and welding, rail failure history and tonnage over the rail if known, etc. (See AREA Engineering Manual, Section 4-2-6.5. and Table 11 of this Study.)

b. Other Track Material and Turnouts

- Other Track Material (OTM) – is generally described as the fastenings such as spikes, tie plates, rail anchors, joint bars, track bolts, nuts, lock washers, gauge rods, etc. (See Table 10 for examples.)

- Turnout Material – Consists of two main sections, a switch section and a frog section. The switch section usually consists of switch points, stock rails, head blocks, connecting rods, tie bars, slide plates, rail braces, gage plates, switch stands, head block timber tie and switch ties generally 9 ft. to 10 ft. in length. The frog section consists of the frogs, which are generally either self guarded manganese, rail bound manganese or spring rail frogs. Also, the frog section has guard rails, tie plates, end blocks, clamp or yoke and adjustable filler. The switch ties in the frog section range from about 11 ft. to 16 ft. in length. The frog and switch sections are connected together by "closure rails." Turnouts generally are identified as numbers 8, 9, 10, 14, 15, 16 and 20. The number defines the frog angle in terms of its rate of "spread," which is the rate at which the turnout track diverges from the main track, e.g., a No. 10 turnout track diverges from the main track one foot for every 10 feet of travel along the route. The Santa Cruz Subdivision has mostly No. 9 and No. 10 turnouts, some with rail bound manganese frogs and some with spring rail frogs. (See Table 10 for examples.)

- OTM quantities are determined by the length of jointed rail, rail anchor patterns, numbers of crossties per mile, etc. For example, the Santa Cruz Subdivision has a branch line standard of about 2,880 crossties per track mile (TM). (See Table 10, Southern Pacific Standard, CS1902.) Since each crosstie has two tie plates, there are about 5,760 tie plates per TM. Similarly, there are about 271 rails, each 39- feet long, per TM, and thus there are 271 pairs of joint bars connecting the jointed rail per TM. Jointed rail usually has only about 12 to 14 rail anchors per each 39 ft. of rail but continuous welded rail has about 24 rail anchors on each 39 ft. of length. (See Table 10 Southern Pacific Common Standard CS 1913.)

- OTM weight generally varies with the weight of rail for which it is designed. For example, a 11" long tie plate for 90 lb rail weighs about 13 lbs but a 14" tie plate for 132 lb rail weighs 22 lbs or more each. Similarly, 90 lb joint bars weigh about 60 lbs per pair and 115 lb joint bars weigh about 100 lbs per pair. Track spikes weigh about 0.85 lb each and rail anchors weigh about 2.5 lbs each. Thus, the weight of the OTM varies with the age of the rail (lighter OTM was used years ago), the weight of the rail (larger rail requires larger fastenings) and the type of rail (CWR does not require joint bars, which constitute about 15% of the OTM weight, but does require more rail anchors).

- OTM has two values, namely as scrap metal and for relay. Most OTM for 90 lb and 110 lb rail is scrapped because it is badly worn and obsolete. Most joint bars of all weights of rail are scrapped because of the increased use of CWR which requires few if any joint bars. Most tie plates smaller in size than AREA double-shouldered 13" and 14" tie plates are scrapped because they are obsolete except for occasional replacements on existing trackage. Based upon experience, almost all spikes and rail anchors are scrapped because they are usually bent, sprung or corroded if they have been in service 25 to 75 years.

As a rule of thumb, most relay OTM has the same value in terms of $/NT as the relay prices for the rail for which it is designed. The value of scrap OTM will be obtained by using the same type of analysis of the various published market prices and transportation costs as used in the scrap rail analysis. Turnouts tend to be better maintained in terms of their components because of the need to maintain closer tolerances. Turnouts salvaged from branch lines, complete with switch and frog sections as well as switch ties, range from $3,750 each to $12,000 for wholesale values each depending on their condition, weight of rail and number designation of the turnout. (See Table 11, for sources of prices.)

c. Crossties

All crossties on the Santa Cruz Subdivision are treated timber with various dimensions of 6" x 8 "x 8 ' and 7"x 9"x 8'. The crossties installed many years ago were mostly Douglas Fir, but in recent years mixed hardwoods have been standard. Because of its branch line designation, there are about 2,880 crossties per TM on the Subdivision, compared to about 3,250 per TM for most main tracks. Salvaged crossties usually fall into three categories: scrap, landscape or relay. Scrap crossties are a liability and must be properly disposed of because they contain a preservative. Landscape crossties are priced at a relatively high retail price of $10 to $14 per tie in the market place for use in gardens for retaining walls or stairways, but railroads typically receive a wholesale price of about $2.00 per crosstie as-is, where- is, in the field. Relay crossties delivered to short line railroad operators can have a retail price of $18 per tie or more depending on quality but railroad owners selling relay crossties to contractors can expect a wholesale price of $5.00 to $8.00 each as is, where is, for crossties installed new 20 to 30 years ago in a light tonnage branch line. The 37,000 new crossties installed in 2003 by Union Pacific will be given special consideration in the NLV Study because of their current quality.

In summary, the only wholesale prices of salvaged track materials available to the general public are the ferrous scrap prices provided by the Iron Age Scrap Price Bulletin which is excerpted in Table 3 of this Study. For all other track materials, there are no published wholesale prices and retail sales are usually on a contract-by-contract basis. Thus, the prices for such materials contained in this Study are based upon actual experience, internal reports or bids from contractors or railroads, a few published retail prices from Brokers and on discussions with rail salvagers, brokers and railroad managers.

d. Highway At-Grade Crossings, Grade Crossing Warning Systems and Grade Separations

Table 7 lists 41 public at-grade crossings on this Subdivision, as well as three crossings that are semi-private with substantial vehicular traffic and one street crossing in Santa Cruz which has been closed.

In addition, there are about 47 "farm-type" vehicular grade crossings. Table 7 also lists 7 "Overheads" or highway overpasses. The highway underpasses are listed with the trestles and bridges in Table 9. Table 7 also shows the types of grade crossing warning system, which are described in detail in Table 8 using excerpts from the California Public Utilities Commission (CPUC) General Order (GO) Number 75C.

The automatic grade crossing warning systems which include flashing lights have a wholesale salvage value but, like relay rail, there is no published price list and retail sales are made on a contract-by-contract basis.

The grade crossings themselves are usually asphalt, asphalt with timber flangeway guards, timber crossings, commercial rubberized crossings or concrete crossings. The concrete crossings have a salvage value since they have a long life and can be removed in panels. The use of rubberized crossings has decreased in recent years in this area because of the wide spread use of precast concrete crossings. The timber crossings are also obsolete and worn. Thus, except for the concrete crossings, the salvage of at-grade crossings is a liability because of the cost to restore the highway surface after removal of the track. If new rail and crossties were installed with the newer concrete panels, credit is given for the wholesale salvage value of the new materials.

e. Bridges, Trestles and Culverts

Table 9 describes the bridges and trestles on this Subdivision. Not listed are about 26 culverts on this Subdivision as shown in Appendix B, Union Pacific's track charts. Culverts range from 36" pipes to 12' x 12' square rock tunnels. There is no history of removal or obtaining any salvaged value from railroad culverts because the cost to remove these items exceeds their reuse or scrap values. Unless the entire railroad roadbed is removed, the culvert must remain in place to provide proper drainage for adjacent land.

Table 9 shows that there are 22 timber trestles, 9 steel bridges and 6 concrete bridges on the Santa Cruz Subdivision. Most of the NLV studies made of abandoned railroad lines assume that railroad trestles and culverts have no NLV, since the cost to remove is usually equal to or greater than the salvage value of the structures. The Federal Railroad Administration (FRA) issued a statement in the 1980's advising "...consideration of bridges as an asset presents a number of problems in estimating the NLV value. In general, it will be found that the demolition of bridges will yield less in recoverable scrap value than the cost to remove...." This statement has been supported by the fact that bridges can be found in place on abandoned rail lines throughout the United States. Some States are known to have required that the bridges be removed and, in our own experience, a trestle across a bay at Corpus Christi, Texas was required to be removed by the Army Corps of Engineers and Coast Guard. Also, the piling had to be cut off "below the mud line," which was a very expensive operation. Except on rare occasions, there are two reasons why railroad companies are not interested in salvaging bridges:

(1) Bridges salvaged from railroad branch lines usually were constructed 50 to 100 years ago. They were not structurally designed for today's heavy rail car axle loads of 70,000 lbs or more. The Santa Cruz Subdivision steel bridges have a Cooper's E rating ranging from E-50 to E-72. Most railroads require that their new bridges have an E-80 loading capacity. This does not mean that the existing steel bridges on the Santa Cruz Subdivision are inadequate for use on that Subdivision which, under SI-11 in Union Pacific's Special Instructions, permits a maximum of 268,000 lbs per 4-axle car. The E-80 bridges are designed for rail routes where the authorized maximum weight of rail car with load is 315,000 lbs or more.

(2) Except for long spans, present-day railroad bridges tend to be constructed with preformed, prestressed concrete with a ballast deck, which is relatively easier to maintain than steel or timber and is fireproof.

The Coopers E Rating for railroad bridges was developed by Theodore Cooper in 1894. The total load on any bridge is the sum of the dead load (weight of the bridge itself) plus the live load which Cooper defined as two steam locomotives with maximum axle loads of 10,000 lb per axle followed by a theoretical train having a uniform load of 1,000 lb per linear foot. For example:

Coopers E Rating*	Maximum Axle Load
10	10,000 lb
50	50,000 lb
72	72,000 lb
80	80,000 lb

*See American Civil Engineering Handbook by Merriman and Wiggin, 5th Edition or General Engineering Handbook by C.E. O'Rourke, Second Edition.

Union Pacific Railroad Company's Special Instructions of 10/25/98 states that the system maximum gross weight limitation for a 4-axle car is 134 tons, which is 33.5 tons per axle or 67,000 lb per axle. Union Pacific's Timetable #3 for the Roseville Area shows no additional weight restrictions under SI-11 or SI-12 in the Timetable as shown in Table 1 of this Study. Thus, Union Pacific does not restrict the movement of its System Maximum Gross Weight cars on the Santa Cruz Subdivision.

The Scope of Work for this Study requires that the following three scenarios be evaluated for bridges and trestles.

(1) The NLV if the bridges and trestles remain in place;

(2) The NLV if the structures must be removed; and

(3) The in-place, RCNLD value of the structures.

f. Cost to Physically Remove and Salvage Trackage and Grade Crossing Warning Signals

As late as the 1960's, railroads salvaged abandoned primary main tracks and branch main tracks using their own forces and the salvaged materials were distributed internally for use within the rail system. Few if any values were assigned to the reusable materials. The railroad transported the scrap metal to market in its own rail cars. By law (anti-trust acts), transportation costs could not be assigned for transport of these company materials.

Starting in the 1970's, railroads began to obtain bids from contractors to remove, classify and market salvaged railroad materials. In some cases, the salvaged contracts sold all of the railroad improvements as-is, where-is to the contractor whose bid depended on the difference between the estimated cost to remove and market the materials and the estimated market value of the materials. In some cases, the railroad specified that certain selected track materials were to be delivered to the railroad as part of the contract.

In more recent years, railroad scrap and used material dealers or brokers have themselves been bidding on the salvage of rail lines. Thus, the salvage contractor assimilated the reusable materials on a wholesale basis into its retail material supply system. The contractor can also sell scrap metal directly to steel mills.

In addition to salvaging the railroad materials, the contractor is required to leave the railroad roadbed in a clean and level condition and all signage must be removed. Where tracks are removed from at-grade crossings, the roadway must be restored to a safe, level condition using the appropriate roadway materials. Timber crossties, bridge ties and timber trestle materials are usually pressure treated with a mixture of petroleum oil (extender) and creosote and, in the case of some bridge ties and other trestle components, a non-flammable pressure treatment was applied. Even though most of the older timber trestles and crossties are "dried out" and have little preservative remaining, all such materials that are scrapped must be disposed of in accordance with state and local regulations, usually through an approved, licensed disposer.

Starting in the 1970's, the typical bid by a contractor to salvage a railroad branch line was $10,000 per route mile for the work of physical removal, classifying, sorting and loading out the materials. In more recent years, that cost has risen to the range of $14,000 to $20,000 per route mile. There are variables such as the availability of access roads, the number of grade crossings to repair, restricted working hours in a community etc., all of which are reflected in the bid price. The Santa Cruz Subdivision has 44 public highway crossings, 47 unpaved private roadway crossings and a total of almost one mile of track in city streets at Watsonville and Santa Cruz, all of which increases the cost of removal.

g. Ballast

Railroad ballast can consist of crushed rock, slag from steel mills, volcanic cinders or copper slag. The track rests on the ballast, which provides drainage, resilience and holding strength to prevent the longitudinal and lateral movement of the track. In the past, most of the ballast used on the Santa Cruz Subdivision has been crushed granite rock of the size and strength approximately equal to American Railway Engineering Association (AREA) Size No. 4, with recommended "limiting values of testing" for granite. With but few exceptions, there is no history of attempting to salvage ballast in railroad abandonments. The Union Pacific uses a hard, basaltic rock for ballast in this territory.

The Santa Cruz Subdivision is typical of most branch lines where, except for a "veneer" of clean ballast on the surface, the ballast is fouled with blow sand, engine sand, and dirt from adjacent agricultural fields. Thus, for the ballast to be salvaged, it must be cleaned and screened, loaded and shipped to the point of use. This cost, plus the uncertainty of whether it can meet the size and strength requirements of railroad ballast, usually results in ballast being left on the roadbed but spread evenly to provide a uniform surface without interrupting surface drainage. The salvage value for ballast in this Study is zero.

The SCCRTC's Scope of Work for this Study specifies that the ballast be removed from the right of way. This cost will be included in the NLV estimate.

NLV Calculations

1. Gross Value to the Landowner for the Railroad Assets.

a) Scrap Steel Rail and OTM

From Table 6	2794.6 GT	
From Tables 3 and 4, Best Value is Delivered Price, FOB, St. Louis, MO.	$169.7/GT	
Gross Value of Scrap Steel 2794.6 GT x $169.7/GT		$474,244

b) Relay Steel Rail and OTM
(From Table 6)

Class	Weight of Rail and OTM (NT)	Estimated Wholesale Value $/NT	Estimated Total Value $	
1	52.4	$320	16,768	
2	1098.6	265	291,129	
3	3314.8	240	795,552	
			Total	$1,103,449

Total Value of Scrap and Relay Rail and OTM $1,577,693

Note: Tables 2, 3, and 4 contain calculations, descriptions and footnotes with sources of data and other information. Table 5 represents quantities of rail by weight and TM from Appendix B but verified and modified by field inspection.

The scrap price in Table 3 is published monthly in the Iron Age Scrap Price Bulletin to which the estimator subscribes. The prices for the estimated wholesale value of various classes of relay rail were obtained by the estimator from a recent audit for the Internal Revenue Service of a NLV Study by a Class I Railroad which donated a 118 mile long branch line to a State (not Union Pacific and not California). Those relay values are consistent with data from other sources including prior NLV studies by the estimator. For additional description of how the physical quantities of track structure were determined, please see pages 2 through 8, pages 12 through 28, Table 10 and Table 11, pages 1 through 8. For an explanation of abbreviations, see Table 12.

c) Crossties

Class	Estimated Quantity (each)	Estimated Wholesale Value $	Total Value $
Relay	37,000	14.00	518,000
Relay	3,000	6.50	19,500
Landscape	30,000	2.00	60,000
Scrap	23,254	---	---
Total	93,254		$597,500

The total number of crossties are determined by Southern Pacific Common Standard CS 1902 found in Table 10, which is 2,880 crossties per TM for branch lines or 93,254 crossties for the total of 32.38 TM. The 37,000 ties with a wholesale value of $14 each represents the new, treated timber 7" x 9" x8' hardwood crossties installed by Union Pacific in 2003. The quantity of the crossties installed was verified by field inspection. This was about 1,100 new crossties per TM, a relatively heavy crosstie renewal. The 3,000 older relay crossties were incidental replacements by Southern Pacific in the last 10 to 20 years. The wholesale values for crossties of various ages removed from branch lines are partly based on a recent audit by the estimator for the IRS on an NLV used by a Class I railroad for abandonment proceedings before the Surface Transportation Board and further supported by similar values used by the estimator in other studies and by other railroad consultants in preparing NLV studies. Similarly, the disposal cost for treated creosoted scrap crossties was obtained from those studies and is included later in the "cost to remove" the assets. For more discussions on crossties, see pages 20 and 21 and Table 11, page 7.

d) Turnouts

	Number of Relay Turnouts	Type	Unit Wholesale Value $	Total Value $
	2	New	40,000	80,000
	13	Branch Main	12,000	156,000
	1	Back Track	3,000	3,000
Total	16			239,000

Turnouts on the Santa Cruz Subdivision are No. 9's or No. 10's, some with springrail frogs, others with railbound manganese and self guarded frogs. See Table 10, Southern Pacific Common Standards CS 1016, 1180, 1153, 842,835 and 1080 for more details. The values for complete relay turnouts are also based on a recent audit of a Class I railroad's NLV Study for the IRS but also reinforced by similar data from NLV's by other railroad consultants as well as the estimator's own work. Turnouts in active rail service usually have a relay value since they must be maintained to a high standard for safety reasons. For more descriptions of turnouts see page 18. The existence of the turnouts was determined by field inspection and they are located at spur tracks, side tracks, the Wye Track at Santa Cruz and the turnout near the west end of the Subdivision at the Davenport Cement Plant.

e) Roadway At-Grade Crossings

At-grade crossing salvage values include crossing material only. The value of the track structure through the crossings is included in the Gross Value of Scrap and Relay Rail and OTM in item (b), above.

Type of Crossing Material	**Number of Crossings**	**Average Width (LF)**	**Salvage Unit Value of Material**	**Total Value**
Concrete Panels	12	45	$200/LF	$108,000
Omni Rubber	4	45	$100/LF	18,000
Asphalt or Timber	27	45	---	---
Total	43			$126,000

For reference to the at-grade crossing locations, see Table 7. The 12 concrete panel crossing were constructed in 2003. A new value has been assigned to this material. The Omni rubberized material has been in service many years and has a limited value when salvaged. The cost for new concrete and rubberized materials was obtained from a construction cost handbook from a Class I railroad. The depreciated value of the rubberized crossing was made by the estimator based on experience. The length of at-grade crossings varies on the Santa Cruz Subdivision. The photos in Appendix A, namely numbers 1, 9, 11, 13, 20, 22, 23, 24, and 30 show that some crossings are about 35 LF wide while others cross roadways diagonally and can be 65 to 70 LF in width. The estimator has chosen an average width of 45 LF, since even crossings that are perpendicular to the roadway usually have margins for pedestrian and bicycle paths. The materials in the timber and asphalt crossings are obsolete and have no salvage value. There is no salvage value in the 47 private at-grade crossings since most of them are dirt as shown in photo 10 of Appendix A. The source for the data in Table 7 is Southern Pacific's Crossing List and Union Pacific's Track Chart (Appendix B) combined with in-field walking inspection and verification. For more information on sources, see Table 11, pages 1 through 9.

f) Grade Crossing Warning Systems

The Santa Cruz Subdivision has no train signal systems but does have some automatic grade crossing warning systems as well as some passive warning signs. Table 7 lists the types of warning systems at each crossing which are illustrated in Table 8, which contains copies of the standards from the CPUC General Order 75-C. Most of the automatic grade crossing warning systems on the Santa Cruz Subdivision have been in service for many years and many of them are obsolete and would not be replaced in kind. There is a wide variety of types and number of warning system "units" (an industry measure of crossing system complexity) at each crossing, such as those shown in Appendix A, photos 1, 9, 11, 13, 20, 24, and 30.

CPUC Type	Number of Units	Estimated Wholesale Value	Total Value
9A	16	$5,000	$80,000
9	22	$3,000	66,000
8	14	$1,300	18,200
		Total	$164,200

The passive CPUC 1-R crossbucks which number about 17 have no salvage value. Based on experience, Class I railroads will not accept salvaged signal materials, since they require that any materials that they install are either from internal inventories or are new and certified by the manufacturer. Thus, the signal materials listed above would be used by short line or industrial railroads. The estimated value of the signal units is based upon the estimator's experience, since there are no active markets or published list prices available. The 14 CPUC Standard 8's include one (1) 8A at Pacific Avenue. See Appendix A, photo 20.

g) Railroad Bridges, Trestles and Culverts

These railroad assets have no known salvage value because there is no active market. Branch Line structures such as those on the Santa Cruz Subdivision are generally 40 to 100 years old and are either obsolete by the nature of their construction or obsolete by their capacity to handle the current heavy axle loads in rail cars at the higher train speeds. The cost to remove the structures is usually equal to or greater than the salvage value of the structure. The estimator has observed abandoned rail lines in all parts of the United States and, for the most part, the railroad bridges remain in place after many years of abandonment. For further discussion, see pages 23 through 25.

h) Ballast

Railroad ballast has no salvage value since many types of ballast have been used in track surfacing throughout the history of the Santa Cruz Subdivision. In addition, even though Union Pacific distributed many tons of crushed rock ballast on the Line in 2003, much of the supporting ballast under the track is fouled with engine sand and blow sand from adjoining agricultural fields. It is not economically feasible to clean and certify the existing ballast for railroad purposes under AREMA specifications. In railroad abandonments, ballast is usually leveled off and spread evenly over the roadbed, thus forming a compacted sub base for pathway purposes. For a further discussion, see pages 27 and 28.

i) Summary of the Gross Value of the Railroad Assets to the Landowner

Item	
Rail and OTM	$1,578,000
Crossties	598,000
Turnouts	239,000
Roadway At-Grade Crossings	126,000
Grade Crossing Warning Systems	164,000
Bridges, Trestles and Culverts	---
Ballast	---
Total	$2,705,000

2. Cost to Salvage the Railroad Assets

a) Salvage Rail, OTM and Turnouts

Type of Rail	TM	Cost Per TM	Total Cost
CWR	9.46	$13,200	$124,872
Jointed	22.92	11,800	270,456
Total	32.38		$395,328

The quantities of the different types of rail are obtained from Table 6. Later investigation revealed that not all of the 0.4 TM of 132 lb rail in Table 6 was CWR. Thus it is included in the jointed rail category. The costs per TM to salvage rail, OTM and turnouts were obtained from a recent audit by the estimator for the IRS of a 118 mile abandonment of a Class I railroad branch line application before the STB and subsequent donation to a State. The costs per mile to remove, sort, classify and load materials into rail cars or trucks are consistent with the estimator's own experience and estimates made by other railroad consultants. See Table 11, page 9 for additional background.

b) Salvage Relay and Landscape Crossties and Dispose of Scrap Crossties

Type of Crosstie	Quantity (Each)	Cost to Salvage ($/Ea.)	Total Cost
Relay	40,000	$2.00	$80,000
Landscape	30,000	2.00	60,000
Scrap	23,254	4.00	93,016
Total	93,254		$233,016

The cost to salvage relay crossties, which includes sorting, classifying and loading into trucks or rail cars, was obtained from a recent audit performed by the estimator for the IRS concerning a Class I railroad branch line abandonment of 118 miles and subsequent donation to a state. These salvage costs are consistent with the estimator's experience in preparing pervious NLV's and with the work of other railroad consultants. The $4.00 cost to salvage scrap crossties includes an additional $2.00 per crosstie for disposing of the creosote-treated crossties through a certified disposer. For further discussion, see pages 20 and 21, and Table 11, page 7.

c) Repair and Restore At-Grade Roadway Crossings and in City Streets

After the track has been removed from grade crossings and city streets, the roadways and streets must be repaired and restored to a smooth surface with asphalt that matches the existing surface. The estimated costs for such repair/restoration are shown below.

Type of Crossing	Number of Crossings	Average Width (LF)	Cost to Repair ($/LF)	Total Cost $
Public	37*	45	55	91,575
Private	47	15	15	10,575
Walker Street, Watsonville	Continuous	2,640	40	105,600
Beach Street, Santa Cruz	Continuous	2,112	40	84,480
			Total	$292,230

*There are four (4) public crossings in Walker Street in Watsonville and three (3) public crossings in Beach Street in Santa Cruz or a total of seven (7) public crossings included in the city street repairs.

The average width of the grade crossings was obtained by sampling. As discussed on page 32, the photos in Appendix A show a wide variety of widths, with many diagonal crossings with a width of 65 LF and longer. The unit costs to restore the crossings and streets with prepared backfill material and asphalt surface were obtained from estimates made by engineering consultants and previous studies and audits made by the estimator for the IRS in connection with railroad abandonments and donations of rail assets to public agencies. The cost to restore streets is less per unit of length than that of the grade crossings, since the crossing repair gang must move from crossing to crossing whereas the street work can proceed on a more productive basis. Also, traffic control and interference will be less on Beach and Walker Streets than at the road crossings with heavy traffic.

d) Cost to Salvage Grade Crossing Warning Systems

CPUC Type	Number of Units (each)	Cost to Salvage Each Unit ($)	Total Cost ($)
9A	16	1,000	16,000
9	22	600	13,200
8	14	270	3,780
			32,980

The 17 wooden CPUC 1-R crossbuck signs are removed during the track removal work. The CPUC Standard 9A crossing systems are the most expensive to remove because of the cantilever signals which hang over the highway (see Table 8). The estimates for salvage of these warning systems are based upon the estimator's experience since there is no historical cost of removal available. The insulated joints are removed with the track salvage and the signal relays and control boxes are removed at the same time as the units shown above.

e) Cost to Remove and Dispose of Ballast

From Table 10, Southern Pacific's Common Standard Roadbed and Ballast for Branch Lines and Sidings (CS513 and CS 500 (not shown)) indicate that, for 6 inches of ballast under the crossties there are 2,257 CY of ballast per TM. From R.S. Mean's 18th Edition Manual on Heavy Construction Cost Data, the estimate for borrow and load in trucks with a front end loader for material similar to fouled ballast is $5.7 per CY and the estimated cost to haul excavated loose material for a round trip of about 20 miles is $8.00 per CY. Thus, for the line under study, we have:

		TM
•	Total Miles of Track	32.38
•	Less: Open Deck Bridges and Trestles	<0.55>
	Total TM of ballasted track	31.83

- Total Quantity of Ballast

  31.83 TM x 2,257 CY/TM = 71,840 CY

- Cost to Excavate, Load into Trucks and Transport Ballast for Disposal

-	Excavate and Load		
	71,840 CY x $5.7/CY	=	$409,488
-	Transport to Disposal Area		
	71,840 CY x $8.0/CY	=	574,720
		Total	$984,208

f) Summary of Cost to Remove, Salvage and Repair

Item	Cost
Rail, OTM and Turnouts	$395,000
Crossties	233,000
Repair Roadways and Streets	292,000
Grade Crossing Warning Systems	33,000
Ballast	984,000
Subtotal	$1,937,000
Salvage Contractor's Profit (18%)*	349,000
Total	$2,286,000

*The percent of profit was derived from bids from a nationwide railroad contractor engaged in railroad construction, operations and salvage work.

3. <u>The Payment to the Landowner by the Salvage Contractor with Ballast Removed and Bridges and Trestles Remaining in Place</u>

- <u>From Page 35</u>

  Gross Value of the Railroad Assets to Landowner $2,705,000

- <u>From Page 39</u>

  Less: Cost to Remove Railroad Assets, Including Ballast but not Including Roadbed, Bridges and Trestles <2,286,000>

  Payment to the Landowner $ 419,000

4. <u>Cost to Remove Bridges and Trestles</u>

Type of Structure	Number of Structures	Total LF	Unit Cost in $/LF to Remove and Dispose of Material	Total Cost to Remove
OD Timber Trestles	12	1,285	$75	$96,375
BD timber trestles	10	1,095	80	87,600
OD Steel Br.	7	1,604	125	200,500
BD Steel Br.	2	236	135	31,860
BD Concrete Br.	6	941	130	122,330
Total	37	5,161		$538,665
		Contractor's Profit (18%)		96,960
			Total Cost	$635,625

The $635,625 is the minimum estimated cost to remove bridges without consideration for environmental mitigation or requirements by agencies such as U.S. Army Corps of Engineers, the U.S. Coast Guard, the U.S. Fish and Wild Life Service and the California Department of Fish and Game. This information requires an environmental impact study which is beyond the scope of this assignment.

The list of structures, including their type and length, is obtained from Table 9, which, in turn, was obtained from Southern Pacific's formal bridge inspection report in 1995 and Union Pacific's Track Chart (Appendix B) and verified by field inspection. (Please note photos of some structures in Appendix A.) Union Pacific did not furnish the SCCRTC with a current bridge inspection report. The unit costs for removal of the structures were obtained form an audit of a Class I railroad in a major branch line abandonment application before the STB with subsequent donation to a state. These unit costs are deemed to be reasonable by the estimator. The Contractor's profit is based on the same source as shown in item 2 (f) above.

5. <u>The Payment Made by the Landowner to the Contractor if the Bridges and Trestles are removed</u>

• Cost to Remove Bridges and Trestles	$636,000
• Payment made to the Landowner with Bridges and Trestles remaining in place	419,000
Payment Made by Landowner to the Contractor	$217,000

Replacement Cost New (RCN) and Depreciated Value

For a discussion about choosing RCNLD for determining the in-place depreciated value of the railroad assets required by the SCCRTC Scope of Work, see Table 11, pages 10 through 13. Replacement Cost New is determined by assuming that the existing Santa Cruz Subdivision does not exist and must be reconstructed with new materials and current prevailing labor wages. Then the theoretically newly constructed railroad is depreciated to its current physical condition with due regard to obsolete elements of the railroad assets. The estimator is familiar with the existing physical condition of those assets relative to the railroad service that might be imposed on them. Thus, the estimator determines how many years of expected life remain in the existing railroad assets for two levels of service.

The SCCRTC did not provide a definition of alternative rail services. The current definition of rail service for the Santa Cruz Subdivision has been determined by Union Pacific to be FRA Excepted Track, which has many restrictions and is described on page 9 and in more detail in Table 11, page 14. For the purpose of this Study, the estimator provides two RCNLD's. The assumptions are that freight and passenger trains will operate on FRA Class I and Class 2 tracks. Table 11, pages 15 and 16 show a portion of the FRA Track Safety Standards, Part 213, with specific reference to Part 213.9, where Class 1 track permits train speeds of 10 mph for freight and 15 mph for passenger trains. FRA Class 2 track permits 25 mph for freight and 30 mph for passenger trains. Some of the track and structure assets of the Santa Cruz Branch are 75 to 100 years old. Thus, as train speeds increase and greater stresses are applied to the track and structures, the expected life decreases from a replacement point of view and, in some cases, the assets become obsolete because of current liabilities in regard to transport of hazardous materials and passengers. The RCN uses present day prices of materials and present day prevailing wages for construction labor. However, in estimating the cost of this theoretical new railroad, it is not always possible to replace the railroad assets "in-kind," since materials used 75 to 100 years ago are not necessarily available and, thus, prices are not available. Two examples are shown below:

- Appendix A, photos 5 and 10, show 90 lb jointed rail laid in 1916 that is 33 ft. long, has 11" single shoulder tie plates, and 25" four hole "continuous type" joint bars. This type of rail and OTM is no longer produced as a new product and, in fact, they are obsolete. For the purpose of this study, new 90 lb CWR and associated OTM are used in preparing the estimate.

- Appendix A, photo 12, shows a 1928-vintage timber trestle. Railroads no longer construct new timber trestles because their maintenance expense is higher than concrete or steel and the timber is subject to destruction by fire. For the purpose of this RCN estimate, timber trestles are replaced by precast, prestressed concrete spans on concrete caps and supported by steel "H" beam piling. The cost of the concrete structures is in the same range as if timber trestles were constructed because of the high cost of lumber (see Table 11, page 10, for recent increases in lumber prices).

In preparing the estimate of cost for new trackage, the materials are estimated separately from the labor to construct, since the same labor is used simultaneously during the construction process to combine all of the materials into trackage. Thus, we estimate:

1) Replacement Cost New

(a) Rail and OTM Materials

Type	TM	TF	$/TF	Total ($)
90 lb CWR	14.56	76,877	22.0	1,691,294
OTM		76,877	7.0	538,139
112 lb CWR	14.16	74,765	26.0	1,943,890
OTM		74,765	9.0	672,885
132 lb CWR	3.66	19,325	32.0	618,400
OTM	____	19,325	11.0	212,575
Total	32.38			$5,677,183

Note 1: Source for prices are based on recent estimates made by the estimator for line capacity improvements for a Class I railroad and confirmed by confidential estimates made by two nationwide engineering firms.

Note 2: Prices include delivery to the jobsite and purchase expense, as well as shop welds and in-field welds.

Note 3: The mileage of 90 lb rail includes 0.3 TM of existing 75 lb rail and 1.42 TM of spur/side tracks.

Note 4: The mileage of 112 lb rail includes some existing 113 lb rail mixed with the 112 lb rail and 0.55 TM of 110 lb rail.

Note 5: The mileage of 132 lb rail includes 2.23 TM of existing 136 lb rail.

(b) Crosstie Materials

Branch Main Track Standard, 7" x 9" x 8', New Treated Hardwood

- 2880 Crossties per TM (Southern Pacific Common Standard CS 1902, Table 11)

- Delivered price \$50.00 ea. (Recent bid by PCJPB contractor)

32.38 TM x 2,880 Ties/TM x \$50/Tie = \$4,662,720
Note: All new bridges will be ballast deck requiring crossties.

c) Ballast

For 6" of ballast under the crossties with single, branch main track, the estimate is 2,800 tons of crushed rock ballast per TM based on Southern Pacific Common Standards CS 500, 513 and CS 1902, some of which are shown in Table 10.

32.38 TM x 2,800 tons/TM x \$14.00/ton = \$1,269,296

The price per ton delivered is based on volume quotes for crushed rock ballast to railroads in the Bay Area.

d) Labor to Construct Track

Labor to construct track includes that for crossties, application of OTM, laying rail, surfacing and lining on crushed rock ballast, laying panelized turnouts, constructing track over ballast deck bridges and construction of track across roadway grade crossings and through city streets. The estimated labor cost is \$60/TF. Thus:

32.38 TM x 5,280 TF/TM x $60/TF = $10,257,984

The cost per TF to construct track is based on the estimator's experience in preparing estimates for a Class I railroad and is substantiated by confidential estimates prepared by two nationwide engineering consulting firms. The labor estimates include all of the usual contractor's additives such as social security, workman's compensation and health and welfare benefits.

e) Summary of Track Construction Costs

New Rail and OTM	$5,677,000
Crossties	4,663,000
Ballast	1,269,000
Labor to Construct	10,258,000
Total	$21,867,000

f) Cost of Materials and Labor to Construct New Panelized Turnouts and Deliver to the Jobsite

The assumption is that all new turnouts will average 115 lb in rail weight, with #10 railbound manganese frogs and 16'-6" switch points. Thus:

16 ea. x $95,000/ea. = $1,520,000

There are 16 existing turnouts on the Subdivision. The panelized turnouts include new switch ties (see Table 10, CS 1016, CS 1180, CS 1153 and CS 835, for more details about turnouts). The unit cost for labor and materials for the prefabricated turnout was obtained from two confidential estimates by nationwide engineering firms and confirmed by the estimator's own experience.

g) At-Grade Roadway Crossings and Tracks in City Streets

These estimates include only the replacement of existing concrete panels and asphalt crossings, including the labor to install them. The trackage is included in Item (e) above.

- Public Roadway Crossings

Concrete Panels		
- 12 ea. X 45 LF x $200/LF	=	$108,000
Asphalt Crossings		
- 25 ea. X 45 LF x $100/LF	=	112,500

- Private Crossings

47 ea. X 10 LF x $100/LF	=	47,000

- Install asphalt material in Beach Street, Santa Cruz (0.4 TM) and Walker Street in Watsonville (0.5 TM)

0.9 TM x 5,280 TF/TM x $100/TF	=	475, 200
	Total	$742,700

Costs for concrete panels and for asphalt paving are based upon a confidential Cost Manual from a Class I Railroad.

The assumed widths of the roadway crossings are averages obtained by spot checks in field. See Appendix A, photos 1, 11, 13, 20, 22, 23, 24 and 30

h) Grade Crossing Warning Systems

The estimate below is for each unit in the crossing signal system. The Santa Cruz Subdivision has a variety of different combinations of types of signals at each crossing. Thus, the usual "pairs" of signals cannot be applied (see Table 7).

CPUC Type	**No. of Units**	**Labor and Material to Install (each)**	**Total $**
9A	14	$200,000	$2,800,000
9	22	175,000	3,850,000
8	13	150,000	1,950,000
1R	17	300	5,100
Total			$8,605,100

The source for unit estimates for grade crossing warning systems are from estimating work for a Class I railroad and for PCJPB/Caltrain.

i) Summary of All Costs to Replace Trackage

Track (item e)	$21,867,000
Turnouts (item f)	1,520,000
Grade Crossings and City Streets (item g)	743,000
Grade Crossing Warning Systems (item h)	8,605,000
Total	$32,735,000

j. Grading

The grading for this Study is defined as the amount of earth work, including side-hill cut, borrowed fill and balanced yardage for cut and fill required to establish a railroad roadbed having a total width of 26 ft. with 1.6 to 1.0 slopes and drainage ditches somewhat similar to the existing roadbed. (See Table 10, CS 513 for more details.) The grading estimate assumes existing sandy soil with some clay and no hard rock blasting required. Grading earthwork is defined as performing the borrow and cut or fill work in accordance with the engineer's requirements for grubbing, clearing, compaction, local drainage, erosion control (seeding, etc.) and the placement of the specified sub-ballast. Thus, estimated grading costs are as shown below.

Cost of Grading

Location	Track Miles (TM)	Track Feet (TF)	Cubic Yards per TF	Unit Cost $/CY	Total Cost $
Watsonville and Santa Cruz (Asphalt in Street)	0.9	4,752	0.75	133.0*	474,012
Branch Main, Sidings and Spurs	4.0	21,120	3.5	14.0	1,034,880
	2.5	13,200	20.0	18.0	4,752,000
	6.0	31,680	8.0	16.0	4,055,040
	3.0	15,840	6.0	15.0	1,425,600
	4.0	21,120	3.5	14.0	1,034,880
	2.0	10,560	2.0	14.0	295,680
	10.0	52,800	12.0	16.0	10,137,600
Total	32.4	171,072			23,209,692

* Includes excavating street 10 ft. wide and 2 ft deep as well as disposal of asphalt. The yardages of fills and excavations are based upon field observations of the existing fills and cuts and subsequent reviews of videotapes. The cost of grading is based on estimates by a Class I railroad and engineering consulting firms (see Table 11, page 9).

k) Bridges, Trestles and Culverts

The dimensions for the existing structures are based upon Southern Pacific's records from a printout dated 8/28/95. We are not aware of any significant changes that may have occurred to those structures since that date. We were advised by Union Pacific during the recent SCCRTC/UP inspection trip that some incidental replacements of bridge ties have occurred. Also, a large box culvert was recently replaced at about milepost 5.1.

Union Pacific did not furnish a bridge inspection report to the SCCRTC, but field observations indicate that no substantial changes have been made in the structures since the 1995 bridge inspection by Southern Pacific.

Type of Structure	**Length (LF)**	**Cost to Construct New $/LF**	**Total Cost**
Timber (Open Deck)	1,285	4,500	$5,782,500
Timber (Ballast Deck)	1,095	5,200	5,694,000
Steel (Open Deck)	1,604	12,000	19,248,000
Steel (Ballast Deck)	236	15,600	3,681,600
Concrete (Ballast Deck)	941	5,000	4,705,000
Corrugated Metal Pipe	420	140	58,800
Concrete Arches	300	350	105,000
Rock Tunnels	1,215	500	607,500
		Total	$39,882,400

The cost estimates to construct various bridges and culverts are from a Class I railroad's Construction Cost Manual, but were also verified by costs obtained from other railroads and confidential engineering consulting firm estimates.

l) Summary of Cost to Replace the Existing Railroad Assets on the Santa Cruz Subdivision, Not Including the Land

Trackage (item i)	$32,735,000
Grading (item j)	23,210,000
Bridges, Trestles and Culverts (item k)	39,882,000
Total	$95,827,000

Depreciated Value

The estimated depreciated value for the purpose of this study is based on the estimated remaining useful life of the asset under specific levels of service requirements. Useful life ends when an asset can no longer be maintained with a reasonable maintenance budget, known in the railroad industry as "normalized" maintenance cost. Also, if the asset begins to either develop service failures that require immediate repair or ultrasonic inspections of steel find the existence of large numbers of internal cracks or flaws which can lead to a sudden failure of the asset, then the asset is no longer viable.

The estimator is familiar with the present condition of the Santa Cruz Subdivision railroad assets and the history of those assets, including their demonstrated ability to withstand the 1989 Loma Prieta Earthquake. In order for the estimator to evaluate each railroad asset, it is appropriate to combine an estimated labor component with the estimated material cost of that component so that the asset has a single new cost basis. For trackage, the estimator has allocated the $60 per TF labor cost to construct track as follows, based upon experience.

	Asset	$/TF
•	Rail and OTM	30
•	Crossties	20
•	Ballast	10
	Total	60

Thus, the cost to construct rail and OTM new are as shown in (a), below.

The depreciated value of rail and OTM under FRA Class I and FRA Class 2 operating scenarios is shown in (b) and (c), below, respectively.

a) Cost New for Rail and OTM

Weight of Rail & OTM	TM	RCN Material ($)	RCN Labor ($)	Total Labor and Material ($)
90 lb	14.56	$2,229,433	$2,306,304	$4,535,737
112 lb	14.16	$2,616,775	$2,242,944	$4,859,719
132 lb	3.66	$ 830,975	$ 579,744	$1,410,719
Total	32.38	$5,677,183*	$5,128,992	$10,806,175

*See page 44.

b) Depreciated Value of Rail and OTM for FRA Class I Track

Weight of Rail & OTM	Total Cost New $	Estimated Remaining Life*	Estimated Depreciated Value
90 lb	4,535,737	None	---
112 lb	4,859,719	20%	971,944
132 lb	1,410,719	22%	310,358
	$10,806,175	Total	$1,282,302

*Based upon the experience of the estimator.

c) Depreciated Value of Rail and OTM for FRA Class 2 Track

Weight of Rail & OTM	Total Cost New ($)	Estimated Remaining Life*	Estimated Depreciated Value ($)
90 lb	4,535,737	None	---
112 lb	4,859,719	None	---
132 lb	1,410,719	10%	141,071
	10,806,175		141,071

*Based upon the experience of the estimator.

d) Total Cost to Construct Crossties Including Labor and Material. Labor is Assumed to be $20 per TF For 32.38 TM of Railroad or about $37 per crosstie

	Number of Crossties	Cost of Material $ (ea.)	Total Cost of Material	Labor to Construct $ (ea.)	Total Labor Cost ($)	Total Labor and Material Cost ($)
	37,000	50	$1,850,000	37	$1,369,000	$3,219,000
	3,000	50	150,00	37	111,000	261,000
	30,000	50	1,500,000	37	1,110,00	2,610,000
	23,254	50	1,162,700	37	860,398	2,023,098
Total	93,254		$4,662,700		$3,450,398	$8,113,098

e) Depreciated Value of Crossties Assuming Rail Service Under FRA Class I Track Requirements

	Number of Crossties (ea.)	Labor and Material Cost to Construct ($)	Remaining Life*	Depreciated Value ($)
	37,000	$3,219,000	95%	3,058,050
	3,000	261,000	50%	130,500
	30,000	2,610,000	10%	261,000
	23,254	2,023,098	---	---
Total	93,254	$8,113,098	---	$3,449,550

*Based upon the experience of the estimator.

f) Depreciated Value of Crossties Assuming Rail Service Under FRA Class 2 Track Requirements

	Number of Crossties (ea.)	Labor and Material Cost to Construct ($)	Remaining Life*	Depreciated Value ($)
	37,000	$3,219,000	95%	3,058,050
	3,000	261,000	25%	65,250
	30,000	2,610,000	5%	130,500
	23,254	2,023,098	---	---
Total	93,254	$8,113,098	---	$3,253,800

*Based upon the experience of the estimator.

g) Total Cost for Material and Labor to Place Ballast, Surface and Line

- Cost of Material

  32.38 TM x 2,800 Tons/TM x $14/Ton = $1,269,296

- Cost of Labor

  32.38 TM x 5,280 TF/TM x $10/TF = 1,709,664

  Total $2,978,960

h) Depreciated Value for Ballast Under Rail Service for FRA Class I Track Requirements

Miles of Ballast	Labor and Material Cost to Construct ($)	Remaining Life*	Depreciated Value ($)
32.38 TM	$2,978,960	30%	$893,688

*Based on the experience of the estimator.

i) Depreciated Value for Ballast Under Rail Service for FRA Class 2, Track Requirements

Miles of Ballast	Labor and Material Cost to Construct ($)	Remaining Life*	Depreciated Value ($)
32.38 TM	$2,978,960	20%	$595,792

*Based on the experience of the estimator.

j) Summary of Depreciated Values for Track

Asset	Labor and Material to Construct	Depreciated Value FRA Class I Track	Depreciated Value FRA Class 2, Track
Rail and OTM	$10,806,175	$1,282,302	$ 141,071
Crossties	8,113,098	3,449,550	3,253,800
Ballast	2,978,960	893,688	595,792
Total	$21,898,233*	$5,625,540	$3,990,663

*Varies by $31,233 from total track construction cost on page 46 because of "rounding-up" calculated unit labor costs.

k) Depreciated Value of Turnouts

Type of No. 10 Turnouts	No. of Turnouts	Cost of Labor and Material (each)	Total Cost of New No. 10 Turnouts
New	2	$95,000	$ 190,000
Branch Main	13	95,000	1,235,000
Back Track	1	95,000	95,000
Total	16		$1,520,000

l) Depreciated Value of Turnouts for Service Under FRA Class I Track

Number and Type of No. 10 Turnout	Total Cost for Labor and Material	Remaining Life*	Depreciated Value
2 New	$ 190,000	95%	$180,500
13 Branch Main	1,235,000	40%	494,000
1 Back Track	95,000	10%	9,500
Total	$1,520,000		$684,000

*Based upon the experience of the estimator.

m) Depreciated Value of Turnouts for Service Under FRA Class 2 Track

Number and Type of No. 10 Turnout	**Total Cost for Labor and Material**	**Remaining Life***	**Depreciated Value**
2 New	$ 190,000	90%	$171,000
13 Branch Main	1,235,000	30%	370,000
1 Back Track	95,000	5%	4,500
Total	$1,520,000		$545,500

*Based upon the experience of the estimator.

n) Roadway Grade Crossings and Streets

1) FRA Class I Track Service

Type of Grade Crossing	**No. of Crossings**	**Total Cost to Construct***	**Remaining Life****	**Depreciated Value ($)**
Concrete Panels	12 ea.	$108,000	95%	$102,600
Asphalt or Timber	25 ea.	112,500	40%	45,000
Private	47 ea.	47,000	10%	4,700
Asphalt in Streets	0.9 TM	475,200	40%	190,080
Total		$742,700		$342,380

* See page 47 for costs.
** Based on the experience of the estimator.

2) FRA Class 2 Track Service

Type of Grade Crossing	No. of Crossings	Total Cost to Construct*	Remaining Life**	Depreciated Value ($)
Concrete Panels	12 ea.	$108,000	95%	$102,600
Asphalt or Timber	25 ea.	112,500	30%	33,750
Private	47 ea.	47,000	5%	2,350
Asphalt in Streets	0.9 TM	475,200	30%	142,560
Total		$742,700		$281,260

* See page 47 for costs.
**Based on the experience of the estimator.

j) Grade Crossing Warning Systems

1) FRA Class I Track Service

CPUC Type	No. of Units	Labor and Material to Construct*	Remaining Life**	Depreciated Value ($)
9A	14	$2,800,000	40%	$1,120,000
9	22	3,850,000	40%	1,540,000
8	13	1,950,000	30%	585,000
1R	17	5,100	25%	1,275
Total		$8,605,100		$3,246,275

* See page 48 for costs.
**Based on the experience of the estimator.

2) FRA Class 2 Track Service

CPUC Type	No. of Units	Labor and Material to Construct*	Remaining Life**	Depreciated Value ($)
9A	14	$2,800,000	25%	$700,000
9	22	3,850,000	25%	962,500
8	13	1,950,000	15%	292,500
1R	17	5,100	25%	1,275
Total		$8,605,100		$1,956,275

*See page 48 for costs.
**Remaining life estimated based on the estimator's experience.

4) Grading

The total estimated cost for grading and sub ballast is $23,209,692 as shown on page 50. Some of the shoulders on the fill sections have eroded and some cut sections have collapsed into the drain ditches. The estimated deterioration of the roadbed for FRA Class I Track Service is 60% and for FRA Class 2 Track Service is 80%. Track drainage must be reestablished in many locations.

FRA Class of Track	Cost to Construct Grading*	Remaining Life**	Depreciated Value ($)
1	$23,209,692	40%	$9,283,876
2	$23,209,692	20%	$4,641,938

* See page 50.
**Based on the experience of the estimator.

l) Bridges Trestles and Culverts

Type	Replacement Cost New ($ Millions)*	FRA Class I Track Remaining Life	FRA Class I Track Depreciated Value ($ Millions)	FRA Class 2 Track Remaining Life	FRA Class 2 Track Depreciated Value ($ Millions)
Timber Trestles	$11.5	15%	$1.7	5%	$0.6
Steel Bridges	22.9	35%	8.0	25%	5.7
Concrete Bridges	4.7	90%	4.2	90%	4.2
Culverts	0.8	50%	0.3	50%	0.3
Total	$39.9		$14.2		$10.8

*For costs, see page 51. Remaining life is based upon the estimator's experience.

m) Summary of Depreciated Values Based Upon Estimated Remaining Life of the Assets Under FRA Class I Track Requirements and, Separately, Under FRA Class 2 Track Requirements

Asset	Cost ($ Millions)	Depreciated Value FRA Class I Track ($ Millions)	Depreciated Value FRA Class 2 Track ($ Millions)	Reference (See Pages)
Track	21.9	5.6	4.0	55
Turnouts	1.5	0.7	0.5	56
Crossings and Streets	0.7	0.3	0.3	57
Crossing Warning System	8.6	3.2	2.0	58
Grading	23.2	9.3	4.6	59
Bridges, Trestles and Culverts	39.9	14.2	10.8	59
Total	$95.8	$33.3	$22.2	

Appendix D

Certified Statement

Of

Qualifications of the Estimator

THE
WOODSIDE
CONSULTING
GROUP

March 15, 2004

Mr. Luis Pavel Mendez
Senior Transportation Planner
Santa Cruz County Regional Transportation Commission
1523 Pacific Avenue
Santa Cruz, CA 95060-3911

Dear Mr. Mendez,

This letter contains my railroad qualifications and experience in connection with preparing Net Liquidation Value (NLV) studies for improvements on railroad rights of way, including trackage, structures, signals and other facilities as well as other types of valuation studies.

I have had 42 years of railroad experience with the Southern Pacific Railroad Company, including engineering positions ranging from General Track Foreman to Division Engineer and Assistant Engineer of Maintenance-System. I have railroad operating experience ranging from that of Superintendent to Vice President of Operations. I also served as Vice President of Purchasing and as Vice President in the Executive Department, which included responsibility for System rail line abandoments.

Following my retirement, I have consulted in the railroad industry for almost 20 years during which time I have prepared over twenty five (25) NLV studies of improvements on railroad rights of way for investors, public agencies and railroad entities. I am associated with The Woodside Consulting Group which engages in railroad consulting work related to operations assessments, cost analysis and models, strategic planning, mergers, abandoments and regional railroad plans and evaluations.

The following are some of my specific railroad experiences related to valuation studies.

- Testimony before the Interstate Commerce Commission (ICC) and the California Public Utilities Commission (CPUC) in regard to railroad main track and branch line abandonments, station abandonments, acquisitions, mergers and discontinuance of passenger service.
- Purchase of railroad operating materials (approximately $400 million per year) and capital equipment and materials (averaged $300 million per year).

PF/NLV/204050.13

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- Sale of obsolete equipment, scrap metal, and abandoned branch lines generated by 14,000 miles of main track operations.

- President of the Northern California Section of the National Association of Purchasing Mangers (NAPM) and a Certified Purchasing Manger (CPM).

- Participated in the physical abandonment and salvage of railroad lines in California, Nevada, Arizona, Texas and New Mexico.

- Participated in studies, negotiations and NLV studies in regard to purchase of portions of the Chicago, Rock Island and Pacific Railroad, sale of portions of the San Diego and Arizona Eastern Railroad to the San Diego M.T.D.B., opposition to the purchase of SPT by Rio Grande Industries, sale of the Peninsula Commute Service and right-of-way by SPT to the PCJPB, and studies of many regional railroad "spin-offs" by Class I railroads as described below.

- Prepared the initial operating plans, capital investment plans and NLV studies of approximately twenty (20) regional and short line railroads for railroads, banks, or investors, the most significant of which are listed below (with the origin of each line shown in parentheses):

  - Mid South (IC)
  - Paducah and Louisville (IC)
  - Gateway Western (IC)
  - Dakota, Minnesota and Eastern (CNW)
  - Escanaba Railroad (CNW)
  - Montana Rail Link (BN)
  - Louisiana and New Orleans (KCS)
  - Wheeling and Lake Erie (CSX)
  - Buffalo and Pittsburgh (CSX)
  - San Joaquin Branch Lines (SPT)
  - San Pedro and Southeastern (SPT)
  - Kyle Lines in Kansas (CRIP)

Education

BA degree with distinction from Sacramento State College (California State University at Sacramento), with major subject in mathematics and minor in physics. Also the Stanford Transportation Management Program and an Alfred P. Sloan Foundation Fellowship to the Stanford Graduate School of Business.

Certification

In preparing this study, I certify that, to the best of my knowledge and belief:

- The statements contained in this Report reflect actual experience, market and contract prices and my judgment based upon sixty (60) years of railroad service.
- The analyses, estimates and conclusions are my personal, unbiased professional opinions.
- I have no present or future direct or indirect interest in the property or transaction which is the subject of this Report.
- My compensation is not contingent upon any pre-determined value or bias which would favor any party involved, and I have no personal interest in or with the prospective seller or buyer.
- My analysis, opinions and conclusions were developed for this Report in conformity with railroad industry standards consistent with industry contract, price, purchase and sales agreements and valuation analyses.

Signed: ______________________

Alan D. DeMoss

ATTACHMENT D - Net Salvage Value of Rail System Assets Scope of Work

Davenport and Santa Cruz Branch Lines - Portion

This valuation will include an inventory of the rail assets present on the described branch lines. It need not be exact but must meet a reasonable standard of accuracy.

Consultant shall also provide certain post-valuation services including, but not limited to, adjustments to the report and opinion of Net Salvage Value of Rail System Assets based on terms defined or adjusted in the negotiated sale agreement and final engineering design, cooperation with other consultants in the acquisition process, and review and comment by Reviewer or SCCRTC on the report, if any.

The effective date of value: current.

The materials, such as rail and ties will be categorized: first by type and then by condition, based on suitability and value for re-sale.

The dollar unit values and totals of the materials categories will be separately shown for each.

The valuation expert will report 3 values, based on the following:

1) The land appraisal will assume a purchase by one private party, from the railroad on the effective date of value, for purposes of private economic development.

   It assumes this buyer would then solicit offers from rail asset salvage contractors.

   The contractor would be required to remove all rail, ties, ballast and other track assets/devices/appurtenances and leave the right of way entirely clear.

   Time would not be a significant constraint as long as the removal is commenced quickly, retaining a full crew and equipment, and continued diligently without interruption until completion.

   The contractor bears all costs associated with the clearance and transport of the materials (including proper legal disposal of any contaminated materials), receives all revenues subsequently generated from the assets, and must make a profit that justifies the time, risk and cost of the undertaking.

   The new landowner remains uninvolved, non-participating, and receives the land fully cleared.

   A) Upon award of the contract, how much would the contractor pay the landowner, or would the landowner have to pay the contractor, for the right and obligation to remove and salvage, assuming that the trestles and bridges can be left standing?

   B) Upon award of the contract, how much would the contractor pay the landowner, or would the landowner have to pay the contractor, for the right and obligation to remove and salvage, assuming that the trestles and bridges are required to be removed (in a manner conforming to law)?

2) The in-place, depreciated value of the rail assets, were the private buyer intending to acquire and use them for alternative rail purposes.

The estimated costs and profit of the contractor are to be shown and explained. Sources of data and estimates of costs and values are to be shown – company, person, phone and date.
The valuation expert is to coordinate with the land appraiser and the appraisal reviewer during this assignment, for clarification and the identification and resolution of problems

1. **SCCRTC-Furnished Products**

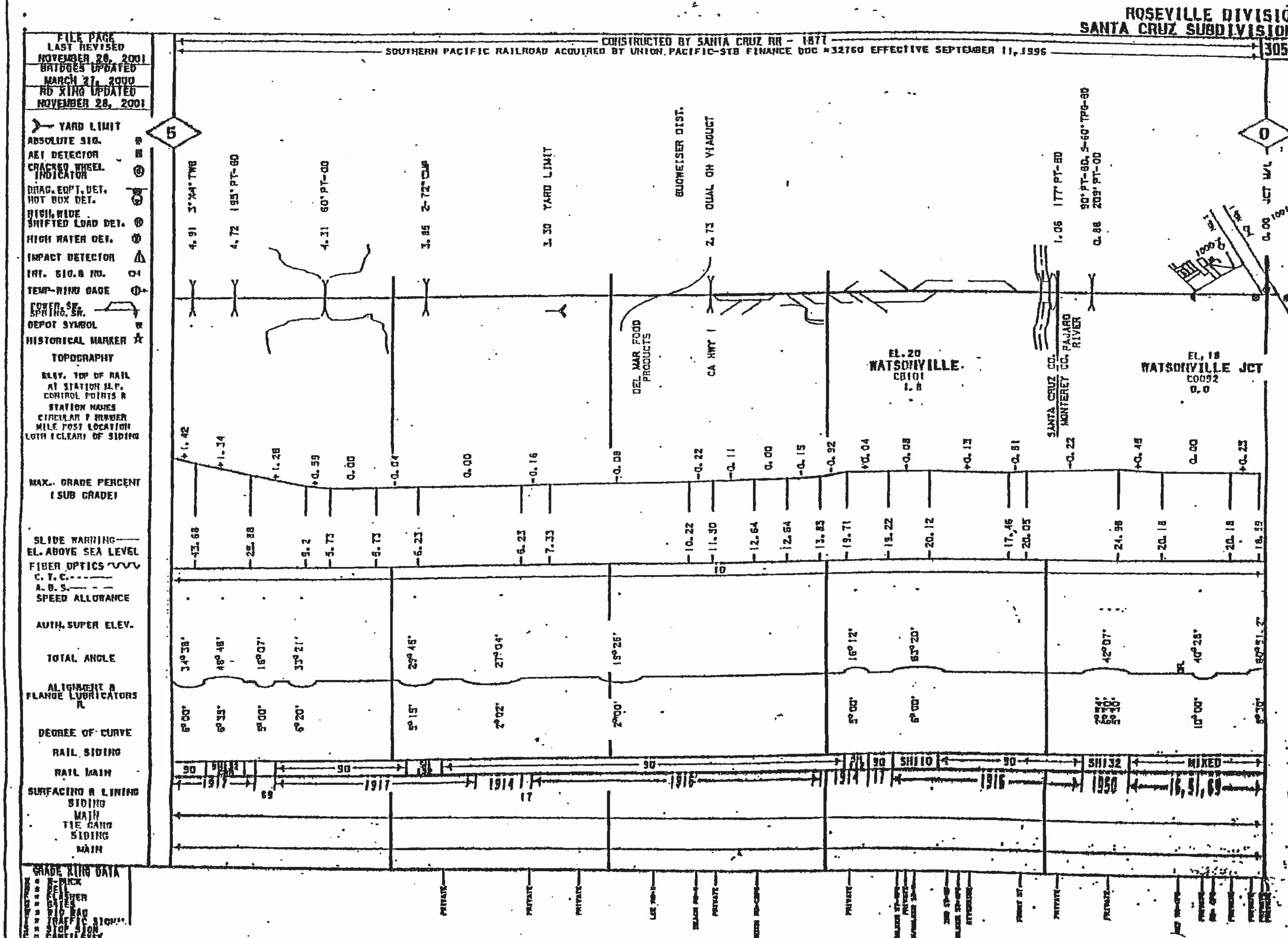
- State of California's *Valuation Procedures and Guidelines for Public Acquisition of Railroad Rights of Way Pursuant to Public Utilities Code, Section 7551.3*;
- Union Pacific Railroad valuation maps showing track and right of way;

2. **Consultant Required Products**

Two major work elements are included in this Scope of Work. They are:

- Report of Net Liquidation Value of Rail Assets and Materials ;
- Post-report services as requested and authorized by SCCRTC. Whether sub-contracted or not, the consultant shall supply a final draft product conforming to the appropriate Scope of Work to the contractor, reviewer and SCCRTC. If the appraiser, reviewer or SCCRTC finds that there are departures from the Scope of Work, omissions or perceived deficiencies in the final draft, these will be transmitted to the providing consultant. If in writing, copies will be furnished to the other parties. The reviewer will have the primary responsibility for the final reporting on the apparent reliability of the report.

Appendix B
Union Pacific's Detailed Track Chart, Watsonville Junction to Davenport



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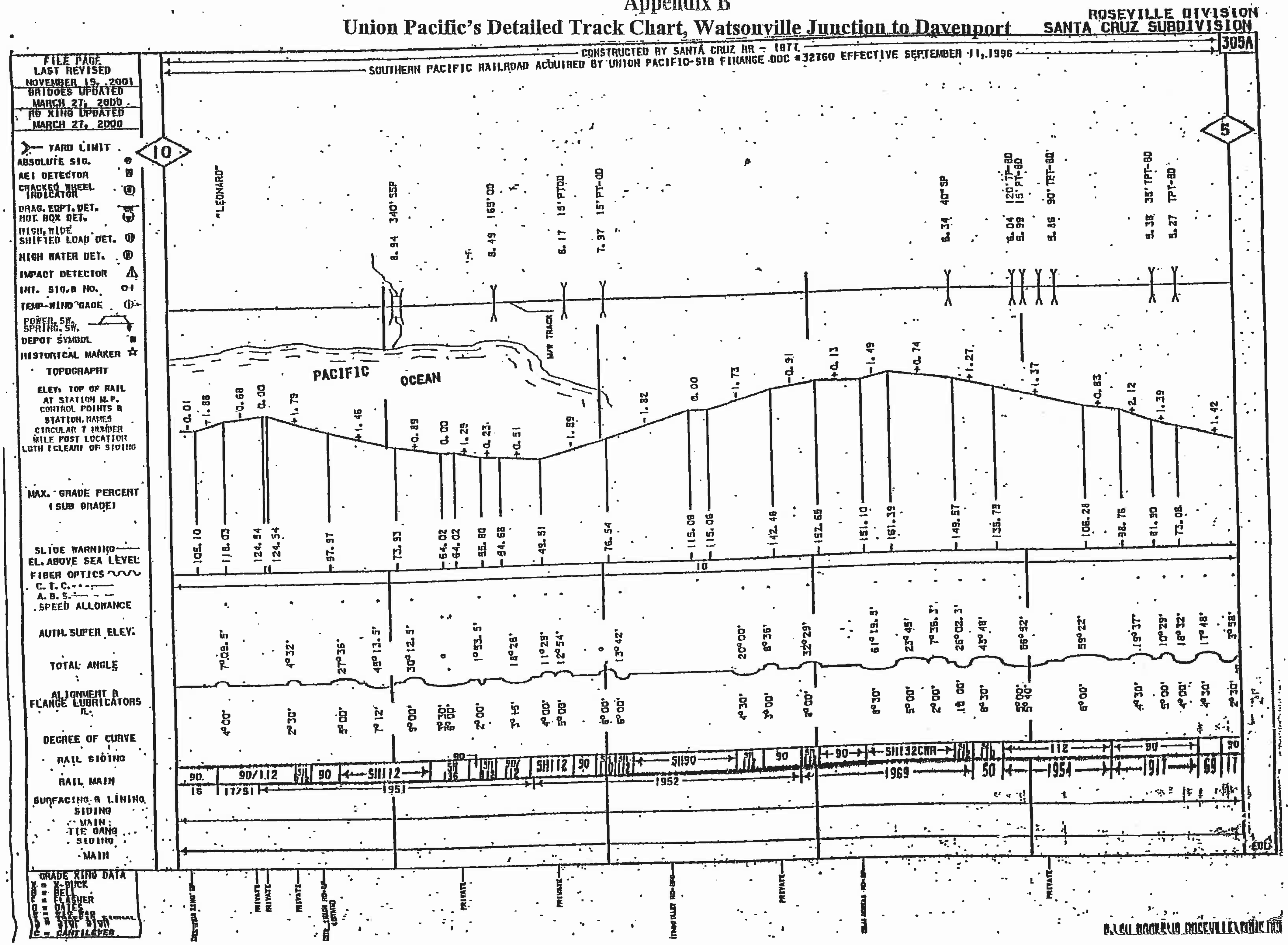
Union Pacific's Detailed Track Chart, Watsonville Junction to Davenport



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Appendix B

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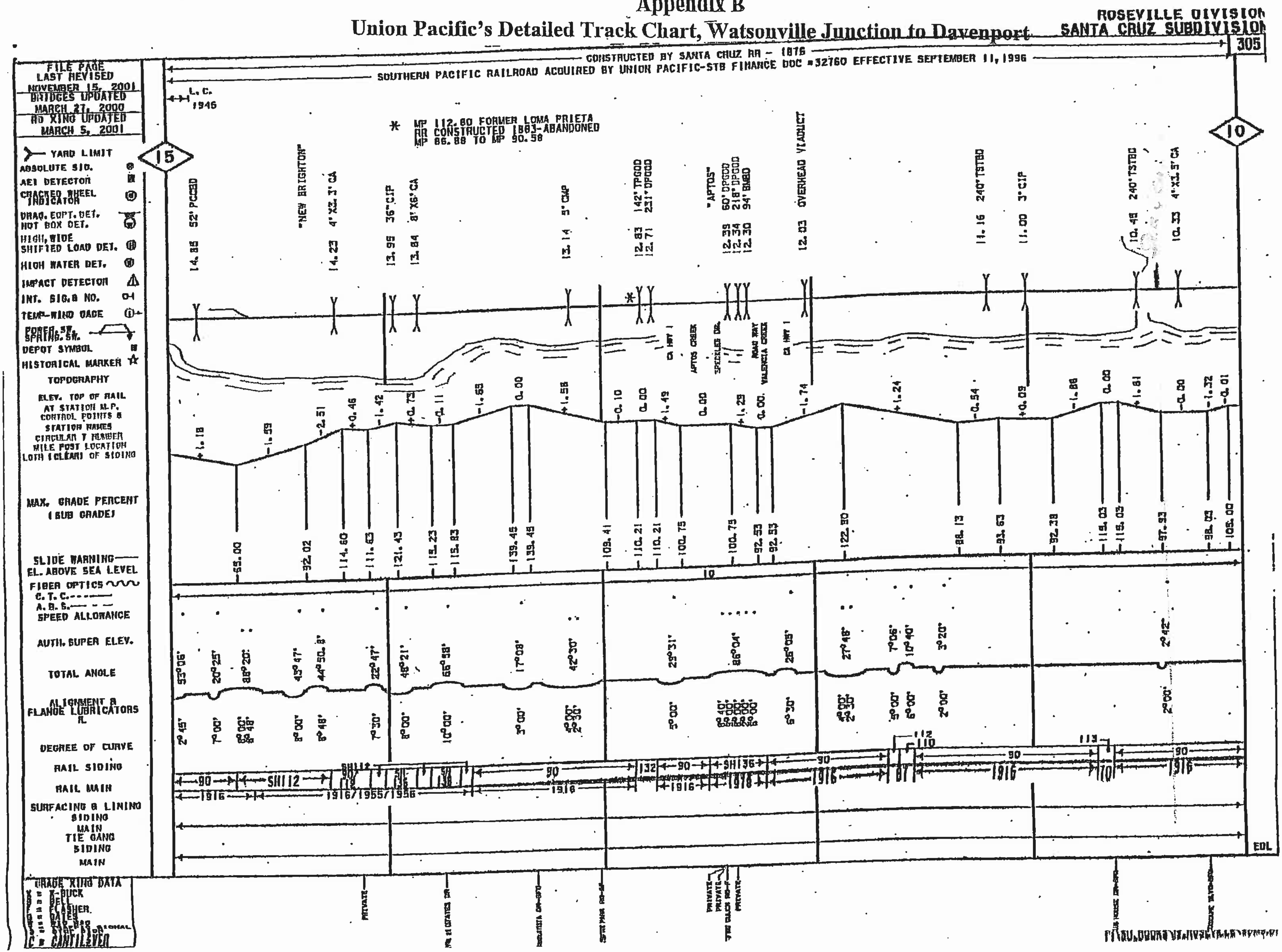

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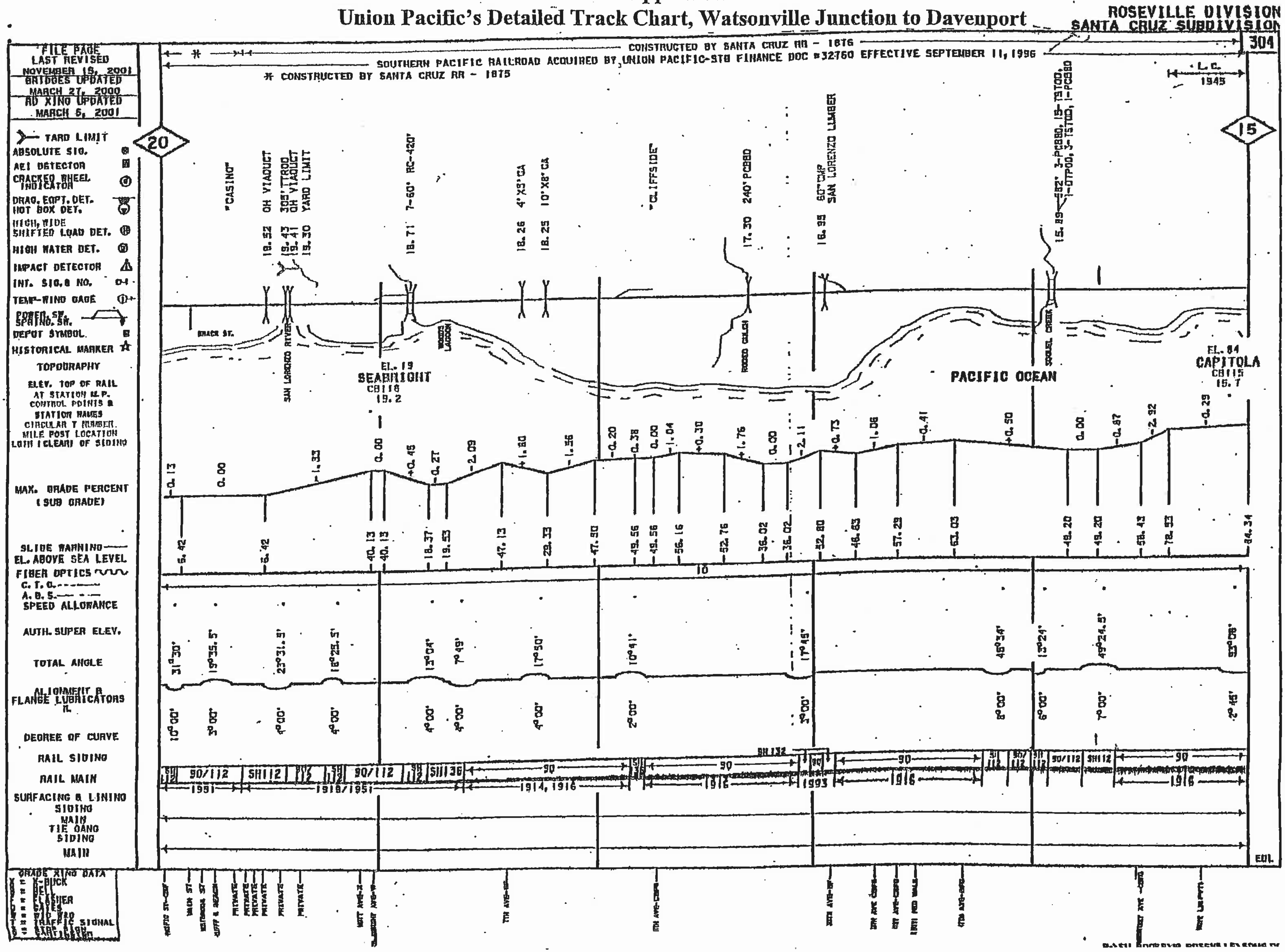

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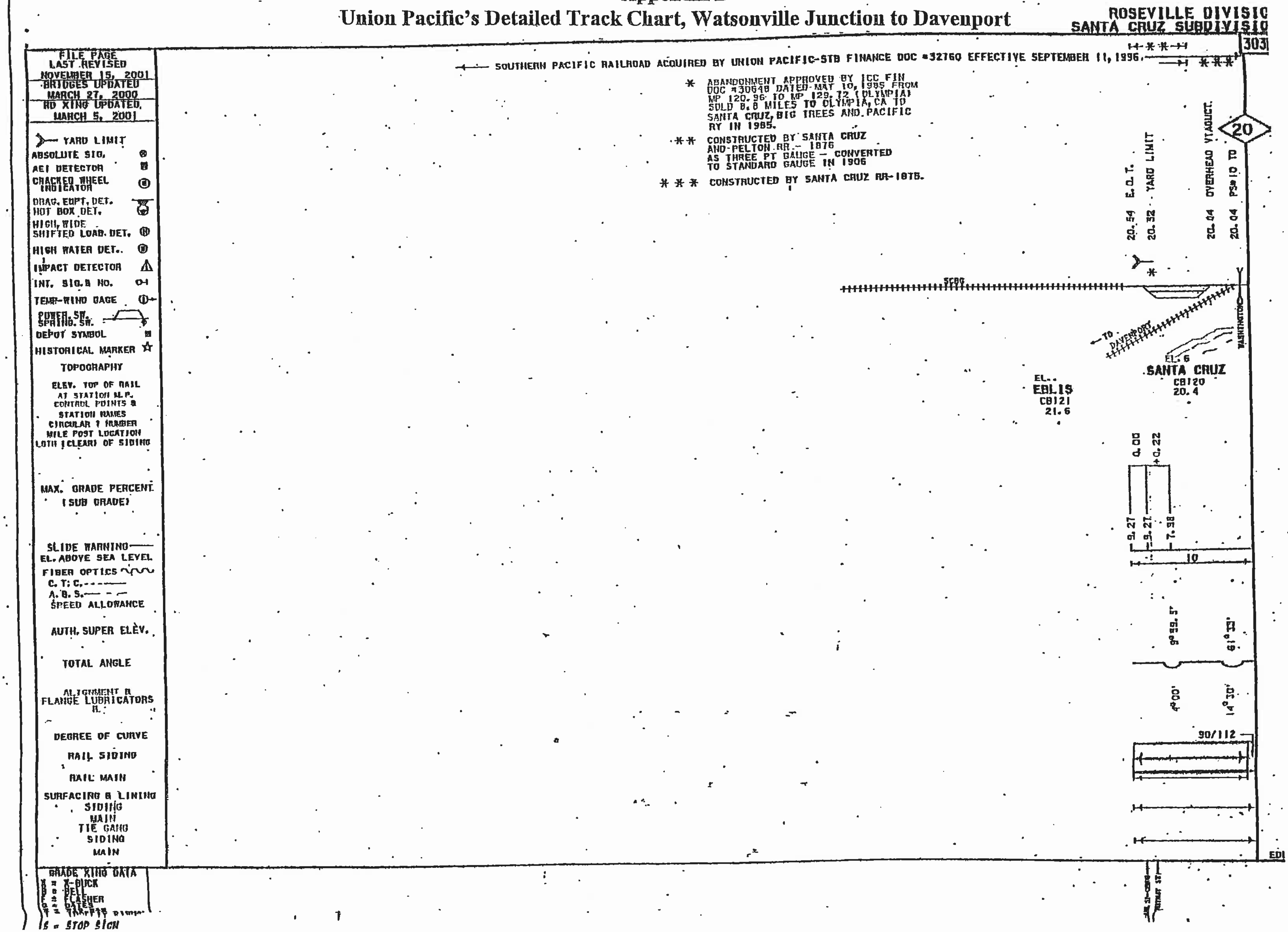

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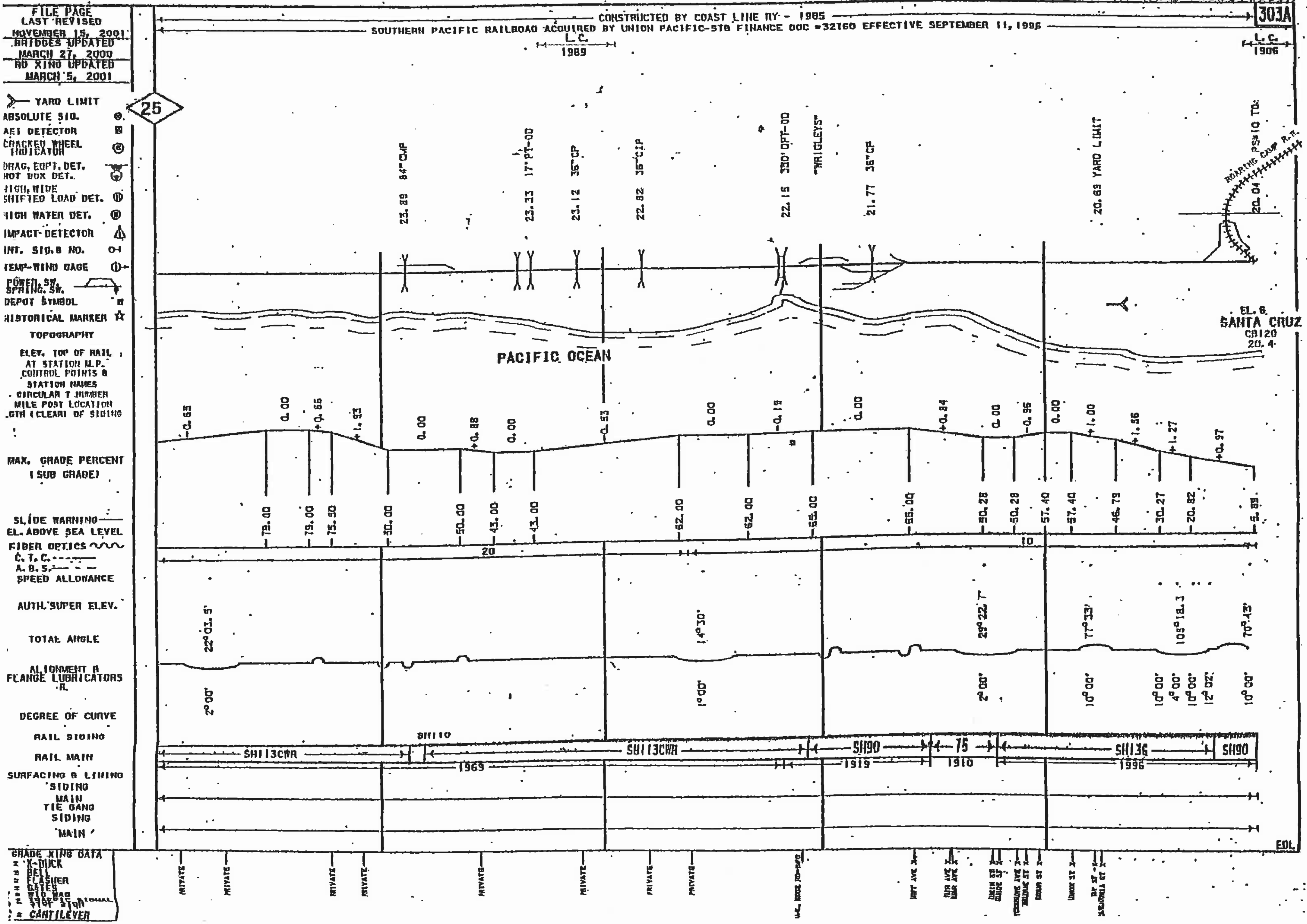

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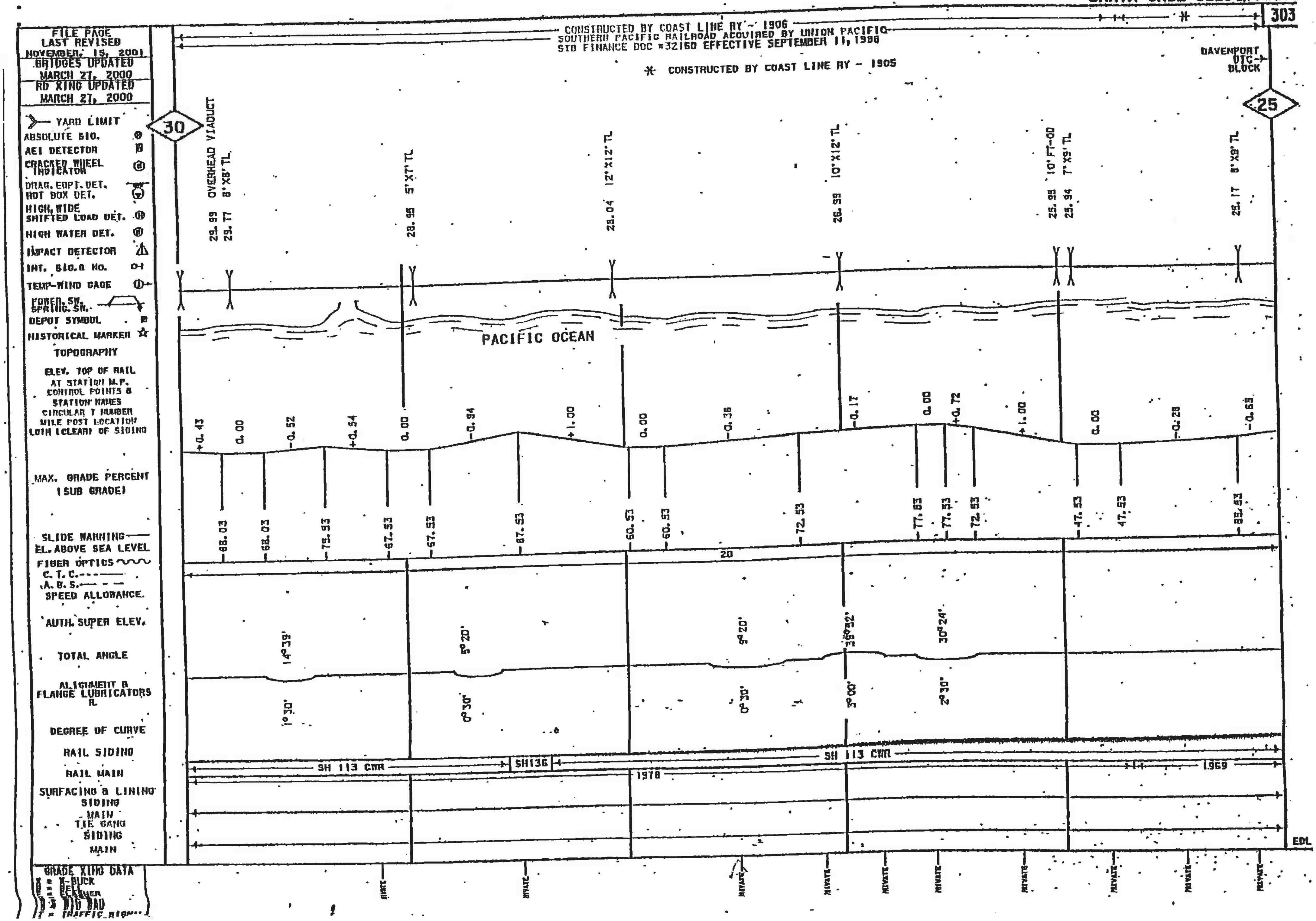

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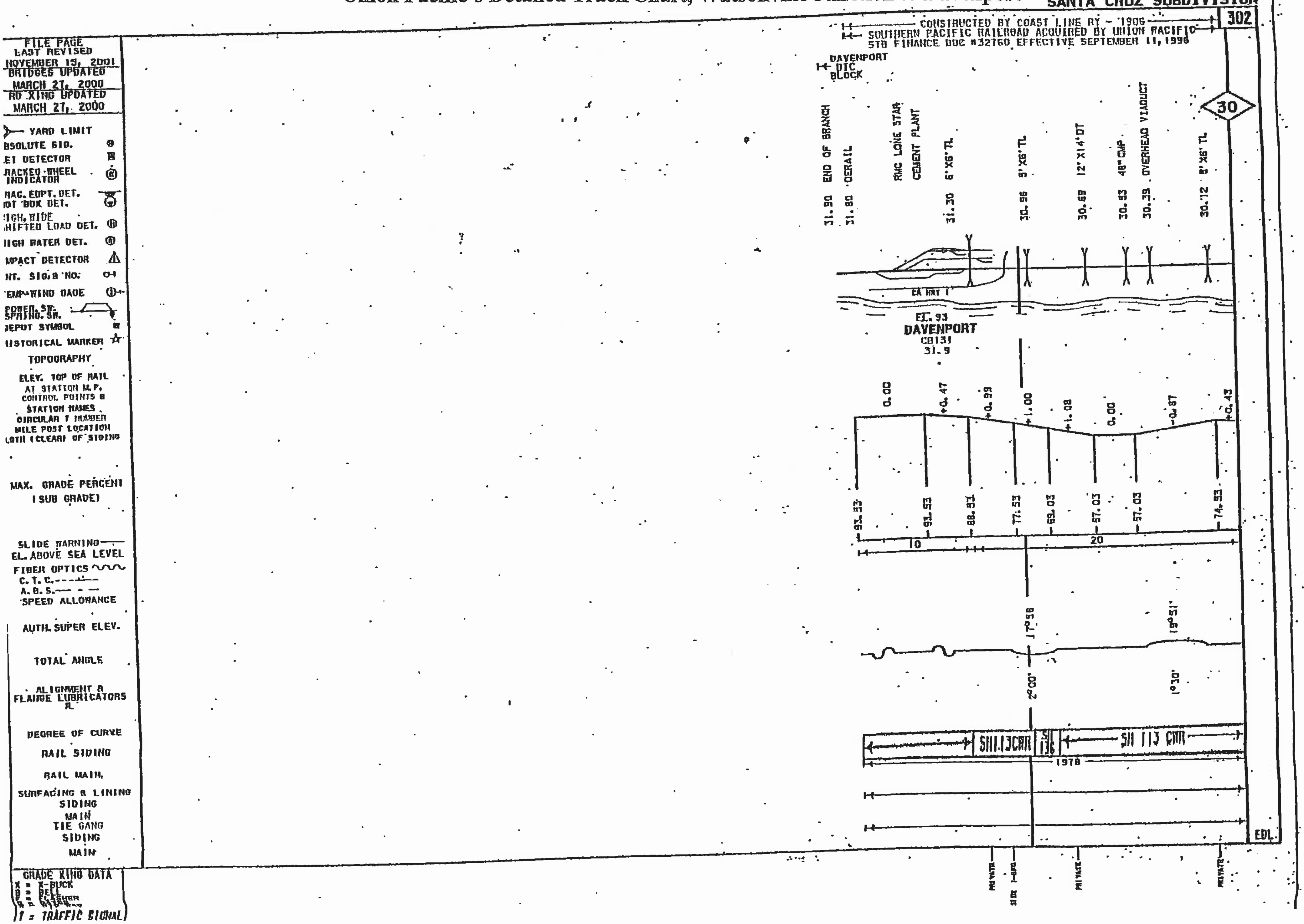


Appendix A

A Photographic Study
of the
Union Pacific Railroad's Santa Cruz Subdivision

Note 1: Photos not otherwise noted were taken 2/17/04. Photos noted as "File Photos" were taken circa 1995.

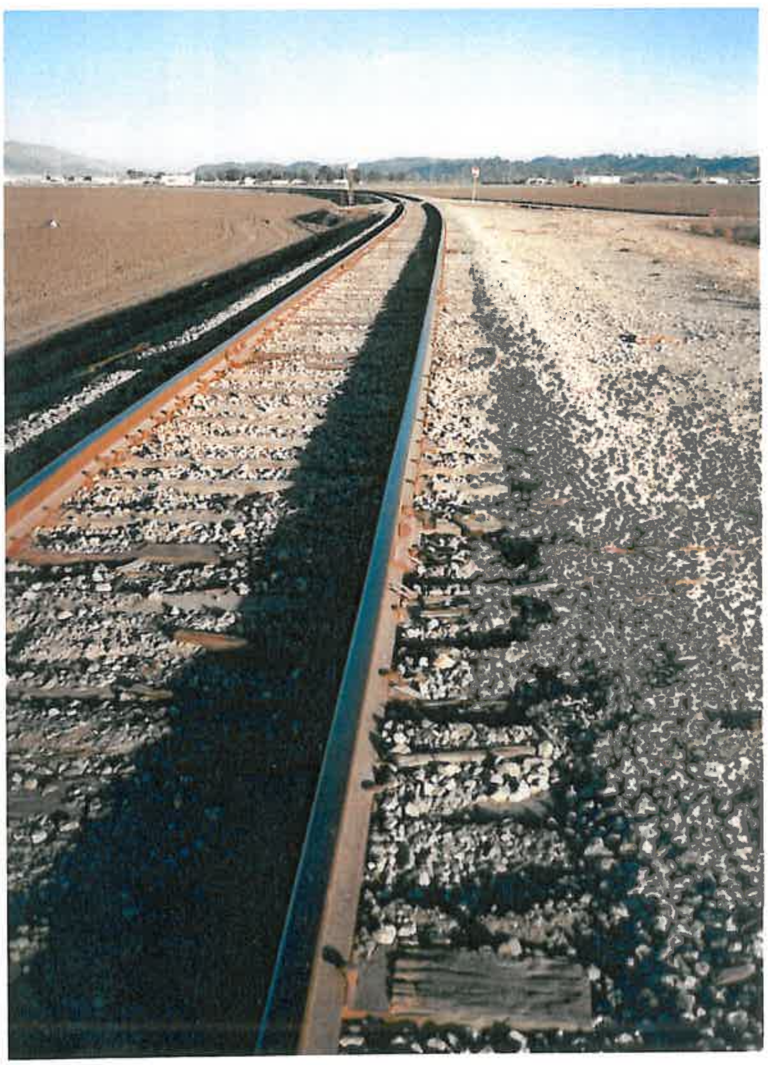
Note 2: The Santa Cruz Subdivision from Watsonville Jct. to Davenport runs magnetic southeasterly to northwesterly. To avoid railroad directional terminology, the facing direction of photos taken will be shown as "easterly" or "westerly" (see Figure 1).

(1) Facing easterly at MP 0.4, Salinas Road, Showing flashing lights, gates and cantilever flashing light warning system. Point of Sale is 50 ft. north of Salinas Road, MP 0.433, Watsonville Junction.

(2) Facing westerly at MP 0.4 showing 10 degree curve, recently retied, surfaced and lined. This curve has 132 lb. RE jointed rail rolled in1946. The continuous welded rail (CWR) distributed outside of track for a UP rail relay project is 112 lb rolled in 1946. Subsequent to this photo of 2/17/04, Union Pacific removed this rail and relaid it elsewhere on their System.

(3) Photo above facing easterly at about MP 1.0 showing the 572 ft. long Pajaro River bridge with open deck timber trestle approaches and 5 ea. steel through plate girder spans constructed in 1906 with Cooper's E rating of 55.

(4) At MP 1.0 facing westerly down Walker Street in Watsonville shows 113 lb HF CWR laid in the 1973-76 era in asphalt without flangeway guards.



(5) Photo above at about MP 2.5 facing westerly, showing Errington Road in foreground and State Route 1, overhead in the far distance. Crossties have been renewed under the jointed 90 lb rail, laid in 1916

(6) File Photo, facing easterly about MP 3.0 showing a 2 degree curve. One of about 47 private at-grade crossings on the Subdivision is shown on the curve with fields used for strawberrys on either side. The rail is jointed 90 lb, rolled in 1913, with 27 inch, 4 hole, continuous style joint bars, and short, single shoulder tieplates.

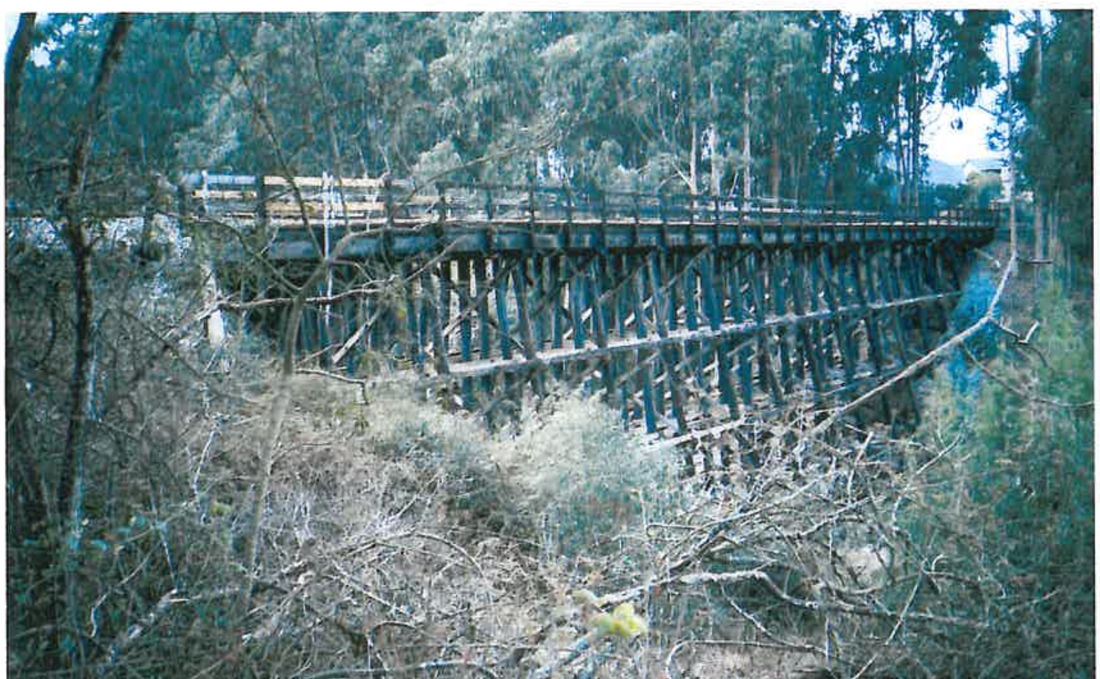
(7) File Photo, at about MP 5.0, part way up the 1 to 2 percent grade to San Andreas summit, showing washout activity typical of this stretch of track with subgrade on a side hill cut in sandy soil.

(8) Facing easterly at MP 6.87, showing 132 lb CWR in track with recent crosstie renewals and distributed relay 112 lb CWR outside of track, part of about 8 Track Miles (TM) of a planned rail replacement program. Subsequent to the date of this photo, 2/17/04, Union Pacific removed the 112 lb CWR and relaid it elsewhere on their System.

(9) Facing westerly at MP 6.87, San Andreas Road, showing asphalt crossing, 2 sets of a flashing light warning system. The curve here is 8° 30'.

(10) File Photo, facing easterly showing 90 lb rail laid in the 1916 era with private grade crossing in the foreground. Irrigation water from adjacent brussels sprout fields drains on the roadbed in the distance at about MP 9.6.

(11) Facing easterly at MP 10.32, Seascape Blvd., showing flashing lights and gate warning system, asphalt crossing and recent crosstie renewals in the foreground.



(12) Facing westerly at MP 10.45 showing a 240 ft. long, ballast deck timber trestle built in 1928.

(13) Facing easterly at MP 13.18, State Road, showing flashing light warning system, rebuilt crossing with UP concrete panels, new CWR, new crossties and pandorl fastenings.

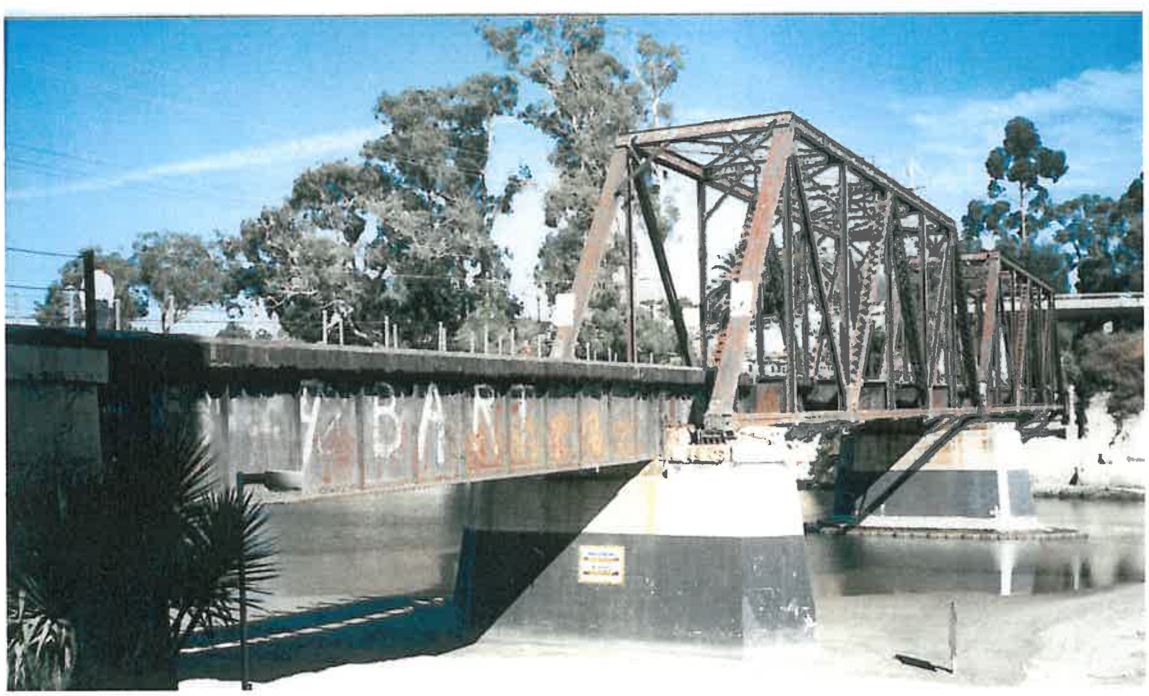
(14) File Photo, facing easterly about MP 15.3, showing 90 lb jointed rail laid in 1916, in a deep cut and trees which cause maintenance problems.

(15) File Photo, MP 15.89, facing easterly at Soquel Creek showing a 522 ft. long open deck bridge with timber trestles on each end plus a one prestressed concrete approach. The steel span shown was built in 1903, and is a open deck, pin connected steel truss with a E-50 Coopers rating.

(16) File Photo, facing easterly at MP 18.71, showing a 420 ft. long reinforced concrete bridge with 60 ft spans built in 1970 over Woods Lagoon and Yacht Harbor.

(17) File Photo, MP 19.4, facing westerly showing Mott Avenue in the distance and 90 lb jointed rail, rolled in 1913 and laid in 1919. Recently Union Pacific has renewed crossties here and improved Mott crossing.

(18) File Photo, MP 19.43, facing easterly showing 305 ft. long, two span, 120 ft. ea., steel riveted thru truss structures with an E-55 Cooper's Rating at the Lorenzo River, Santa Cruz.



(19) Facing easterly at MP 20 showing 132 lb CWR in Beach Street, Santa Cruz, on a 10 degree curve without flangeway guards.

(20) Facing westerly, below, showing Pacific Avenue grade crossing, MP 20.11, with asphalt crossing and one set of flashing lights with cantilever warning system. Timber overhead in the distance carries West Cliff Dr., and was built in 1918. The turnout beyond the overhead is the switch to the easterly leg of the Santa Cruz wye track. The term "Overhead" in the Study is synonymous with "Highway Overpass."

(21) Standing on the easterly leg of the Santa Cruz wye track showing the westerly leg of the wye track to the left and the line segment in the far distance running parallel to Chestnut Street to Laurel Street, MP 20.5, and to end of Union Pacific ownership at MP 20.54, where the SCBT&P Railway begins.

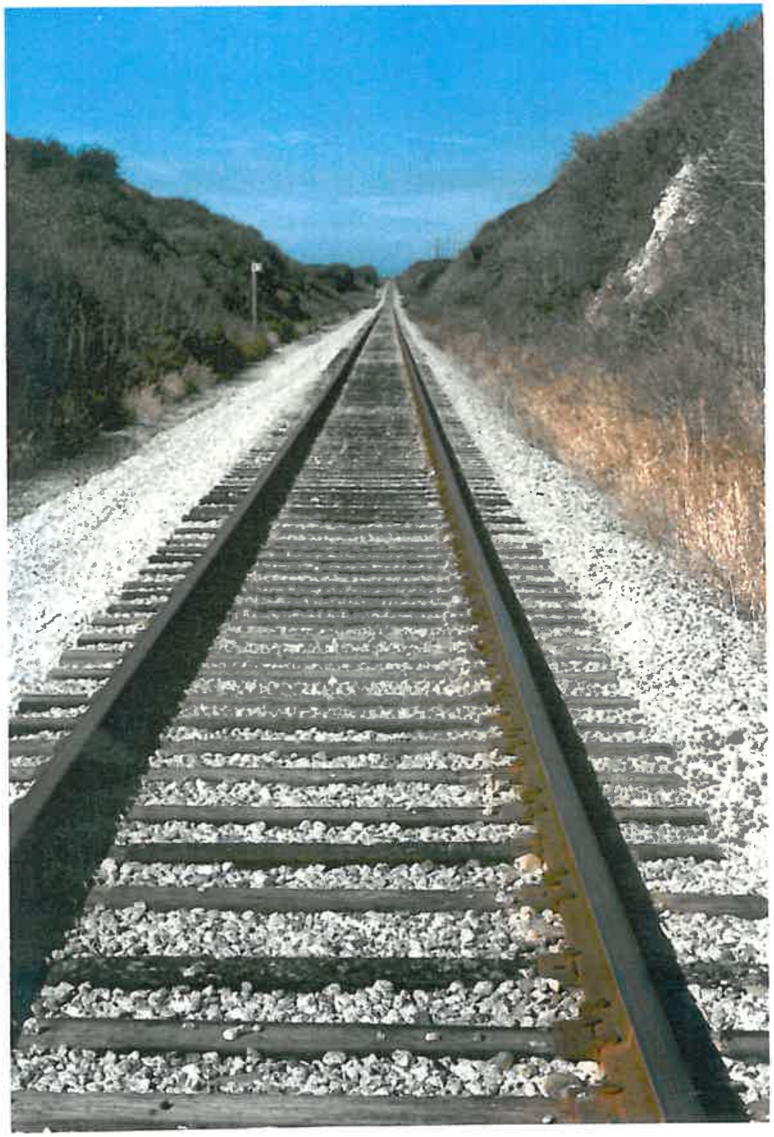
(22) Facing easterly and standing on Bay Street (MP 20.9) in Santa Cruz, showing recent crosstie renewals and new concrete panels in Bay Street and California St. in the distance. Rail is 136 lb jointed relay rail, 1996.

(23) Facing easterly about MP 21.5, Fair Street showing a new concrete crossing with new 136 lb CWR, new crossties and pandrol fastenings, within City limits of Santa Cruz.

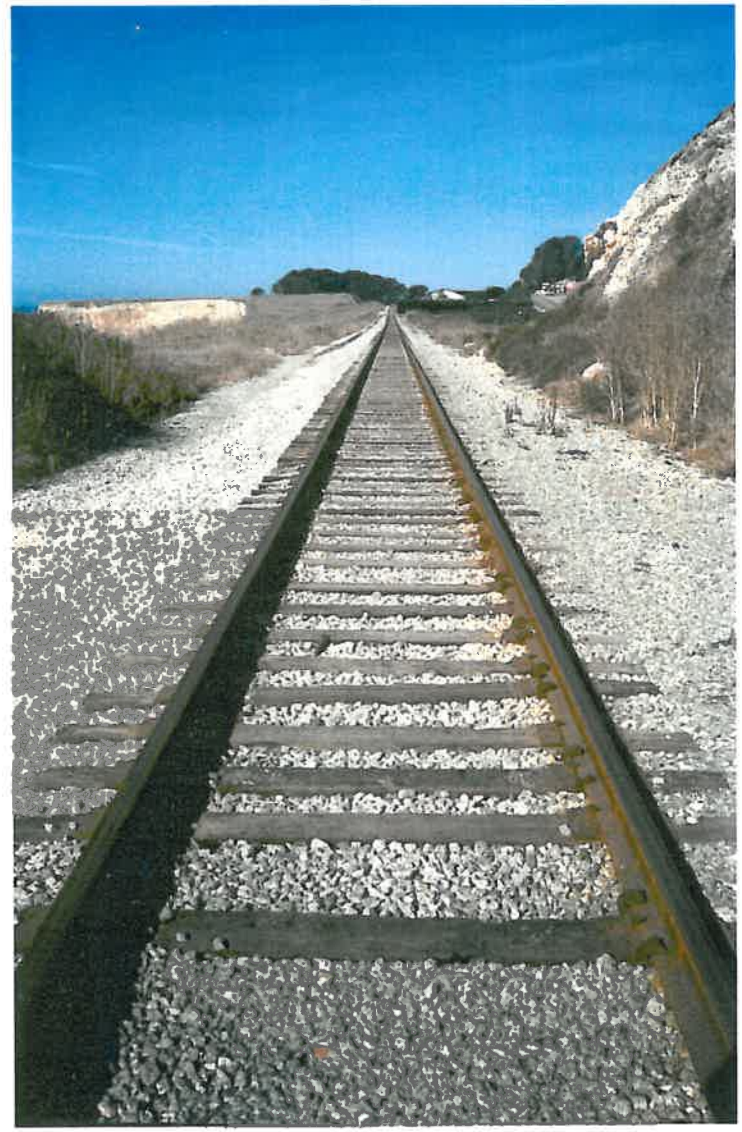
(24) Facing easterly at MP 22.2, Natural Bridges Road showing old style timber crossing, flashing light and gate warning system and recently installed crossties in the foreground, near the westerly boundry of the City of Santa Cruz.

(25) Facing westerly at MP 22.15 showing a 330 ft. long open deck timber trestle over Moore Creek with relay 113 lb CWR laid in 1969.

(26) File Photo, facing westerly near MP 25.5, showing 112 lb CWR rolled in 1936. Irrigation water from brussels sprout fields foul the ballast but UP recently retied, surfaced and lined the entire Subdivision.



(27) File Photo, facing westerly near MP 27.7, showing 112 lb CWR, rolled in 1936 with 13" tie plates and alternative crossties boxed anchored. UP recently retied, ballasted and surfaced this line.



(28) File Photo, about MP 30.5, facing westerly showing 112 lb CWR rolled in 1935. UP retied, ballasted and surfaced this Subdivision.

(29) At Davenport, facing westerly at end of proposed Sale, MP 31.39 at derails shown beyond the turnout in the distance. UP retied the Santa Cruz Subdivision up to this No. 10 turnout which will require switch ties in the future. UP's maintenance now ends at the derails and we are advised the RMC-Davenport Cement leases and maintains the yard tracks in the distance.

(30) Facing westerly at MP 31.28, showing State Route 1, crossing with asphalt surface and flashing light and gate warning system.

Table 12

Abbreviations and Definitions

AAR	-	Association of American Railroads
AREA	-	American Railway Engineering Association, now known as AREMA, American Railway Engineering and Maintenance Association.
CPUC	-	California Public Utilities Commission
FRA	-	Federal Railroad Administration
STB	-	Surface Transportation Board, successor to the ICC, Interstate Commerce Commission
WCG	-	Woodside Consulting Group
SCCRTC	-	Santa Cruz County Regional Transportation Commission
BTSC&P	-	Big Trees Santa Cruz and Pacific Railroad
NT	-	Net Ton (2,000 lb)
GT	-	Gross Ton (2,240 lb)
TM	-	Track Mile – one mile of single track
RM	-	Route Mile – one mile of railroad regardless of single track, double track and siding lengths
TF	-	Track Feet – feet of track, complete including two rails
LF	-	Linear Feet of one rail, an at-grade crossing, length of a bridge, etc.
CWR	-	Continuous Welded Rail
OTM	-	Other Track Material including tie plates, spikes, rail anchors, joint bars, bolts, nuts, nut locks.
OD	-	Open Deck bridge or trestle. Crossties rest directly on stringers or steel beams
BD	-	Ballast Deck bridge or trestle. Crossties rest on ballast supported by solid panels underneath.

Table 12

<u>Abbreviations and Definitions</u>

NLV	-	Net Liquidation Value. (Specifically the cash an owner of the Santa Cruz Subdivision would receive if all of the railroad assets were removed and sold for their salvage value.)
RCNLD	-	Replacement Cost New Less Depreciation (Specifically, if the entire Santa Cruz Subdivision were reconstructed at present day costs and depreciated to its present physical condition and utility for a specific service, what is the present value of the Line?.)
Relay	-	Reusable for railroad purposes.
FOB	-	Free On Board which is the price of materials delivered in rail cars to the job site or steel mill.
Railroad Assets	-	All investments made on a railroad right of way which permits the operation of trains including but not limited to track structures, bridges, trestles, culverts, signals, at-grade crossings, highway grade separations, buildings, shops, communication lines and towers, tanks, fueling facilities, etc.
Track Structure	-	That part of railroad assets which include rail, ballast, crossties, fastenings (OTM), turnouts, bridges, trestles and culverts, and the roadbed.
SPT	-	Southern Pacific Transportation Company also known as Southern Pacific Co., the owner of the Santa Cruz Subdivision prior to Union Pacific's purchase in 1996.
Class I Railroad	-	The STB designates three classes of freight railroads as follows: <u>Class I</u> – Revenues $272 million or more <u>Regional</u> – Revenues $21.8 to 271.9 million <u>Local</u> – Revenues less than $21.8 million Note: These classifications are for the year 2002.

Table 11

Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction

1. General Familiarity and Experience with the Subject Matter

The estimator worked for Southern Pacific Transportation Company for 42 years including the following positions related to the Santa Cruz Subdivision:

- General Track Foreman
- Division Engineer
- Assistant Engineer-Maintenance, system (18,000 miles of track)
- Vice President Purchasing
- Vice President Operations

Experience in the above positions enabled the estimator to know SPT's standards in terms of quantities, weights, costs and capacities of track structure (see Table 10 for a sample of SPT Standards). The estimator had direct responsibility for crosstie renewals, rail laying programs, rail welding programs, branch line abandonments and reallocation of salvaged materials.

This experience was reinforced by 18 years of railroad consulting throughout the lower 48 States, Alaska and Hawaii. Included in that consulting work was estimating for new railroad construction and preparing NLV Studies for banks, investors, and the IRS. These studies enabled the estimator to establish a "library" consisting of wholesale values of salvaged materials, cost to remove railroad assets, and costs to construct new railroad assets. In addition, the "library" consists of NLV's prepared by other consultants which are used for verification of information.

Table 11

Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction

The "library" also consists of confidential contractor's bids for railroad projects and some Class 1 railroad's internal cost and construction manuals. Specific names of clients, railroads, contractors and consultants cannot be included in this Study for reasons of confidentiality.

2. Determination and Verification of the Railroad Assets on the Santa Cruz Subdivision

The estimator made two inspection trips over the Santa Cruz Subdivision. The first was made in 1995 for an NLV Study for the SCCRTC when Southern Pacific owned the Line. Southern Pacific roadmaster Jerry Castenada accompanied the estimator. Hyrail inspection vehicle stopped at all track locations where there was a change in weights of rail or where the track structure varied form the Standards. (See Table 10.) Measurements and photographs were taken on a sampling basis but included every bridge and trestle.

The second inspection made on 1/30/04, was accompanied by Union Pacific Manager of Track Maintenance, DeWayne Hillman, who worked for Mr. Castenada during Southern Pacific's ownership and who was able to describe all changes made by Southern Pacific in the period December, 1995, until September 1996, as well as those made by Union Pacific September 1996 to the date of this Study, 1/30/04. Those changes were verified by visual inspection during the 1/30/04 hyrail trip over the Santa Cruz Subdivision. However, because that inspection did not schedule sufficient time for stops to make measurements and update photographs, a second inspection was made by walking during the week of 2/16/04, and later another hyrail and walking inspection was made with Union

Table 11

Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction

Pacific Manager of Maintenance DeWayne Hillman at specific locations where Union Pacific's track chart was known to be incorrect. Also, Mr. Hillman reiterated the changes made in the trackage and described the minor bridge repairs made in recent years as well as flooding experiences and troubles from high winds blowing trees down on the track and on adjacent homes and motor vehicles.

The following documents were used in making this study:

- Southern Pacific's original Rail and Ballast Chart
- Southern Pacific's Track Chart
- Union Pacific's Track Chart
- Southern Pacific's Detail List of Grade Crossings by name, milepost and grade crossing warning systems (later updated by walking inspection)
- Southern Pacific's Detail Bridge Inspection Report
- SCCRTC Video Tape of the Line, Watsonville Jct. To Santa Cruz
- SCCRTC Video Tape," Rail Line Hirail Tour" Santa Cruz Branch, 1/30/04, made by Justin Fox of Wilber Smith Associates
- Union Pacific's Timetable #3, dated 6/22/03

The Union Pacific did not furnish the SCCRTC with a current Grade Crossing Inventory similar to the Southern Pacific's Detail List of Crossings but Union Pacific's Track Chart (See Appendix B) shows public and private at-grade crossings at milepost locations with symbols indicating the type of warning system at each crossing. The Union Pacific did not furnish a current detailed bridge inspection report similar to Southern Pacific's Report but the bridges for highway underpasses and waterways and the highway overpasses are also shown on the Union Pacific Track Chart by milepost number, type and length (see Appendix B).

2. Determination of the Quantities of the Railroad Assets on the Santa Cruz Subdivision

Table 2 shows how the weights of rail are determined by Track Mile for the specific weights of rail found on the Santa Cruz Subdivision.

Table 5 shows how the track miles of each weight of rail has been determined from the Union Pacific Track chart as revised from inaccuracies found in the field inspection.

Table 6, converts the track miles of rail into net tons and provides the following additional information.

- The weight of the Other Track Material (OTM) which his associated with the rail for which it is designed

  In lieu of preparing extensive calculations, the estimator has prepared ratios of the weight of OTM to the accompanied weight of rail. For example, based upon field observations and Southern Pacific Standards, (Samples in Exhibit 10), the total weight of the tie plates, spikes, rail anchors, joint bars, nuts, bolts and nut locks for 90 lb jointed rail is about 31% of the weight of rail. Thus, the OTM weight for 90 lb rail in Table 6 is –1,831.0 NT x 0.31

or 567.6 NT of OTM. The same principle applies to the other OTM calculations.

- The classification of the quantities of rail and OTM by the quality of reusable (relay) railroad and OTM and by scrap rail and OTM.

These classifications are based upon the experience of the estimator and judgment of the estimator about the highest and best use for these materials. The American Railway Engineering Association Manual, Section 4-2-6.5, provides guidelines for rail grading classification. In addition, it is the estimator's personal policy that no non-controlled cooled rail will be placed in main tracks. Thus, except for use as incidental repair materials to existing track of the same type, for the purpose of this Study all rail and OTM ranging from 75 lb to 110 lb will be scrapped. Following Section 4-2-6.5 of the AREA Manual we have the following:

Class of Relay Rail	Range of Top Wear	Range of Gage Wear	General Use	Engine Burns and Corrugations
Class I	1/8" to 3/16"	1/4" to 1/2"	Main Track	Very Minor
Class II	5/16"	1/2" to 3/4"	Branch Line	Small
Class III	3/8" to 7/16"	3/4" to 7/8"	Light Branch	Medium
Class IV	1/2" to 9/16"	7/8" to 1"	Yards	Not mashed or fractured

There are many other factors which the estimator considers when classifying rail and OTM including permanent vertical and lateral bending, corrosion or putting, nicks on the base of rail, shell spots, detector car and service failure history, if available, gross tons of rail traffic over the rail if available and fillet wear and bolt hole elongation if the rail is considered to be relayed as jointed and not cropped for welding. The engine burn and corrugation conditions are noted above in AREA Section 4-2-6.5, are also taken into consideration. The 2004 Union Pacific ultrasonic rail detector car test of the Santa Cruz Subdivision found 12 defects, mostly bolt hole cracks, detail fractures and vertical split head failures.

The rail classification in Table 4 is based upon all of the factors outlined above. Except for the obsolete 90 lb rail laid in the 1914-1917 era, the existing rail is "second position" rail having been relaid on the Santa Cruz Branch after being removed from high speed, heavy tonnage service on the main track and no longer suitable for that service.

Special note should be made of the 9.46 TM of the 112/113 lb CWR in Table 6, which is located mostly between Santa Cruz and Davenport. A second, close inspection revealed that most of this rail is non-control cooled 112 lb rail rolled in the 1934 to 1936 era and thus is downgraded to Class 3 rail.

- The quantities of scrap rail and OTM are converted from net tons (2,000 lbs) to gross tons (2,240 lbs) so that they can be used in the calculations of scrap values as shown in Table 4. It should be noted that the same relay price per ton is assigned to the OTM as its accompanying rail and the same GT price for scrap rail is assigned to scrap OTM.

Table 11

<u>Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction</u>

- <u>The quantities and classification of crossties on the Santa Cruz Subdivision</u>

  The Chart CS 1902, in Table 10 of this Study shows that the Southern Pacific's standard for branch lines is 18 crossties per 33 ft rail which translates to 2,880 crossties per track mile (TM). Table 5 shows that there are 30.96 TM of main branch line and 1.42 TM of side tracks and spurs. Thus, the total miles of track, 32.38 TM has 93,254 crossties. Since Union Pacific installed about 37,000 new crossties in the year 2003, those 7" x 9" x 8' treated hardwood crossties will be classified as No. 1 relay crossties. Before the year 2003, Union Pacific made only incidental crosstie replacements and in the years before Southern Pacific sold the subdivision to Union Pacific, very few crossties were installed on a "spot" basis, thus most of the remaining crossties are of landscape value or scrap.

- <u>The quantities of Turnouts</u>

  The turnouts consist of a switch section and a frog section complete with switch ties and fastenings. The number and type of turnouts on the Subdivision where identified in the field inspection and checked against the line diagram in the track charts. The turnouts on this subdivision are #9's and # 10's, all with 16'-6" switch points and a mixture of railbound manganese, springrail and self guarded frogs. For more details, see Table 10, drawings CS 1016, 1180, 1153, 842, 835, and 1080. There are 16 turnouts on the Santa Cruz Subdivision as shown in Table 5.

Table 11

<u>Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction</u>

- <u>The quantities and types of highway at-grade crossings and their grade crossing warning signals as well as highway overpasses</u>

  Table 7 is a list of these assets on the Subdivision which originated from a Southern Pacific Inventory of crossing and which was updated by a recent walking field inspection. Table 7 gives the crossings and overpasses by milepost, name, type of crossing material and crossing warning system per CPUC standards. The Union Pacific Track Chart also provides coded data on these crossings.

- <u>The types and lengths of bridges, trestles and culverts</u>

  Union Pacific did not furnish a detailed bridge inspection report for this Study but their Track Chart shows these structures by milepost, length and symbols for type of structure. This Study relied not only upon Union Pacific's Track Chart but field inspection and verification as well as Southern Pacific's detailed bridge inspection report of 1995. Table 9 provides a summary of the type and length of the structures with a separate list of roadway underpass bridges by milepost and name.

3. <u>Determination of the Value of Railroad Assets on the Santa Cruz Subdivision for the Purpose of the NLV Study</u>

The SCCRTC's Scope of Work for this Study requests "how much would the contractor pay the landowner" for the railroad assets after removal of all such assets from the right of way. Thus, the cash paid to the landowner is the

Table 11

Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction

contractor's wholesale value of the assets reduced by the contractors cost to remove, classify, sort, load-out and ship such assets to point of sale or point of inventory. Obviously railroad contractors and brokers of railroad materials do not publish a list of wholesale prices for railroad materials and, in fact, there are very few lists of retail prices since most sales are made on a contract by contract basis with prices varying with factors such as the quantities purchased and the existing economic or market conditions. For the purpose of Study the estimator relies on data obtained by updating estimates from 20 railroad NLV Studies in the past and a library of estimates, actual costs and prices assembled from the following:

Name	Number	Data
Class I Railroads	4	NLV Studies, Prices, Cost Manuals, Cost estimates
Nationwide Railroad Contractors	2	Current Bids for Specific Railroad Projects
Nationwide Railroad Material Brokers	3	Limited retail price lists and verbal contact to update prices
Nationwide Railroad Engineering Consultants	2	Engineering estimates for western railroad construction projects
Nationwide Railroad Consultants	2	NLV Studies
Individual Railroad Officers who sell relay materials to brokers and purchase new materials	4	Retail Prices and Wholesale Prices

Table 11

Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction

Railroad costs manuals, contractors bids and engineering estimates are by nature confidential.

With but few exceptions, there is consistency between all of the data assembled from various sources. It should be remembered that NLV estimates are "order of magnitude" estimates since the railroad industry itself is a cyclical business in which ordinary maintenance and investment budgets vary with the economy thus influencing the demand and price for relay track materials.

The date of this Study is March 2004. The Wall Street Journal reports timber prices spiking at a high about $425 per MBM [Thousand Board Foot Measure]. Similarly, crude oil has increased from $36 per barrel to $44 per barrel. Also, in one month, cold rolled steel prices rose from $737 per ton to $750 per ton and those prices were below $400 per ton in 2003. All of these factors influenced the new, relay and scrap values of railroad materials. As Vice President of Purchasing in Southern Pacific in 1974, the estimator for this Study experienced the same rapid rise in prices for fuel, crossties and rail during the first oil embargo. That is why NLV Studies should be considered to be "order of magnitude" values but, at the same time, based on historic trends for prices of new, relay and scrap railroad materials.

4. Determining Cost to Replace the Santa Cruz Subdivision Railroad Assets with New Materials and Depreciating Them to Their Current Value

There are several approaches to determining the current value of assets:

Table 11

<u>Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction</u>

1. Going Concern Value (GCV);
2. Original Cost Less Depreciation (OCLD);
3. Comparable Sales (CS);
4. Replacement Cost New Less Depreciation (RCNLD) and a variant, Reproduction Cost New Less Depreciation; and
5. Value in Non-Rail Use (VNRU). (See California Department of Transportation "Transportation Practitioner Journal," 1990, Volume 57, #4.)

The SCCRTC's Scope of Work for this Study requested an estimate for the "in-place, depreciated value of the rail assets, were the private buyer intending to acquire and use them for alternative rail purposes."

The Scope of Work does not define which of several approaches to the Study that the estimator should use. The following is the process used in arriving at the method for –"in-place, depreciated value" called for in the Scope of Work.

- GCV - The determination of Going Concern Value has been assigned by the SCCRTC to other consultants.

- OCLD - The Original Cost Less Depreciation valuation is not practical, since those costs have been spread over 100 years of construction and replacement and even if they could be determined from railroad "ledger value" sheets, they would be meaningless. On 8/9/88, a Connecticut Commission rejected OCLD as not being a reliable indication of the

Table 11

Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction

current worth of a business entity, which supports our conclusion.

- RCNLD - Reproduction Cost New Less Depreciation is not practical since it is not possible to reproduce some existing railroad assets because the original materials and their prices are not available. For example, the 6-pile bent timber trestles built in 1928, would not be constructed "as-is" because it is obsolete and subject to fire hazards. See Appendix A, photo 12, and Table 10, CS 1618. The replacement structure in all probability would be precast, prestressed concrete caps and spans on "H"-beam steel piling. Similarly, the jointed 90 lb rail laid in 1914, with lengths of 33 ft and continuous 4-hole joint bars, are all obsolete and would be most closely replaced by 90 lb CWR with double shoulder tie plates.

- VNRU - The Value for Non-Rail Use has not been requested in this Scope of Work.

- RCNLD - Replacement Cost New Less Depreciation has been chosen by this estimator as the proper method of appraisal.

  Where existing assets are obsolete and materials are not available or prices unknown, the most logical materials with current prices will be used.

Table 11

Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction

- Book Depreciation is not meaningful in this Study since most railroad depreciation rates involve large quantities of assets of various ages, sizes, strengths and service requirements and thus, cannot be applied to a site-specific location such as the Santa Cruz Branch. Furthermore, in many cases, assets which are totally depreciated for book and/or tax purposes still are in service and have a meaningful value in terms of "useful life" for the service in which the assets is utilized. The estimated remaining life in terms of years is determined by asking the question "How many more years can this asset be maintained under acceptable (normalized) maintenance budgets?" The depreciated amount is obtained by dividing the estimated remaining life by the total estimated life of the asset. Some railroad assets such as certain types of steel bridges have existed for well over a hundred years and remain in service even with high speed passenger trains and heavy tonnage freight service.

  On the other hand, some rail and OTM installed almost 100 years ago can perform satisfactorily in limited conditions of train speed and tonnage but becomes instantly obsolete when subjected to higher freight train speeds or the imposition of passenger train service.

The SCCRTC Scope of Work for this Study does not provide a specific definition of "alternative rail purposes." That definition is important since the type of trains, train speeds and annual million gross tons of rail traffic over the line determines how long any asset can remain in service and, thus, determines the "remaining useful life."

Table 11

Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction

At present, the Union Pacific Railroad Company operates the Santa Cruz Subdivision under the provisions of FRA regulations 49 CFR, Part 213.4, Excepted Track as follows:

§ 213.4 **Excepted Track.**

A Track owner may designate a segment of track as excepted track that provided that –

(a) The segment is identified in the timetable, special instructions, general order, or other appropriate records which are available for inspection during regular business hours;

(b) The identified segment is not located within 30 feet of an adjacent track which can be subjected to simultaneous use at speeds in excess of 10 miles per hour;

(c) The identified segment is inspected in accordance with 213.233(c) and 213.235 at the frequency specified for Class 1 track;

(d) The identified segment of track is not located on a bridge including a track approaching the bridge for 100 feet on either side, or located on public street or highway, if railroad cars containing commodities required to be placarded by the Hazardous Materials Regulation (49 CFR part 172), are moved over the track; and

Table 11

Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction

(e) The railroad conducts operations on the identified segment under the following conditions:

(1) No train shall be operated at speeds in excess of 10 miles per hour;

(2) No occupied passenger train shall be operated;

(3) No freight train shall be operated that contains more than five cars required to be placarded by the Hazardous Materials Regulations (49 CFR part 172); and

(4) The gage on excepted track shall not be more than 4 feet 10 ¼ inches. **(This paragraph (e) (4) is applicable September 21, 1999.)**

(f) A track owner shall advise the appropriate FRA Regional Office at least 10 days prior to removal of a segment of track from excepted status.

The estimator has made the assumption that the "private buyer" would not acquire the Santa Cruz Subdivision to perpetuate the limited operating conditions prescribed by FRA Track Safety Standards Part 213.4, and, thus, the estimator has assumed two different levels of service requirements in determining the "remaining life" of the assets, namely Class 1 and 2 below:

Table 11

Sources for Quantities and Values of Railroad Assets in this Study and Costs of Removal, Costs for New Materials and New Construction

§ 213.9 Classes of track: operating speed limits.

(a) Except as provided in paragraph (b) of this section and §§ 213.57(b), 213.59(a), 213.113(a), and 213.137(b) and (c), the following maximum allowable operating speeds apply –

[In Miles per Hour]

Over track that meets all of the requirements prescribed in this part for—	The maximum allowable operating speed for freight trains is—	The maximum allowable operating speed for the passenger trains is—
Excepted track........	10	N/A
Class 1 track..........	10	15
Class 2 track..........	25	30
Class 3 track..........	40	60
Class 4 track..........	60	80
Class 5 track..........	80	90

Table 10

A Sample of Southern Pacific's Standard Drawings

The Santa Cruz Subdivision was constructed to Southern Pacific Railroad Company's standards known as Common Standard Drawings. There are over 500 such Drawings from which estimates of quantities and weights of materials are derived for both the NLV and RCNLD Studies.

Attached is a sample of Common Standard Drawings and below is a description of how they are used in the Study.

CS 513 Standard Roadbed and Ballast for Branch Lines. This standard is used for calculating yardages of ballast and for determining the amount of grading required for cuts and fills of various heights used in the RCN Study and used in estimating the physical depreciation of the existing roadbed.

CS 1902 Standards for the size and spacing of crossties used in all parts of the Study.

CS 1913 Application of rail anchors to continuous welded rail used in determining the quantity of rail anchors per track mile for CWR.

CS 717 Description of a 4-hole, 28 inch long, joint bar for 115 lb rail.

CS 419 Description of an 11 inch long, single shoulder tie plate for 90 lb rail. This particular tie plate was adapted in 1926, whereas the Santa Cruz 90 lb rail was laid in the 1915 era with tie plates slightly smaller.

CS 631 Standard 14" tie plate for 6" base rail which are 131 lb, 132 lb, 133 lb, and 136 lb rail, some of which are found on the Santa Cruz Subdivision.

CS 690 Describes the 5/8" x 6" long track spike. Different spiking patterns are used under differing degrees of curvature as well as policies regarding the use of "hold down" spikes. Spiking patterns were noted in the field inspection. Appendix A, photo 5, shows two line spikes per tie plate and photo 8 shows 2 inside line spikes, 1 outside line spike.

Table 10

A Sample of Southern Pacific's Standard Drawings

CS 723 Details of 90 lb, 24 inch, 4-hole joint bars adapted in 1922 and revised in 1933. The 1915 era 90 lb joint bars on the Santa Cruz Subdivision are the old fashioned "continuous type" joint bar which does not provide the same strength as the "long toed" joint bar shown in this standard.

CS 1600 Details of a 6 pile bent, ballast deck, timber trestle such as shown in photo 12, Appendix A of this Study.

CS 1618 Details of a 5 pile bent, open deck timber trestle with frame bents.

CS 1626 Details of timber trestle framing and bracing similar to that shown in photo 12, Appendix A of the Study. Notice the longitudinal girts and transverse cross bracing in the photo.

CS 1016 Details of a 113 lb, 16 ft, 6 inch, switch section which is a typical example for the #9 and #10 turnouts on the Santa Cruz Subdivision.

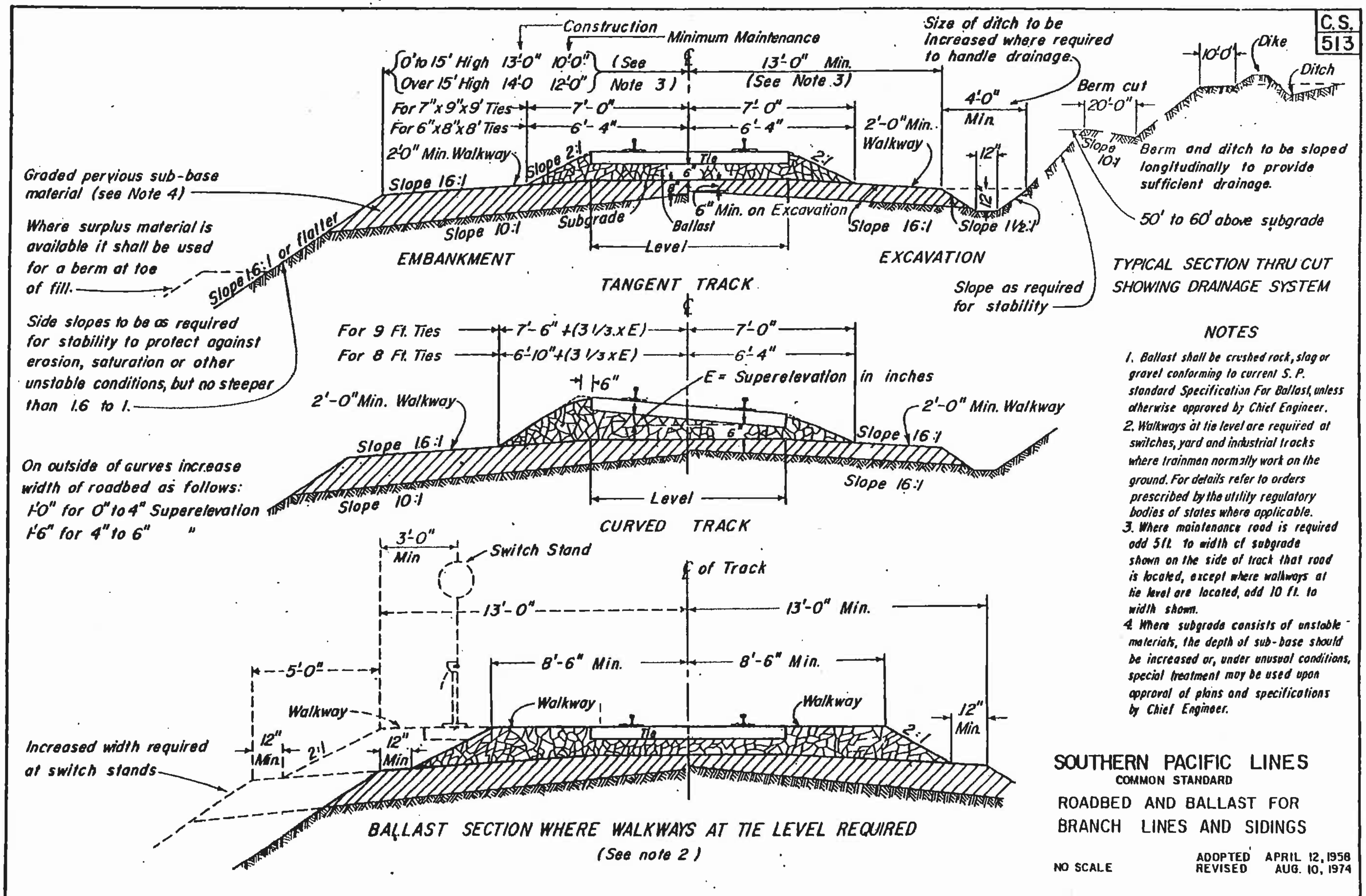
CS 1180 Switch tie lists providing details of the number of length of switch ties for various numbered turnouts.

CS 1153 A Switch Layout for a No. 10, railbound manganese frog and 16'-6" switch points which is typical of the turnouts on the Santa Cruz Subdivision.

CS 842 Design of a Self Guarded Frogs, several of which are on the Santa Cruz Subdivision.

CS 835 Design of a No. 10 rail bound frog, typical of main track frogs on the Santa Cruz Subdivision.

CS 1080 High and Low Switch Stands. All turnouts on the Santa Cruz Subdivision main track have "High Switch Stands."



NOTES

1. Ballast shall be crushed rock, slag or gravel conforming to current S. P. standard Specification For Ballast, unless otherwise approved by Chief Engineer.
2. Walkways at tie level are required at switches, yard and industrial tracks where trainmen normally work on the ground. For details refer to orders prescribed by the utility regulatory bodies of states where applicable.
3. Where maintenance road is required add 5 ft. to width of subgrade shown on the side of track that road is located, except where walkways at tie level are located, add 10 ft. to width shown.
4. Where subgrade consists of unstable materials, the depth of sub-base should be increased or, under unusual conditions, special treatment may be used upon approval of plans and specifications by Chief Engineer.

SOUTHERN PACIFIC LINES
COMMON STANDARD

ROADBED AND BALLAST FOR BRANCH LINES AND SIDINGS

NO SCALE

ADOPTED APRIL 12, 1958
REVISED AUG. 10, 1974

SIZE AND NUMBER OF TIES

To be as follows, unless otherwise authorized :

CROSS TIES	SIZE OF TIE	NUMBER PER RAIL LENGTH (See Note B)
MAIN TRACKS		
Primary Main	7" x 9" x 9'	24 per 39'
Secondary Main and Branch Main (Heavy Traffic)	7" x 9" x 9'	18 per 33'
Branch Main (Light Traffic) Creosoted fir, spruce, pine, gum and oak	6" x 8" x 8'	18 per 33'
SIDING, YARD AND OTHER TRACKS		
Heavy traffic main line sidings, and important terminal, drill and switching tracks	7" x 9" x 8'	18 per 33'
Spur tracks laid with continuous welded rail	7" x 9" x 9'	18 per 33'
Other sidings, yards etc. Creosoted fir, spruce, pine, gum and oak	6" x 8" x 8'	16 per 33' (See Note A)

SWITCH TIES

In turnouts all switch ties to be 7" x 9" unless plans show otherwise. Size, length and spacing to be in accordance with standard plans.

SPACING OF TIES

JOINT TIES

1. Unless otherwise authorized, joint ties to be so spaced that the center of space between ties will coincide with the center of the joint bars.

2. With line-spiked bars, joint ties to be spaced as follows:

(a) Primary main line - 19-1/2" on centers where 26" or longer bars are installed; 18" on centers where 24" bars are installed.

(b) All other classes of track - 18" on centers where 24" bars are installed. Where bars longer than 24" are installed, joint ties to be so spaced that outer edge of ties are even with ends of bars.

3. With slot-spiked bars, joint ties to be so spaced that there will be not less than 2" from center of spike to edge of tie.

INTERMEDIATE TIES

4. Intermediate ties to be uniformly spaced to conform as nearly as practicable to the authorized spacing for the class of track in which they are installed. (See C. S. 1900)

NOTES:

A. Use 18 ties per 33' rail length on curves of 4 degrees or over and under lighter than 75# rail on other sidings, yards, etc.

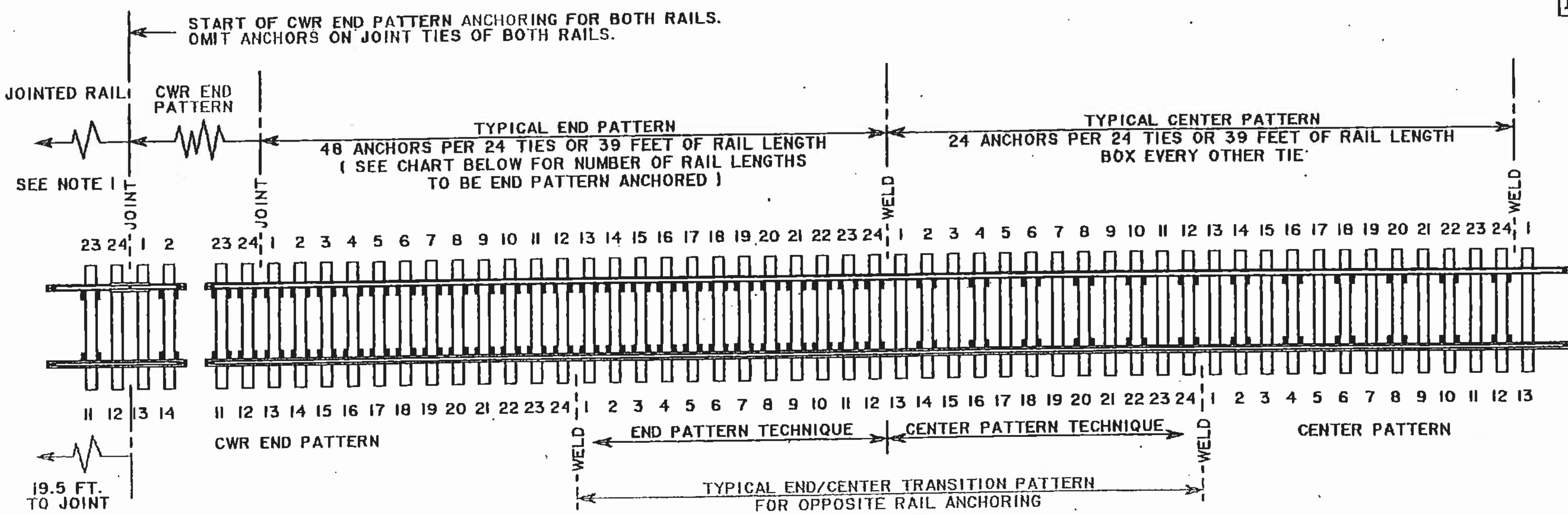
B. Number of ties for shorter or longer lengths of rail should be in proportion to number indicated in accordance with classification of track.

NUMBER OF TIES PER MILE

24 per 39' rail - 3250 per mile
18 per 33' rail - 2880 per mile
16 per 33' rail - 2560 per mile

SOUTHERN PACIFIC LINES
COMMON STANDARD
SIZE AND SPACING OF TIES

ADOPTED NOV. 15, 1937
REVISED OCT. 20, 1973



NOTES:

1. FOR JOINTED OR 78 FT. WELDED RAIL, CONNECTING TO CONTINUOUS WELDED RAIL, APPLY CWR END PATTERN ANCHORING CONCEPT FOR THREE 39 FT. RAIL LENGTHS OR THE EQUIVALENT LENGTH OF 72 TIES WHERE THERE ARE FEWER THAN 24 TIES PER 39 FT. OF RAIL LENGTH. OMIT ANCHORS ON JOINT TIES BOTH RAILS.

2. REFER TO CHIEF ENGINEER'S INSTRUCTIONS SECTION 2: 2.1.16, 2.3.8, 2.4.40(e), 2.5.2, 2.8.3, 2.8.6, 2.8.7, 2.8.8, 2.8.14, and 2.9.

CONTINUOUS WELDED RAIL	END PATTERN ANCHORING REQUIRED AT EACH END OF CWR	
NUMBER OF 39 FT. RAILS IN STRING	NUMBER OF 39 FT. RAIL LENGTHS AT EACH END TO HAVE 48 ANCHORS PER RAIL LENGTH	WHERE THERE ARE FEWER THAN 24 TIES PER 39 FT. OF RAIL LENGTH THE FOLLLOWING NUMBER OF TIES WILL BE USED AS EQUIVALENT LENGTH
OVER 40	10	240
32 TO 39	6	144
26 TO 31	5	120
20 TO 25	4	96
14 TO 19	3	72
8 TO 13	2	48
5 TO 7	1	24

3. WHERE ANCHORING PATTERN TRANSITION OCCURS FOR OPPOSITE RAIL, CAREFUL DEPLOYMENT OF TRANSITION PATTERN TECHNIQUES MUST BE OBSERVED SO AS TO AVOID ANY TORQUE EFFECT CONDITIONS.

4. FOR 78 FT. WELDED RAIL, APPLICATION OF ANCHORS SHALL BE IN ACCORDANCE WITH DRAWING C.S. 1908.

5. FOR JOINTED RAIL, APPLICATION OF ANCHORS SHALL BE IN ACCORDANCE WITH DRAWING C.S. 1909.

6. INSTALL 48 ANCHORS PER EACH 24 TIES FOR 300 FT. AHEAD OF AND BEHIND SWITCH ON MAIN TRACK AND TO THE CLEARANCE POINT OF TURNOUT FOR ALL SWITCHES IN SIGNAL TERRITORY.

7. INSTALL 48 ANCHORS PER EACH 24 TIES FOR 300 FT. ON EACH SIDE OF HOT BOX DETECTORS.

SOUTHERN PACIFIC LINES
COMMON STANDARD

APPLICATION OF RAIL ANCHORS TO CONTINUOUS WELDED RAIL

NO SCALE

ADOPTED MAY. 1, 1968
REVISED JAN. 10, 1991

EN.C.STANDARD.CS1913

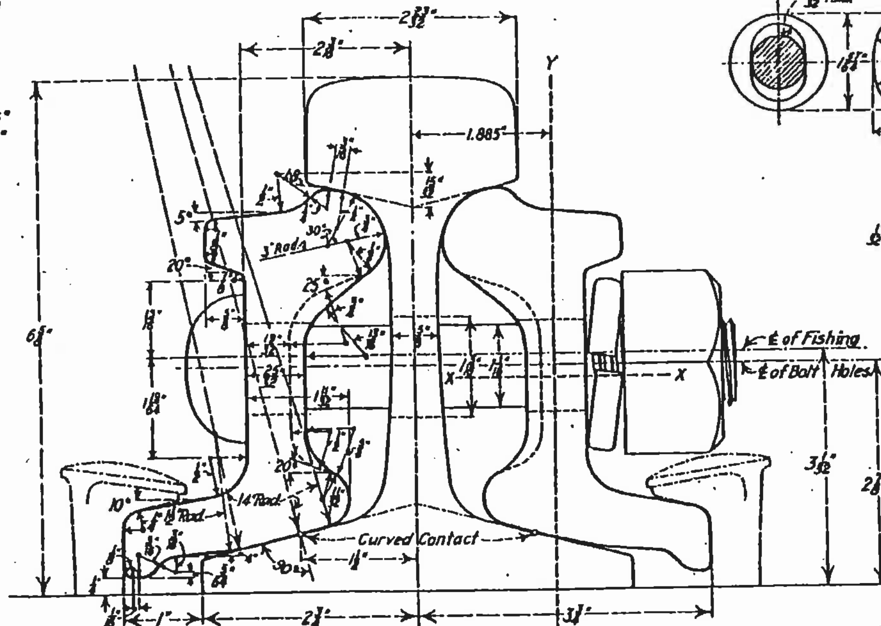
C.S. 717

PROPERTIES: ONE BAR		Max. Section	Min. Section
Area, sq. ins.		6.52	6.05
Mom. of Inertia	I_Y		3.14
	I_X	15.11	14.92
Section Mod.	Top	6.30	6.20
	Bottom	5.97	5.91
Distance from Neut. Axis to	Top	2.40"	2.405"
	Bottom	2.53"	2.525"
Weight per inch		1.78#	

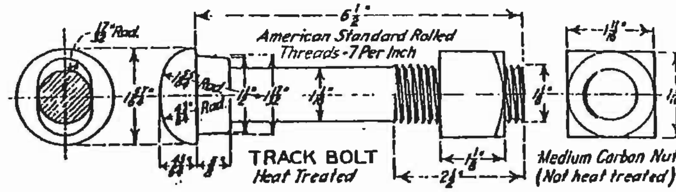
PROPERTIES: TWO BARS

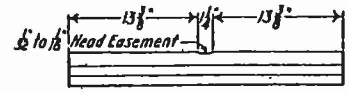
Mom. of Inertia about vertical Axis of Rail 49.28

Weight per 28" Joint .... 99.72#

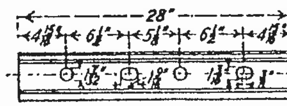


RAIL AND JOINT

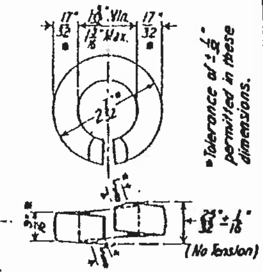




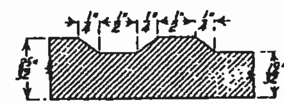
TOP VIEW



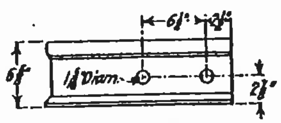
OUTSIDE ELEVATION OF BAR



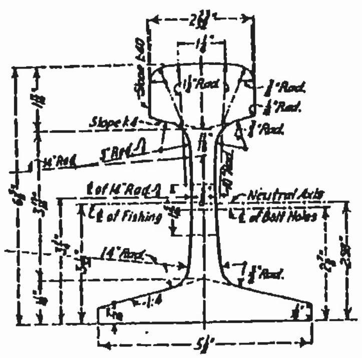
SPRING WASHER


LONGITUDINAL SECTION OF WEB

NOTE: Spring Washers shall comply with the A.R.E.A. Specifications of 1948 except that in Section 302 Subdivision (a) reactive spring pressure shall be 7000# after platens are released .036 inches.



RAIL DRILLING



115 LB.R.E. SECTION

PROPERTIES OF RAIL SECTION

Area of Rail Section	11.25 □"
Weight per yard	114.75 lb.
Area of Head	34.8 %
" " Web	27.1 %
" " Base	38.1 %
Moment of Inertia	65.6
Neutral axis above center line of bolt holes	0.10"

Specifications for O.H. Steel Rails	A.R.E.A. Latest Revision
" " Angle Bars (Quenched)	A.R.E.A. Latest Revision
" " Bolts and Nuts	C.S. 1003-A, Class "B"

TABLE OF QUANTITIES

Item	Size	Wt. each	Per Mile of Track		Per 1000 Net Tons of Rail	
			Number	Net Tons	Number	Net Tons
Rails	39'	1491.75 lb.	270	201.96	1341	1000
Angle Bars	28"	49.86 "	540	13.46	2682	66.86
Bolts & Nuts	1 1/16"	2.62 "	1080	1.41	5364	7.03
Sprg. Washers	1 1/8"		1080		5364	

Note: Figures given are exact quantities considering all rails 39 feet long. In estimating fittings, add 5% to above amounts for short rails and turnouts.

SOUTHERN PACIFIC LINES
COMMON STANDARD
R.E. SECTION

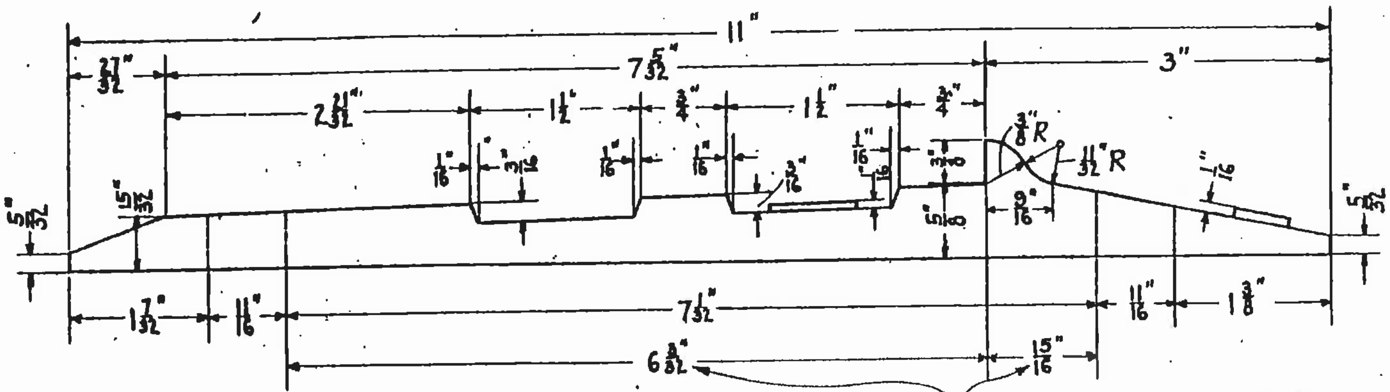
115 LB. STEEL RAIL AND JOINT

28 IN. ANGLE BAR-HEAT TREATED

NO SCALE

ADOPTED: OCT. 10, 1950
REVISED: JUNE 22, 1955

C.S. 419



SECTION

Note: These dimensions to control punching of Plate, regardless of over run of Plate as furnished by Mills.

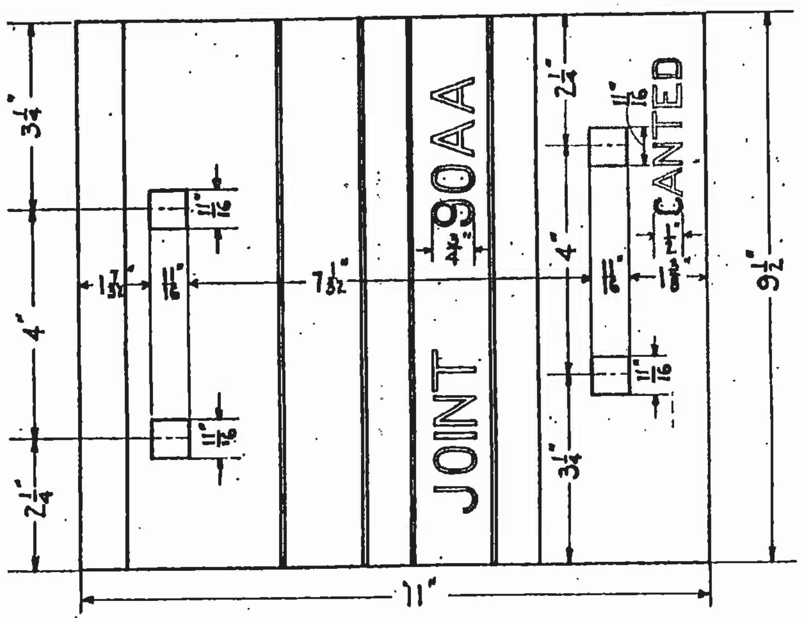


TABLE OF QUANTITIES				
Per mile of track			Per 1000 Gross tons of rail	
Number	Wt. each	Net tons	Number	Net tons
540	13.3 lbs	3.59	3830	25.47

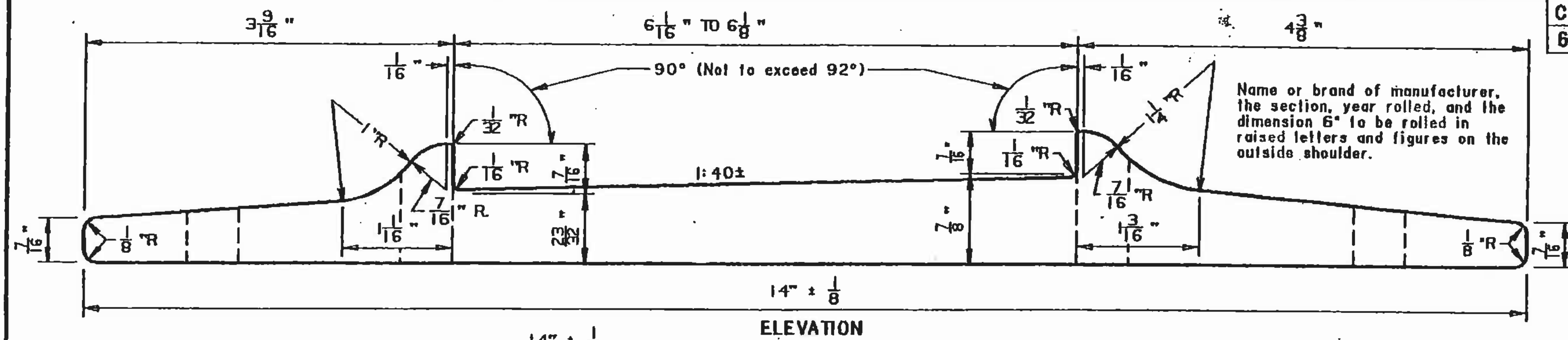
Note: Quantities based on 39 foot rails, 2 plates per joint.

"JOINT," "90AA" and "CANTED" to be rolled on each plate.

SOUTHERN PACIFIC LINES
COMMON STANDARD
$9\frac{1}{2}$" × 11" JOINT TIE PLATE
FOR LINE SPIKING
90 LB. A.R.A. SERIES A RAIL

NO SCALE ADOPTED DEC. 16, 1926

C.S. 631



Name or brand of manufacturer, the section, year rolled, and the dimension 6" to be rolled in raised letters and figures on the outside shoulder.

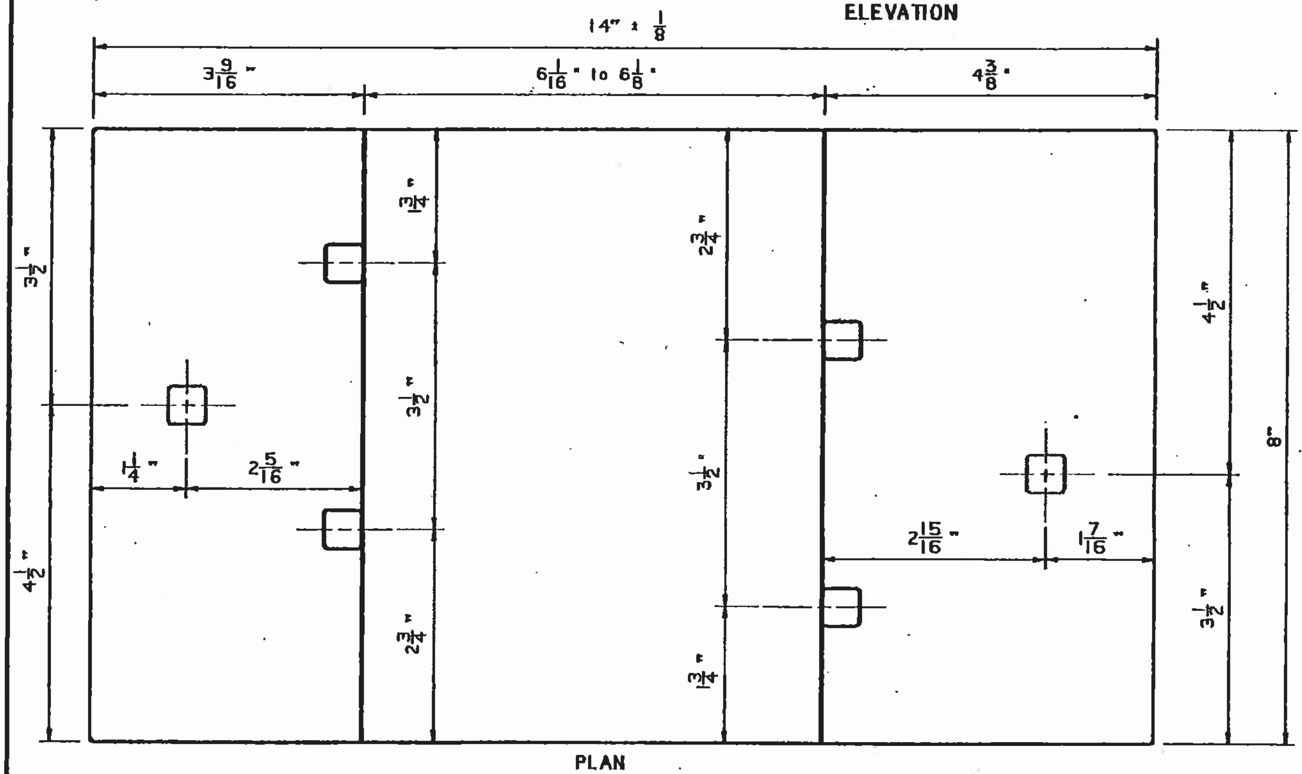


TABLE OF QUANTITIES	
Per Mile of Track	
Number required	6500
Weight each	22.3 lb.
Net tons	72
Quantities based on 24 ties per 39 ft. rail, 3250 ties per mile.	

Notes:
All holes 3/4" square with 1/16" fillets at corners.
Inside of shoulder holes to be in line with shoulders at the bottom of the plate.
Size and location of holes may be varied when authorized by Chief Engineer.

SOUTHERN PACIFIC LINES
COMMON STANDARD

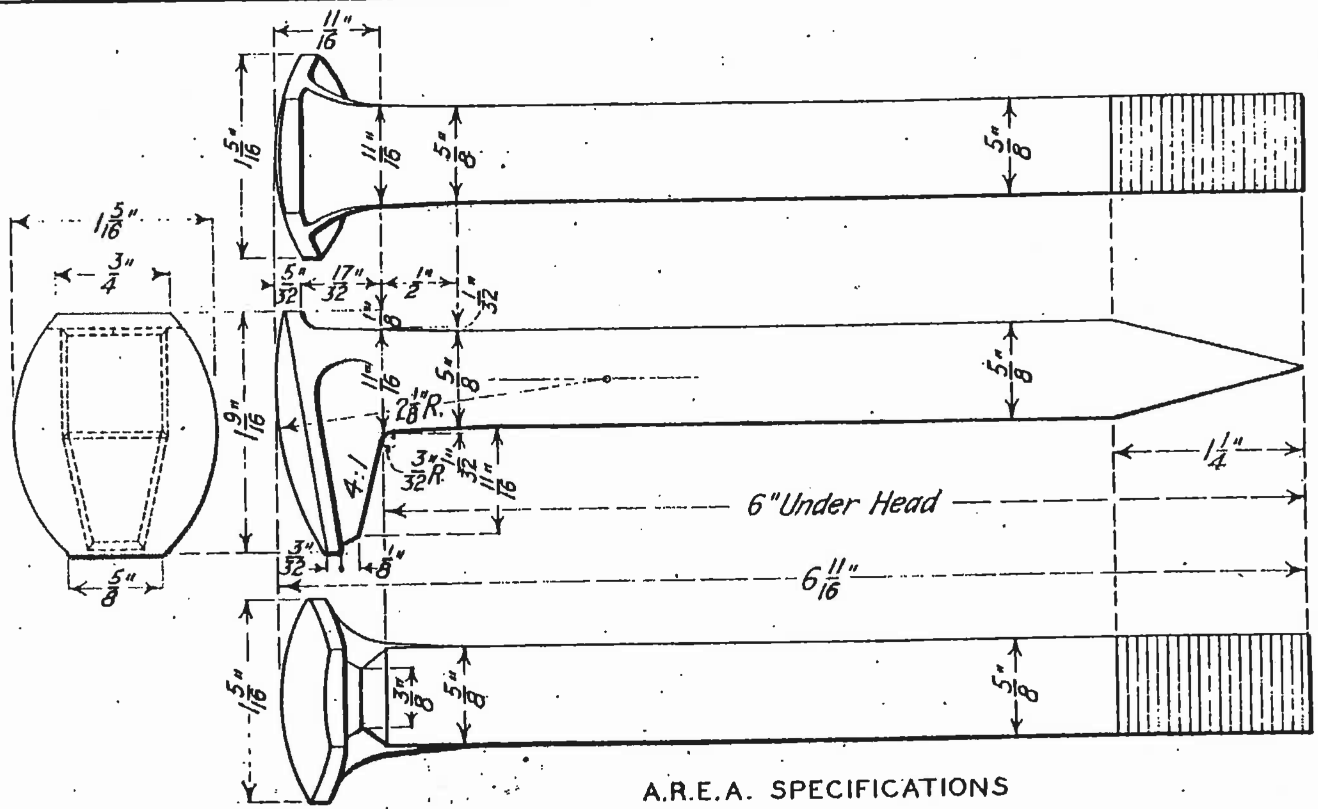
8" X 14" TIE PLATE

FOR 136, 133, 132 & 131 LB. RAIL

NO SCALE ADOPTED DEC. 20, 1990

EN.C.STANDARD.CS631

C.S. 690



A.R.E.A. SPECIFICATIONS

TABLE OF QUANTITIES												
Required per Mile of Track			Required per 1000 Gross Tons of Rail									
			Number of Spikes					Number of Kegs				
Weight Each	№ of Spikes	№ of Kegs	90# Rail	110# Rail	112# Rail	130# Rail	131# Rail	90# Rail	110# Rail	112# Rail	130# Rail	131# Rail
0.85 lb.	13000	55.3	91919	74962	73666	63862	63267	391.1	319.0	313.5	271.8	269.2

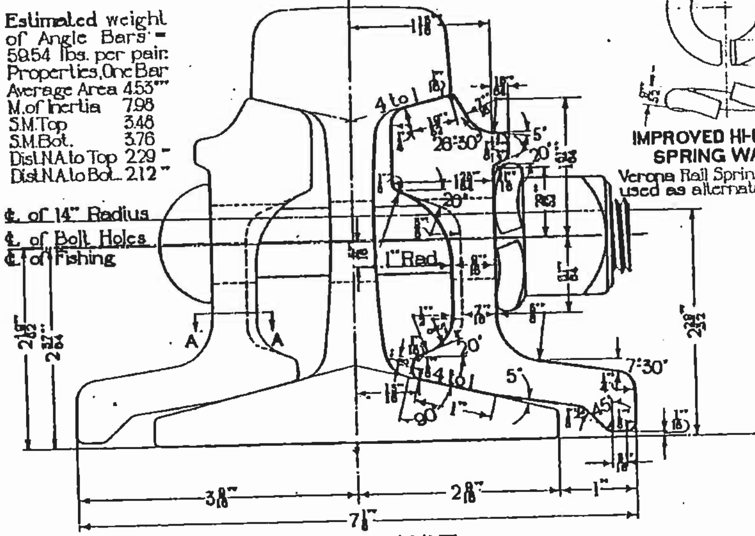
Notes: Quantities are based on 235 spikes per keg of 200 lb. net weight, 3250 ties to the mile and 4 spikes to the tie.
Figures are for exact quantities; a percentage should be added for additional spiking on curves, switches, etc.

SOUTHERN PACIFIC LINES
COMMON STANDARD
5/8" TRACK SPIKE
WITH REINFORCED THROAT
NO SCALE ADOPTED MAR. 18, 1938

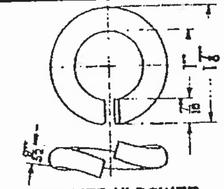
C.S. 723

Note:-Holes in angle bars to be punched alternately round and oval.

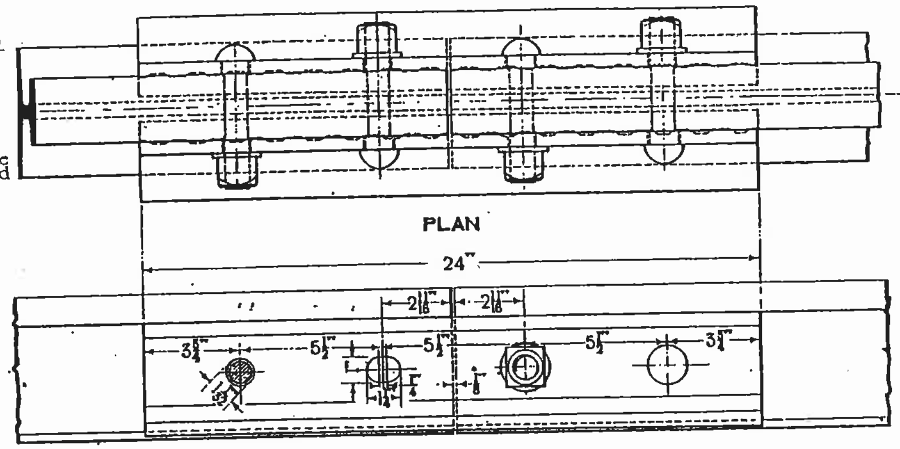
Estimated weight of Angle Bars = 59.54 lbs. per pair.
Properties, One Bar
Average Area 4.53□"
M. of Inertia 7.98
S.M. Top 3.48
S.M. Bot. 3.76
Dist. N.A. to Top 2.29"
Dist. N.A. to Bot. 2.12"



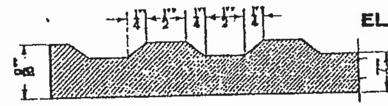
RAIL AND JOINT



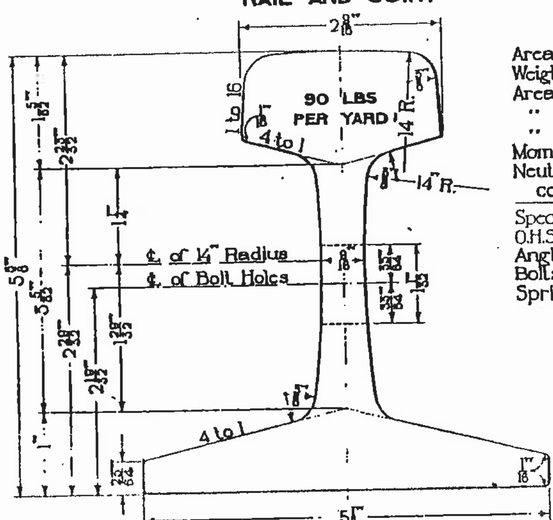
IMPROVED HI-POWER SPRING WASHER
Verona Rail Springs may be used as alternate standard



ELEVATION



SECTION A-A



Area of section 8.82□"
Weight per yard 90.00 lbs
Area: Head 36.20 %
" Web 24.00 %
" Base 39.80 %
Moment of Inertia 38.70
Neutral axis below center line of bolt holes .05375"

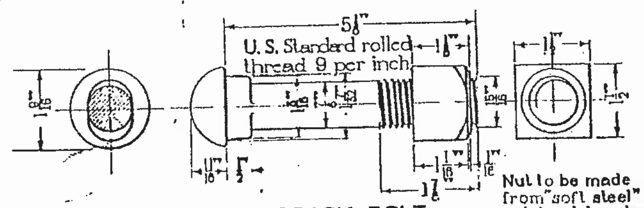
Specifications for:

O.H. Steel Rail.	A.R.E.A.,	1925
Angle Bars	C. S. 1002-A	
Bolts and Nuts	C. S. 1003-A, Class B	
Spring Washers	C. S. 1008-A	

TABLE OF QUANTITIES

Item	Size	Wt. each	Per mile of track		Per 1000 Gross Tons of rail	
			Number	Tons	Number	Tons
Rails	39'	1170.0 lbs.	270	141.4 Gr	1915	1000. Gross
Angle Bars	24"	29.77 "	540	8.04 Net	3830	57.01 Net
Bolts & Nuts	7/8"	1.62 "	1080	0.87 "	7660	6.20 "
Spg. W'sh's	15/16"	0.125 "	1080	0.07 "	7660	0.42 "

Note: Figures given are exact quantities considering all rails 39 ft. long. In estimating fittings, add 5% to above amounts for short rails and turnouts.



Nut to be made from "soft steel" not heat treated.

TRACK BOLT
High Carbon, Heat Treated

SOUTHERN PACIFIC LINES
COMMON STANDARD
A. R. A. SECTION-SERIES A

90 LB. STEEL RAIL AND JOINT

24" ANGLE BAR—HEAT TREATED

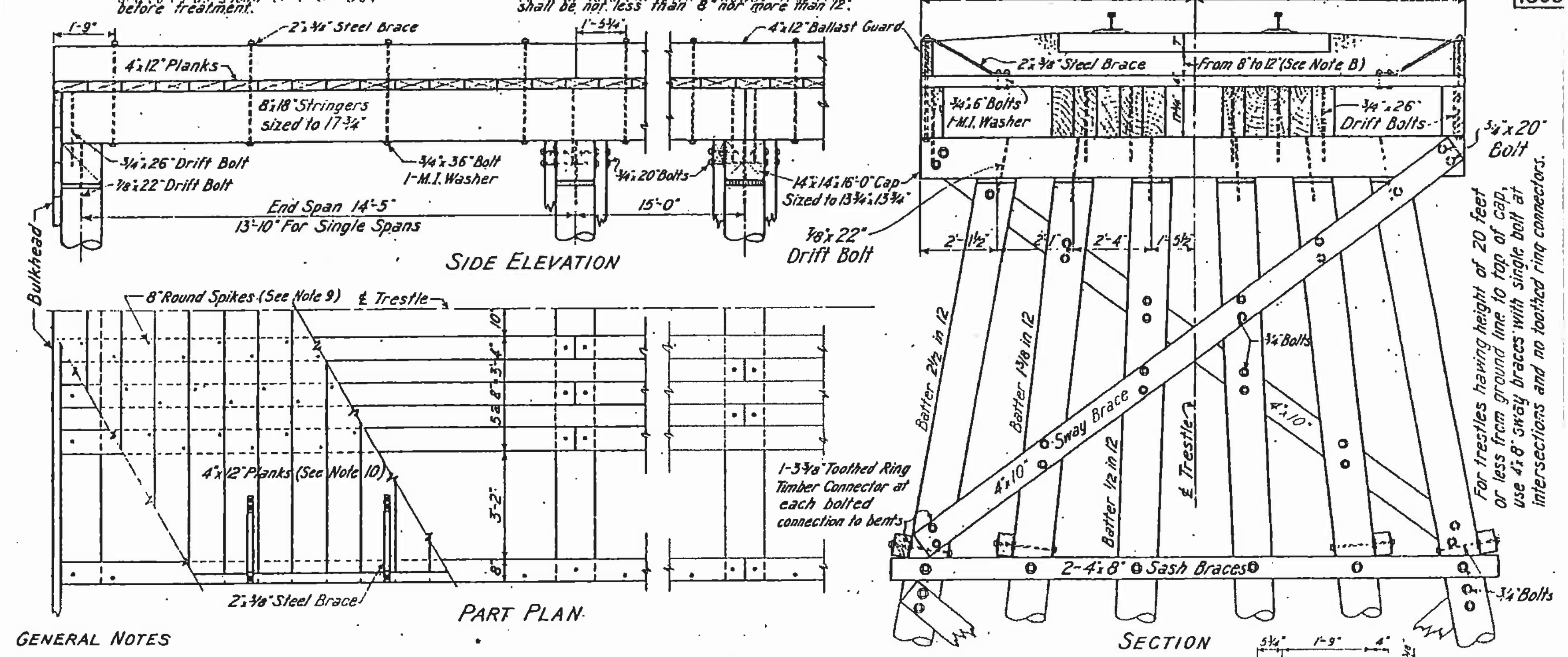
NO SCALE

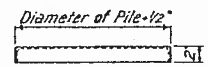
ADOPTED MAY 24, 1922
REVISED AUG. 16, 1933

C.S. 1600

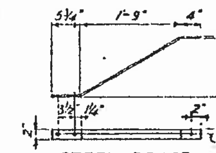
Note A—Creosoted material shall be framed and bored as shown on C.S. 1607 before treatment.

Note B—Depth of ballast below bottom of tie shall conform to depth below roadway ties but shall be not less than 8" nor more than 12".





PILE COVER
22 Gage Galv. Iron



STEEL BRACE
2"x⅜"x2'-10" Plate
8 per panel Req'd.

GENERAL NOTES

1. All bolts shown are machine bolts with square nuts and two malleable iron washers each, except as noted.
2. Holes for machine bolts shall be bored the same diameter as the nominal size of the bolt, except that when galvanized hardware is used, diameter of bored holes shall be 1/16" larger than the nominal size of the bolt.
3. Holes for drift bolts shall be bored the same diameter as the nominal size of drift bolt and to a depth 2 inches less than the length of drift bolt.
4. Galvanized hardware may be used in seacoast territory and at other locations where protection against corrosion is required.
5. After nuts have been tightened, bolts through ballast guard to be cut off and burred. Other bolts to have threads checked when tight.
6. Fillers to be used between transverse bracing and piles where necessary.
7. Trestles two or more spans long on curves shall have bents placed radially and so spaced that stringers 29'-11½" long may be used on outside of curve.
8. All timber to be creosoted.
9. Each floor plank shall be spiked to alternate stringers with one round spike. Spikes to be alternated from side to side of both floor planks and stringers, as indicated.
10. Random width floor planks not less than 8" nor more than 12" wide may be substituted for the 12" planks shown.
11. Stringers in chords shall be packed tightly together.
12. For details of handrail see C.S. 1629.
13. For details of ballast guards on approaches to trestles see C.S. 1660 and C.S. 1661.

TREATMENT OF PILE HEADS AT CUT-OFF

After piles have been sawn off, tops of piles to receive three coats of hot Creosote and one coat of hot Grade A Asphalt, and then to have metal Pile Covers applied.

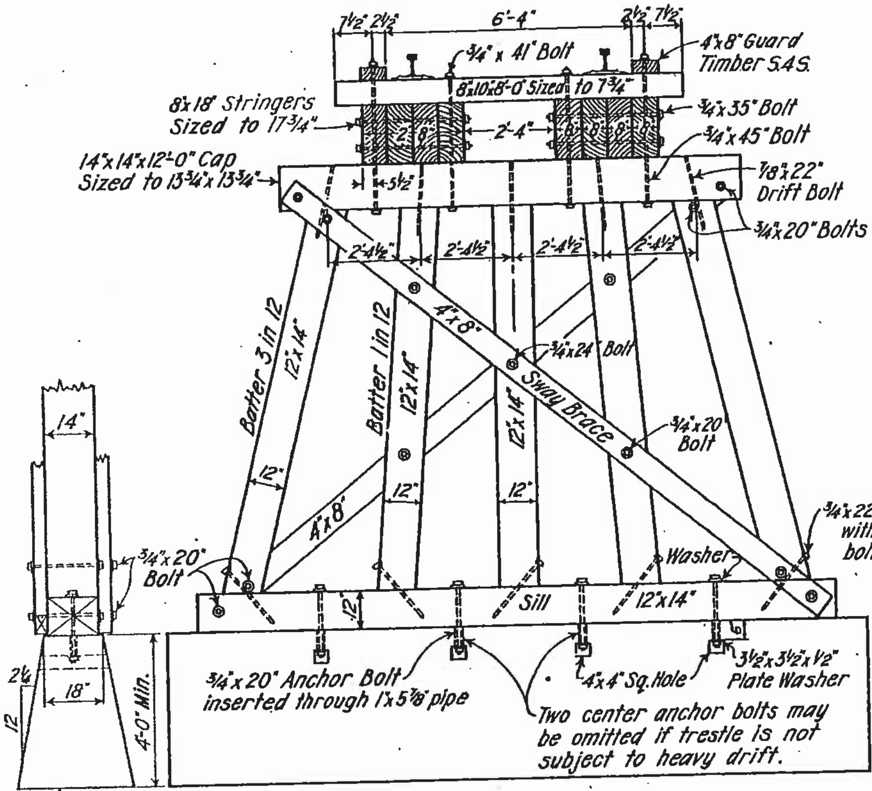
SOUTHERN PACIFIC LINES
COMMON STANDARD

BALLASTED DECK PILE TRESTLE
SINGLE TRACK, SIX-PILE BENTS
FIVE-STRINGER CREOSOTED PACKED CHORDS

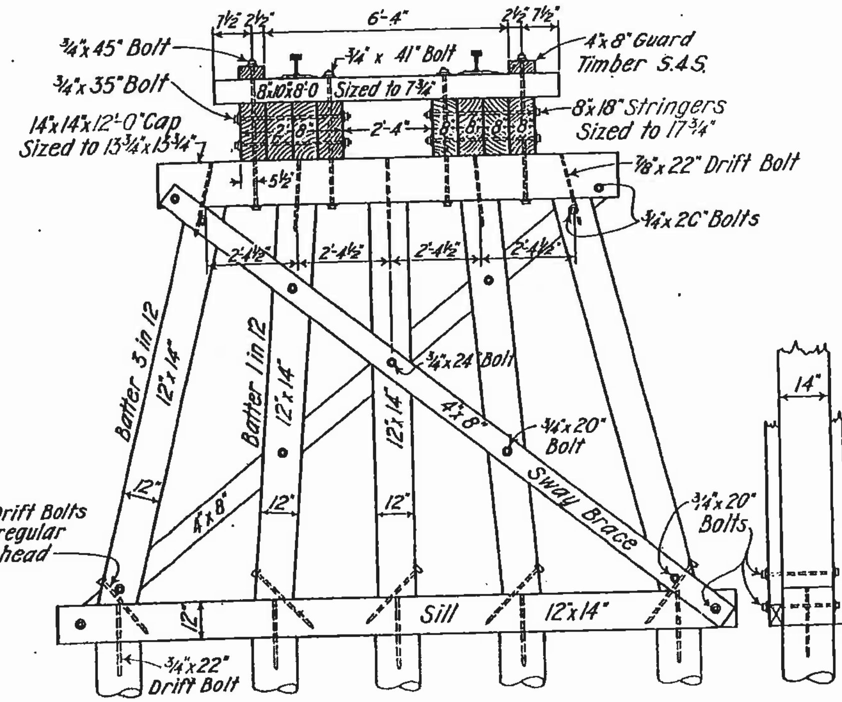
NO SCALE

ADOPTED MAY 19, 1937
REVISED JUNE 16, 1938

C.S. 1618
Formerly C.S. 317



ELEVATION OF FRAME BENT ON CONCRETE FOOTING



ELEVATION OF FRAME BENT ON PILES

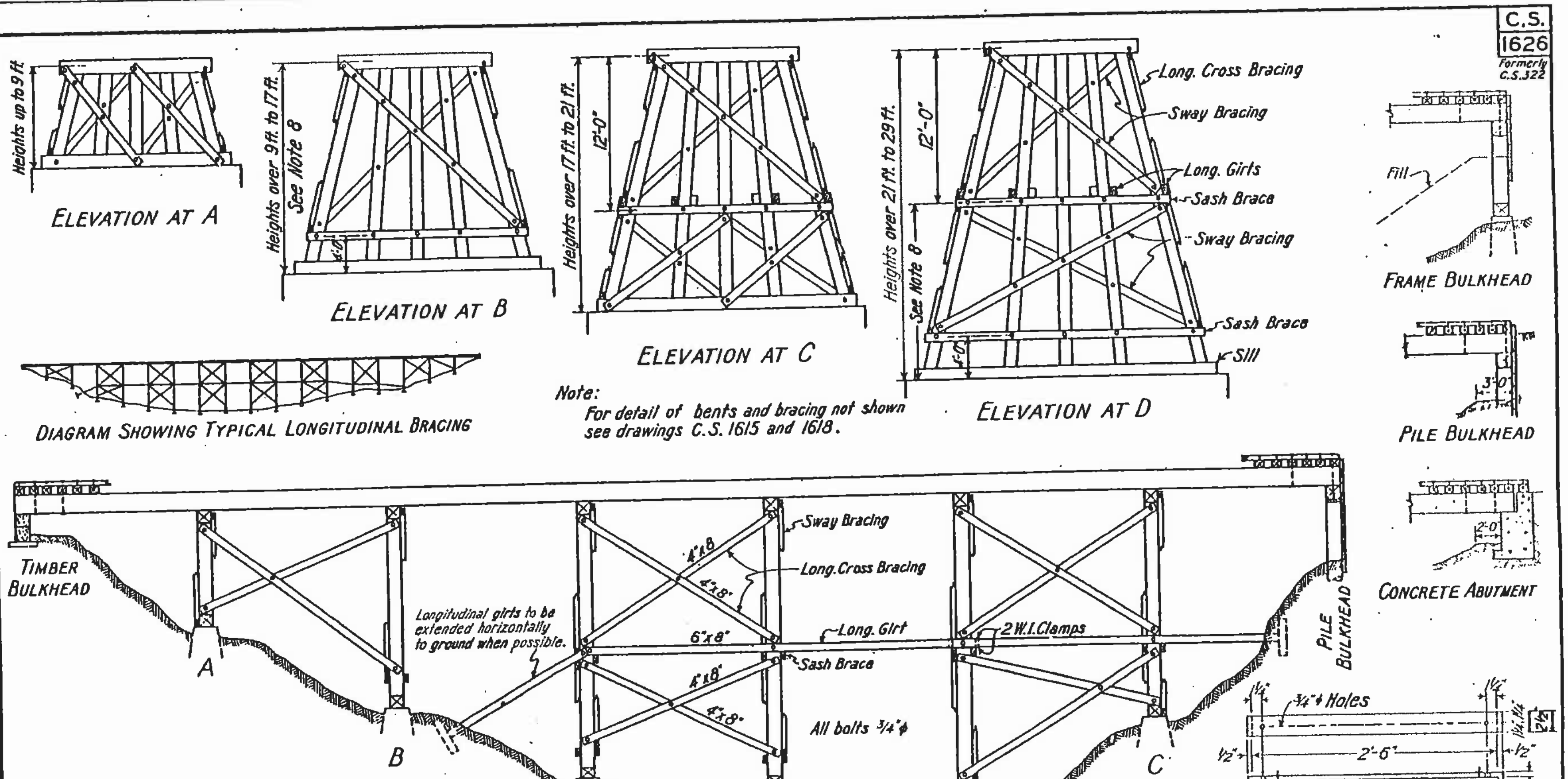
Earth pressure on footing as shown is 3500 lbs. per sq. ft. Width of footing must be increased proportionally if allowable earth pressure is less than 3500 lbs. per sq. ft.

Notes: For details of deck see C.S. 1622.
For general notes and details see C.S. 1610.
For typical bracing of frame trestles see C.S. 1626.

SOUTHERN PACIFIC LINES
COMMON STANDARD
OPEN DECK FRAME TRESTLE

NO SCALE

ADOPTED JAN. 26, 1910
REVISED JULY 1, 1969



Notes:

1. Frame trestles shall have transverse and longitudinal bracing for all heights.
2. Longitudinal cross bracing to be used in every second panel.
3. Longitudinal girts to be used on all bents more than one story in height.
4. Longitudinal girts shall be carried to solid ground at each end.
5. For heights greater than shown, or where necessary to omit longitudinal bracing because of drift, detail drawing is to be obtained from Office of Chief Engineer.
6. Piles of uniform size may be substituted for framed timber posts.
7. Timber sill on piles (per C.S. 1615 or C.S. 1618) may be used instead of concrete footing if conditions warrant.
8. Omit sash braces and extend sway braces to sill (per C.S. 1618) for heights less than 16 feet.

SOUTHERN PACIFIC LINES
COMMON STANDARD

TYPICAL BRACING FOR OPEN DECK FRAME TRESTLES

NO SCALE

ADOPTED: JAN. 26, 1916
REVISED: APR. 22, 1958

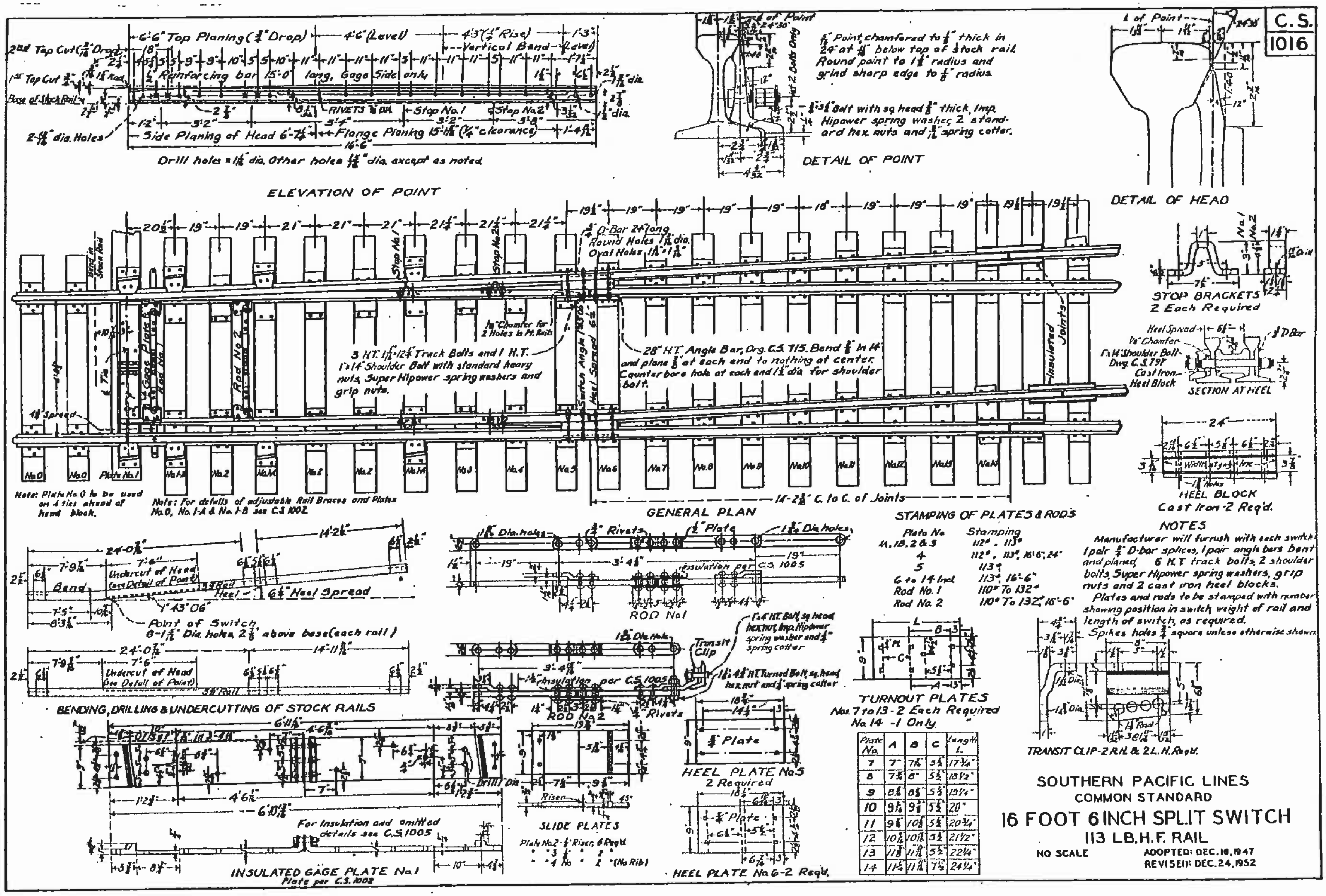


Plate No.	A	B	C	Length L
7	7"	7[illegible]	5 1/2"	17 1/4"
8	7[illegible]	8"	5 1/2"	18 1/2"
9	8[illegible]	8[illegible]	5 1/2"	19 1/4"
10	9[illegible]	9[illegible]	5 1/2"	20"
11	9[illegible]	10[illegible]	5 1/2"	20 3/4"
12	10[illegible]	10[illegible]	5 1/2"	21 1/2"
13	11[illegible]	11[illegible]	5 1/2"	22 1/4"
14	11[illegible]	11[illegible]	7 1/2"	24 1/4"

CS 1180

		7	9	10-A		10-B	14	16	20-A	20-B
LIST NUMBER		7	9	10-A		10-B	14	16	20-A	20-B
FROG NUMBER		7	9	10		10	14	16	20	20
LENGTH OF SWITCH		16'-6"	16'-6"	16'-6"		16'-6"	24'-0"	30'-0"	30'-0"	39'-0"
TYPE OF FROG (See Note 4)		SG	SG	SG	SR RBM	SR RBM	RBM	RBM	RBM	RBM
WEIGHT OF RAIL		90 119 136	90 119 136	90 119 136	90	119 136	119 136	119 136	119 136	119 136
LENGTH OF TIES	9'-0"	15	13	15		20	30	25	35	27
	10'-0"	8	12	10		10	13	31	20	26
	11'-0"	5	7	8		8	11	12	17	17
	12'-0"	5	6	6		6	9	9	12	16
	13'-0"	5	5	7		7-8"x10"	8-8"x10"	13-8"x10"	12-8"x10"	14-8"x10"
	14'-0"	5	5	6		6-8"x10"	9-8"x10"	11-8"x10"	12-8"x10"	12-8"x10"
	15'-0"	4	5	6		6	8	9	12	12
	16'-0"	4	4	5		5	8	9	10	18
	17'-0"	–	–	–		–	8	11	–	–
TOTAL NUMBER OF TIES		51	57	63		68	104	130	130	142
F.B.M.	7"x9" TIES	3092	3465	3885		3202	5318	6515	6227	7087
	8"x10" TIES	–	–	–		1167	1533	2153	2160	2334

NOTES:

1. FOR TURNOUT DATA SEE C.S. 1101, C.S. 1102, C.S. 1103 and C.S. 1105
2. 1-8"x12"x16'0" HEAD BLOCK (128 F.B.M.) REQUIRED WITH EACH SET OF SWITCH TIES FOR HAND-THROW SWITCHES.
3. ALL SWITCH TIES ARE 7"x9", EXCEPT WHERE 8"x10" ARE SHOWN. 8"x10" TIES TO BE USED ON MAIN LINE SWITCHES ONLY.
4. SG-(SELF GUARDED), RBM-(RAIL BOUND MANGANESE), SR-(SPRING RAIL)

SOUTHERN PACIFIC LINES

COMMON STANDARD

SWITCH TIE LISTS

NO SCALE

ADOPTED APRIL 22, 1948
REVISED JUNE 1, 1985

C.S. 1153

LIST. No. 10-D

LIST OF SWITCH TIES SHOWING LENGTHS	
PRIMARY MAIN LINE SIZE 7"x 9"	
NUMBER OF TIES	LENGTH OF TIES
17	9'-0"
10	10'-0"
8	11'-0"
6	12'-0"
7	13'-0"
6	14'-0"
6	15'-0"
3	16'-0"
1	16'-0" (8"x12" H.B.)
64	TOTAL
7"x 9" TIES	3812 F.B.M.
8"x 12" H.B.	128 F.B.M.

NOTES:

Switch stand to be placed on turnout side except when otherwise authorized.

Lengths of rails in lead may be varied to suit rail on hand.

Position of rails in lead may be interchanged when joints approximately opposite each other are not required in connection with signal work.

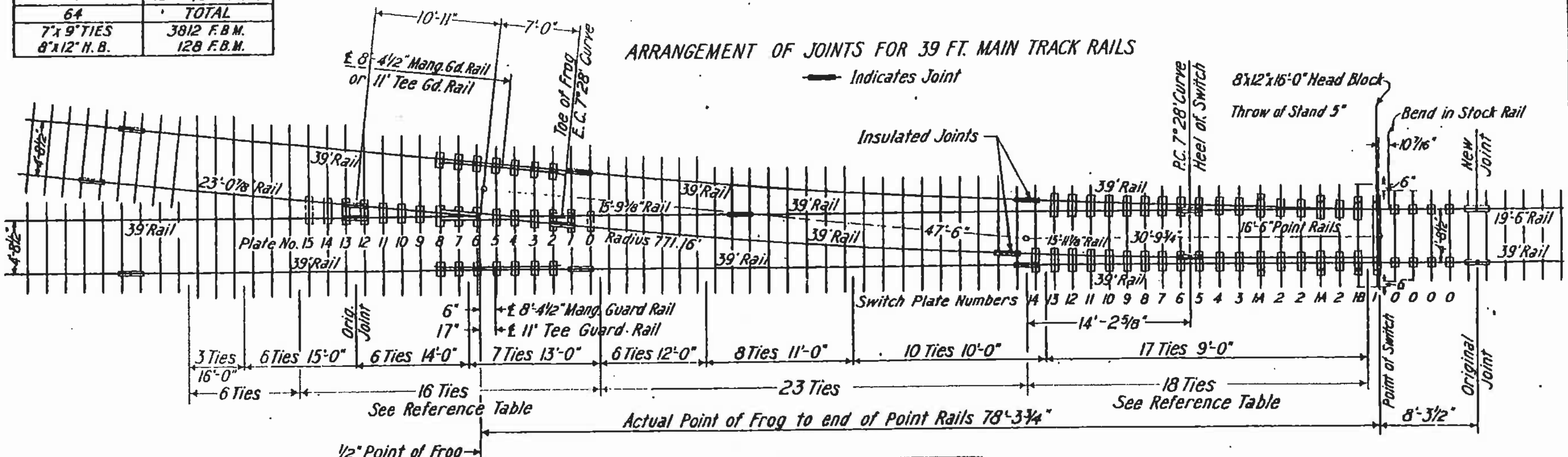
Closure Rails behind heel of switch points to be drilled for anti-creeper straps when required.

Requisitions for switches should specify whether insulated or non-insulated switch. If power operated, state type of switch machine.

Frog Plates Nos. 0 & 15 for 132-lb. H.F. Rail only.

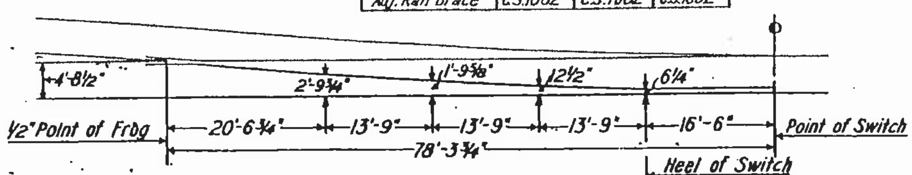
For Crossover Data see C.S. 1100.

ARRANGEMENT OF JOINTS FOR 39 FT. MAIN TRACK RAILS



REFERENCE TABLE			
Rail Section	113-lb. H.F.	115-lb. R.E.	132-lb. H.F.
16'-6" Split Switch	C.S. 1016 & C.S. 1018	C.S. 1009	C.S. 1017 & C.S. 1019
No. 10 R.B. Mang. Frog	C.S. 835	C.S. 835	C.S. 835
8'-4½" Mang. Gd. Rail	C.S. 920	C.S. 920	C.S. 921
11' Tee Guard Rail	C.S. 912	C.S. 912	C.S. 912
Adj. Rail Brace	C.S. 1002	C.S. 1002	C.S. 1002

TURNOUT DATA		
FROG	Number	10
	Angle	5°43'29"
	Length on Straight Track	17'-11"
	Toe Length on Straight Track	7'-0"
	" " " Turnout "	7'-0"
SWITCH	Length of Points	16'-6"
	Heel Spread	6¼"
	Angle	1°43'06"
Lead		78'-3¾"
LEAD CURVE	Degree	7°28'
	Central Angle	4°00'23"
	Radius	768.81'
Radius of Curved Rail		771.16'
Straight Closure		54'-9¾"
Curved Closure		54'-11¼"



OFF-SET DIAGRAM

SOUTHERN PACIFIC LINES
COMMON STANDARD

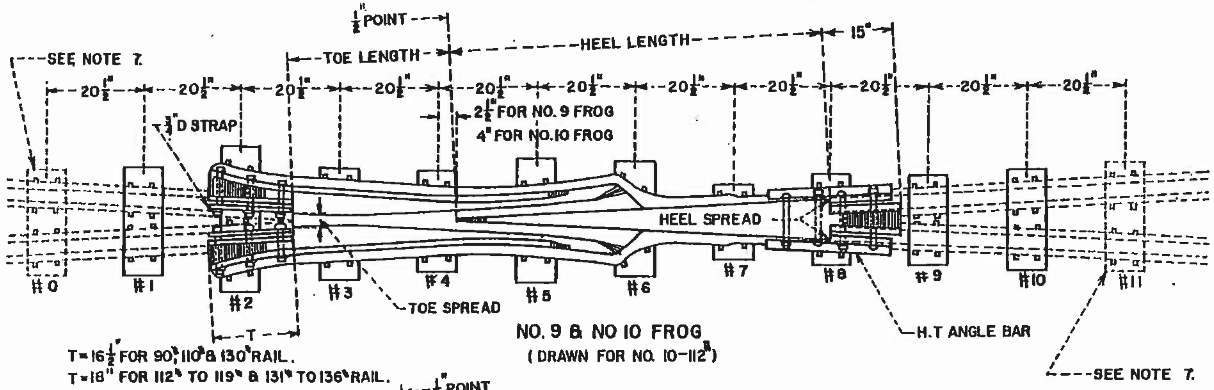
SWITCH LAYOUT

No. 10 R.B. MANG. FROG 16'-6" POINT RAILS
FOR USE WITH 113-lb. H.F., 115-lb. R.E. & 132-lb. H.F. RAIL

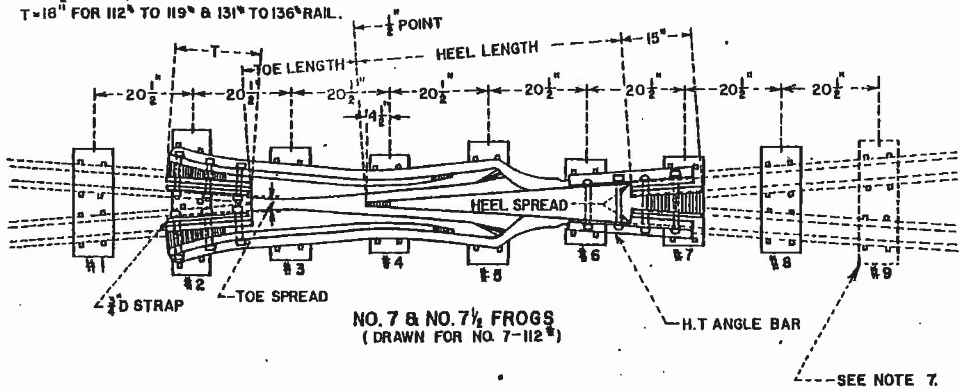
NO SCALE

ADOPTED OCT. 10, 1950
REVISED NOV. 11, 1951

C.S. 842



NO. 9 & NO 10 FROG
(DRAWN FOR NO. 10-112#)



NO. 7 & NO. 7½ FROGS
(DRAWN FOR NO. 7-112#)

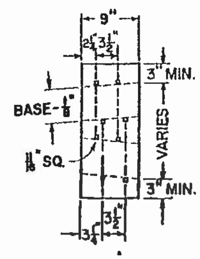
DIMENSIONS						
FROG NO.	WEIGHT OF RAIL	LENGTHS			SPREAD	
		TOE	HEEL	TOTAL	TOE	HEEL
	Lb. Per. Yard	Ft. In.	Ft. In.	Ft. In.	In.	In.
7	90	1-11	4-4	6-3	2 25/32	7 15/16
	110 TO 119	2-0	4-7	6-7	2 15/16	8 11/32
	130 TO 136	2-11	5-2⅛	8-1½	4 ½	9 13/32
7½	90	2-1	4-8	6-9	2 27/32	7 31/32
	110 TO 119	2-2	4-11	7-1	2 31/32	8 ⅜
	130 TO 136	2-11	5-7	8-6	4 5/32	9 7/16
9	90	2-6	5-7	8-1	2 27/32	7 15/16
	110 TO 119	2-7	5-10	8-5	2 15/16	8 9/32
	130 TO 136	2-11	6-10	9-9	3 ⅜	9 ⅝
10	90	2-9	6-2	8-11	2 13/16	7 29/32
	110 TO 115	2-10	6-6	9-4	2 29/32	8 5/16
	119	2-11	6-8	9-7	3	8 ½
	130 TO 136	3-9	7-7½	11-4½	4	9 21/32

WEIGHT OF RAIL	Shank Diam. of Bolt	LENGTH OF BOLTS (Inches)										
		TOE BOLTS (Sq. Heads)			HEEL BOLTS (Button Heads See C.S.790)							
		ALL FROGS			NO. 7 FROGS				NO. 7½ FROGS			
90#	⅞"	7½"	8½"	9½"	11"	11½"	12"	12½"	10"	11"	11½"	12½"
110#	1"	7½"	8½"	9½"	11"	11½"	12"	13"				
112# to 119#	1 1/16"	7½"	9"	10½"	11½"	12"	12½"	13"	11½"	12½"	13"	14"
130# to 136#	1 1/16"	8"	9"	10½"	12"	12½"	13"	13½"				
		SIZE OF HEAD			NO. 9 FROGS				NO. 10 FROGS			
90#	⅞"	11/16" x 1 5/16"			9½"	10"	10½"	11½"	11"	11½"	12"	12½"
110#	1"	⅝" x 1½"			11"	11½"	12"	12½"	10½"	11"	11½"	12"
112# to 119#	1 1/16"	¾" x 1 11/16"			11½"	12"	12½"	13½"	11½"	12"	12½"	13½"
130# to 136#	1 1/16"	¾" x 1 11/16"			12½"	13½"	14"	14½"	12½"	13"	13½"	14"
Threaded Length		3¼"			3½"				3½"			
No. per Frog		2 Each			1 Each				1 Each			

NOTE: ALL BOLTS TO BE H.T AND FURNISHED WITH STANDARD HEAVY SQUARE NUTS AND SUPER HIPOWER SPRING WASHERS. THREADS TO BE AMERICAN STANDARD. TOE BOLTS TO BE CLASS B OR C, AND HEEL BOLTS TO BE CLASS B PER C.S. SPECIFICATION 1003-A.

NOTES

1. FROG TO BE SOLID MANGANESE STEEL. DETAILS NOT SHOWN BASED ON A.R.E.A PLAN 641-55.
2. MANUFACTURER WILL FURNISH FROG, TIE PLATES, STRAPS, BOLTS AND SUPER HIPOWER SPRING WASHERS.
3. FOR DRILLING AND RAIL SECTION SEE C.S. 700.
4. ALL SPIKE HOLES TO BE 11/16" SQUARE, STAGGERED AS SHOWN AND TO EXTEND 1/16" UNDER BASE OF RAIL, BASE OF CASTING OR TOE OF ANGLE BAR.
5. PLATES TO BE ¾" THICK, 9" WIDE & LENGTH TO PROVIDE 3" MIN. EDGE DISTANCE.
6. PLATE NUMBER, FROG NUMBER AND WEIGHT OF RAIL TO BE STAMPED ON EACH PLATE.
7. PLATES SHOWN DASHED NOT REQUIRED FOR 110# OR LIGHTER RAIL.



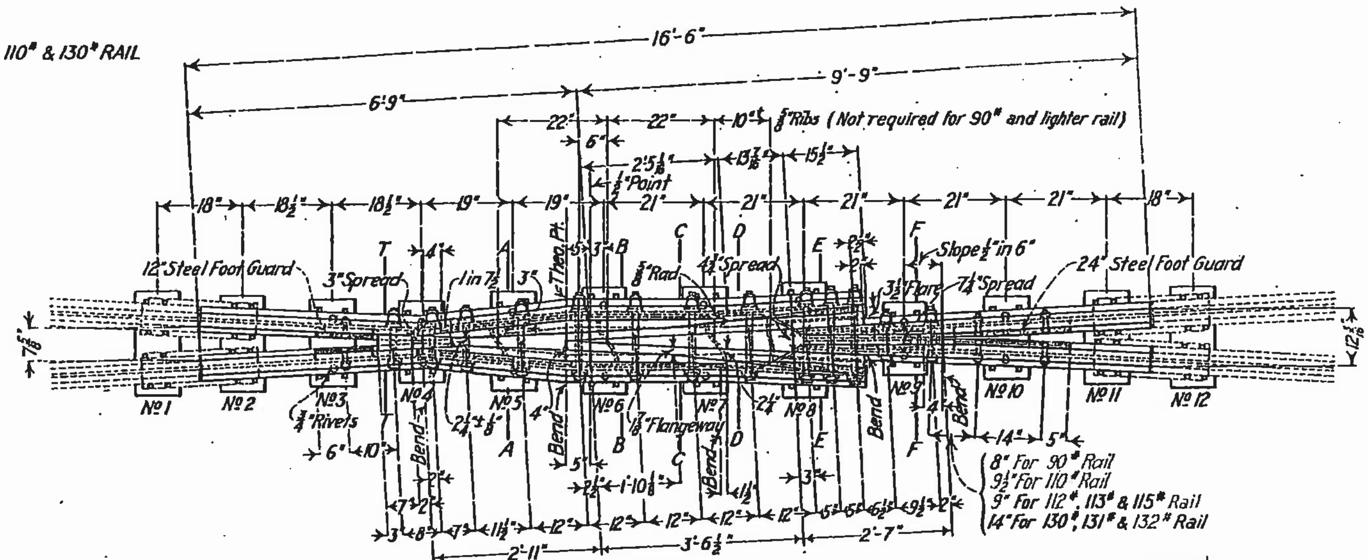
TYPICAL PLATE PUNCHING

SOUTHERN PACIFIC LINES
COMMON STANDARD
Nos 7, 7½, 9, & 10
SELF GUARDED FROGS
90 LB. TO 136 LB. RAIL

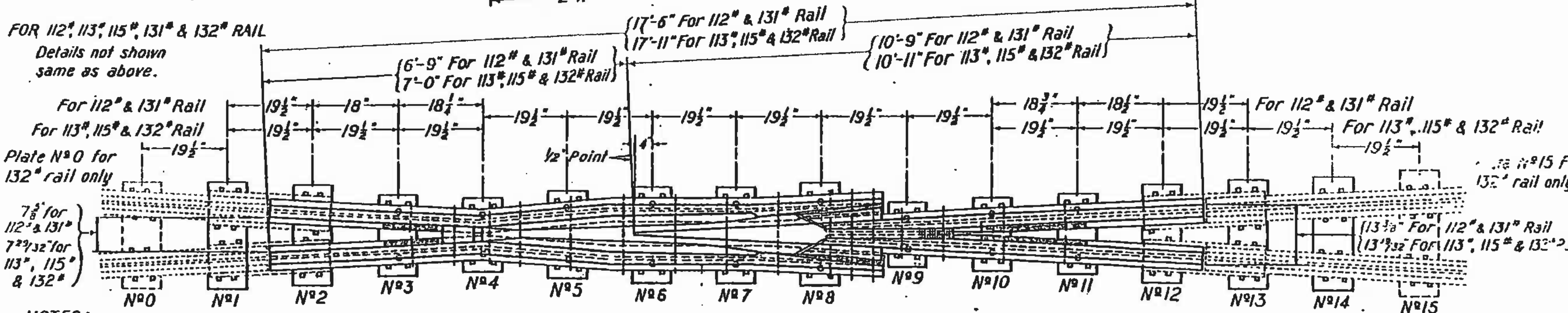
NO SCALE
ADOPTED: OCT. 23, 1945
REVISED: JAN 30, 1974

C.S.
835

FOR 90#, 110# & 130# RAIL



FOR 112#, 113#, 115#, 131# & 132# RAIL
Details not shown same as above.



NOTES:
Following plates to be made fast to frog with 3/4" rivets, as shown:
Plates No 3 to No 10 inclusive for 90#, 110# & 130# rail.
Plates No 3 to No 11 inclusive for 112#, 113#, 115#, 131# & 132# rail.
For size and punching of tie plates see C.S. 831.
For further details and sections see C.S. 829 and C.S. 830.
Manufacturer will furnish frog, tie plates and foot guards.

LENGTHS OF WING AND HEEL RAILS

Weight of Rail	90#, 110# & 130#	112# 131#	113#, 115# & 132#
Length of Wing Rails	11'-7"	11'-7"	11'-10"
Length of Heel Rails	6'-2 1/2"	7'-2 1/2"	7'-4 1/2"

Note: Length of heel rails are finished lengths, measured from point of 4 3/4" spread. For cut lengths add 1/8" for 90-lb. rail, 1/2" for 110-lb. to 115-lb. rail, and 3/8" for 130-lb. to 132-lb. rail.

SOUTHERN PACIFIC LINES
COMMON STANDARD
No 10 RAIL BOUND MANGANESE FROG
90-LB. TO 132-LB RAIL

NO SCALE

ADOPTED: SEPT. 9, 1927
REVISED: OCT. 10, 1950

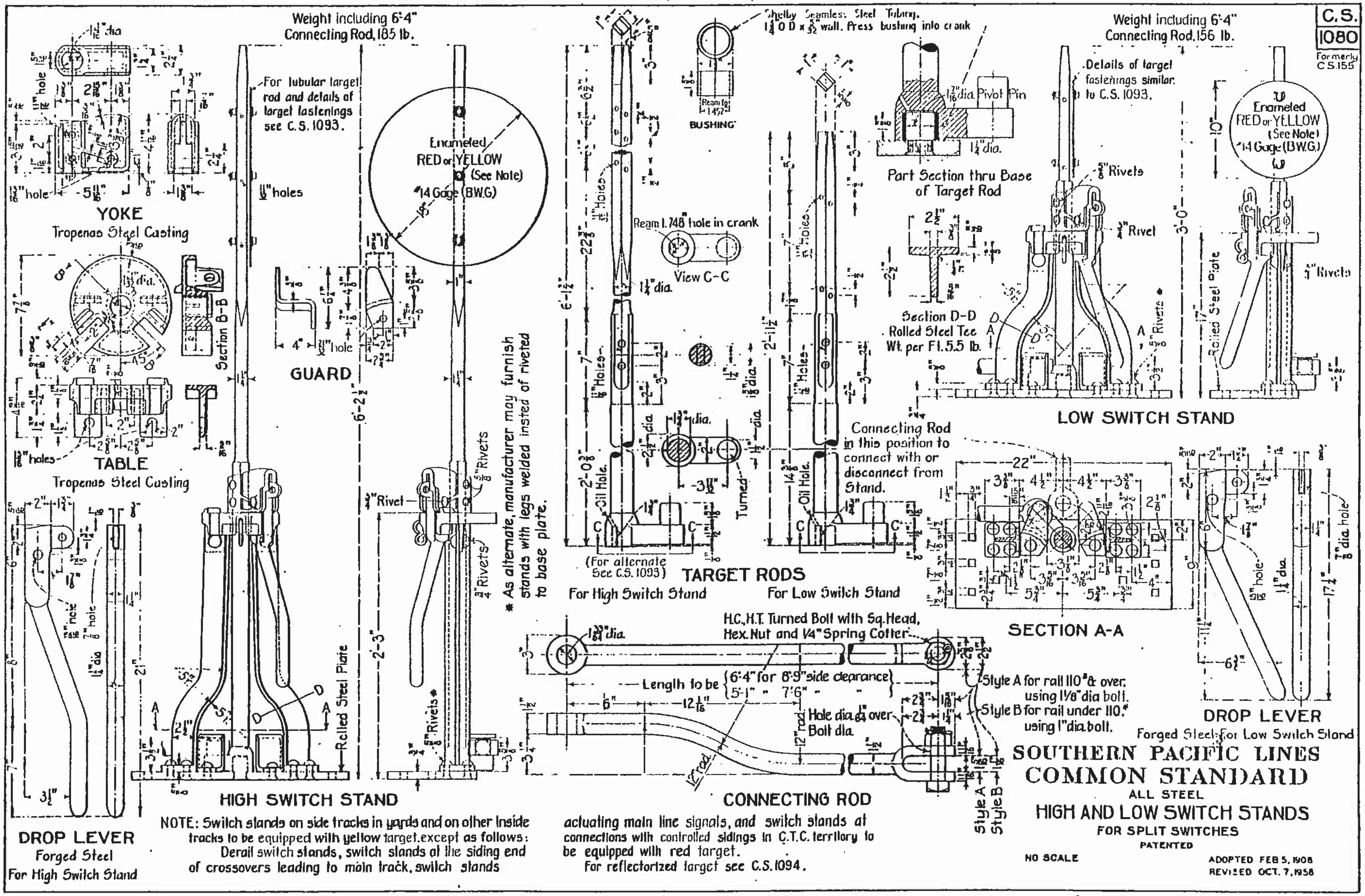

C.S. 1080
Formerly C.S.155
YOKE
Tropenas Steel Casting
TABLE
Tropenas Steel Casting
Section B-B
GUARD
Weight including 6'-4" Connecting Rod, 185 lb.
For tubular target rod and details of target fastenings see C.S. 1093.
Enameled RED or YELLOW (See Note) 14 Gage (B.W.G.)
HIGH SWITCH STAND
Rolled Steel Plate
DROP LEVER
Forged Steel
For High Switch Stand
* As alternate, manufacturer may furnish stands with legs welded instead of riveted to base plate.
Shelby Seamless Steel Tubing. 1¼ O.D. x 5/32 wall. Press bushing into crank
BUSHING
Ream 1.748" hole in crank
View C-C
TARGET RODS
For High Switch Stand
For Low Switch Stand
(For alternate See C.S. 1093)
Connecting Rod in this position to connect with or disconnect from Stand.
Part Section thru Base of Target Rod
Section D-D
Rolled Steel Tee
Wt. per Ft. 5.5 lb.
Weight including 6'-4" Connecting Rod, 156 lb.
Details of target fastenings similar to C.S. 1093.
LOW SWITCH STAND
SECTION A-A
DROP LEVER
Forged Steel For Low Switch Stand
H.C., H.T. Turned Bolt with Sq. Head, Hex. Nut and 1/4" Spring Cotter
Length to be 6'-4" for 6'-9" side clearance; 5'-1" " 7'-6" "
Hole dia. 1/64" over Bolt dia.
Style A for rail 110# & over, using 1⅛" dia bolt.
Style B for rail under 110#, using 1" dia. bolt.
CONNECTING ROD
NOTE: Switch stands on side tracks in yards and on other inside tracks to be equipped with yellow target, except as follows: Derail switch stands, switch stands at the siding end of crossovers leading to main track, switch stands actuating main line signals, and switch stands at connections with controlled sidings in C.T.C. territory to be equipped with red target.
For reflectorized target see C.S. 1094.
SOUTHERN PACIFIC LINES
COMMON STANDARD
ALL STEEL
HIGH AND LOW SWITCH STANDS
FOR SPLIT SWITCHES
PATENTED
NO SCALE
ADOPTED FEB. 5, 1908
REVISED OCT. 7, 1958

Table 9

Inventory of Bridges and Trestles Including Highway Underpasses on the Santa Cruz Subdivision

Type of Structure	Number of Structures	Total Length of Structures Linear Feet (LF)
Timber Trestle		
• Open Deck	12	1,285
• Ballast Deck	10	1,095
Total	22	2,380
Steel Bridge		
• Open Deck	7	1,604
• Ballast Deck	2	236
Total	9	1,840
Concrete Bridge		
• Ballast Deck	6	941

Note 1: Steel Bridges include Deck Plate Girder (DPG), Through Truss (TT), Deck Truss (DT) and Through Plate Girder (TPG). Cooper's E Rating ranges from E-50 to E-72.

Note 2: Most of the structures are for drainage purposes but some are specifically for Highway Underpasses (also known as Highway Undergrades). In some cases, bridges were constructed primarily for drainage purposes but were later used to accommodate a roadway underneath the structure.

Milepost	Name of Roadway Underpass
8.49	La Selva Beach
12.30	State Highway
12.34	Soquel Drive (Span-1)
12.39	State Highway
12.83	Aptos Highway
14.85	New Brighton Beach
15.89	Capitola Ave. (Segment A, Span 3, Soquel Creek)
15.89	Wharf Road, Segment D, Soquel Creek

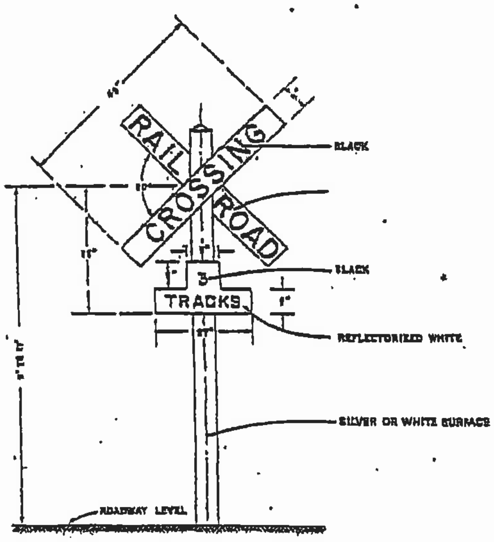
Table 8

Watsonville to Davenport
Existing Public Grade Crossing Warning System
Per CPUC Standards, GO-75-C

—11—

Figure 3

STANDARD NO. 1-R

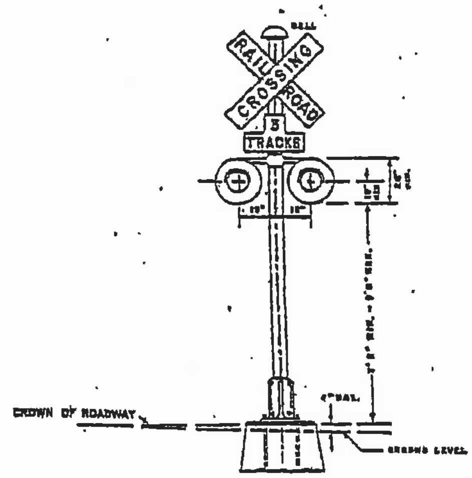


The crossing sign shall be reflectorized white background with the words "RAILROAD CROSSING" in black letters. If there are two or more tracks, including sidings, the number of tracks shall be indicated on an auxiliary sign as shown above.

—12—

Figure 4

STANDARD NO. 8



Top of foundation to be at the same elevation as the surface of the traveled way and no more than 4 inches above the surface of the ground.

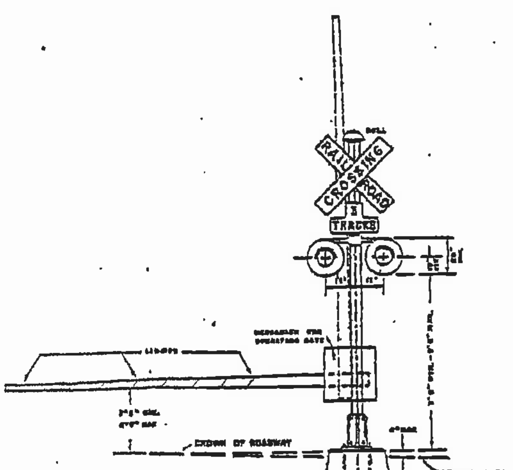
HIGHWAY CROSSING SIGNAL ASSEMBLY
FLASHING LIGHT TYPE

SEE NOTES 1, 2 AND 3, SECTION 8.

—15—

Figure 7

STANDARD NO. 9



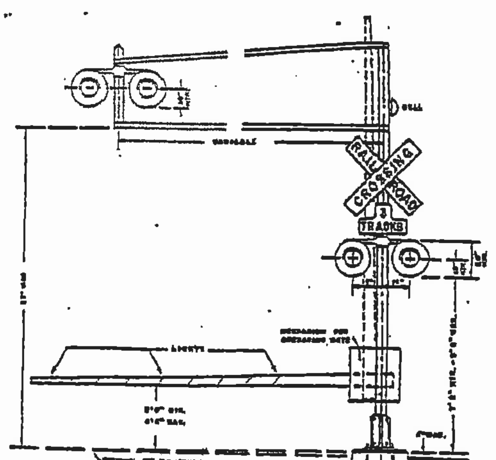
HIGHWAY CROSSING SIGNAL ASSEMBLY
AUTOMATIC GATE TYPE

SEE NOTES 1, 2 AND 3, SECTION 8.

—16—

Figure 8

STANDARD NO. 9-A



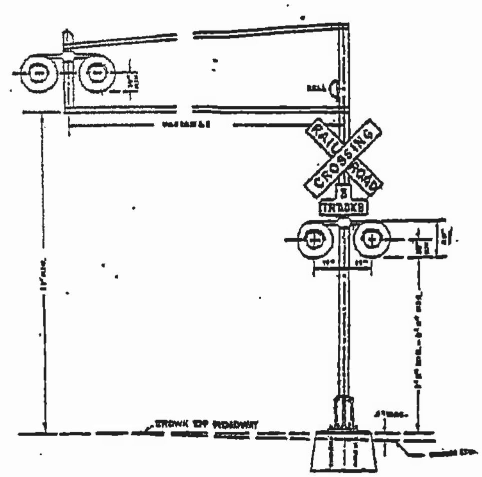
HIGHWAY CROSSING SIGNAL ASSEMBLY
AUTOMATIC GATE TYPE WITH CANTILEVER ARM

SEE NOTES 1, 2 AND 3, SECTION 8.

—13—

Figure 5

STANDARD NO. 8-A



HIGHWAY CROSSING SIGNAL ASSEMBLY—
CANTILEVER TYPE

SEE NOTES 1, 2 AND 3, SECTION 8.

Table 7

Highway Overheads and
Vehicular Public Grade Crossings
Watsonville to Davenport

Public Grade Crossings			
Milepost No.	**Name of Street or Roadway**	**Type of Surface**	**Warning System per CPUC GO-75C Standards**
0.4	Salinas Road	Asphalt	2 ea-9A
1.0*	Front Street	Asphalt	1 ea.-1-R
1.3*	State Route 129	Asphalt	4 ea.-9
1.4*	Second Street	Asphalt	2 ea. 8
1.5*	Beach Street	Asphalt	2 ea.-9A
2.5**	Errington Road	Concrete	2 ea.-9A
2.8*	Lee Road	Asphalt	1 ea.-1R
6.87	San Andreas Road	Asphalt	2 ea.-8
7.74	Spring Valley Road	Asphalt, Timber Flangeway Guards	2 ea.-9
8.94	El Camino Del Mar	Asphalt	2 ea.-9 (Semi-Public)
10.32	Seascape Blvd.	Asphalt	2 ea.-9; 2 ea.-8
10.81	Club House Drive	Asphalt	2 ea.-9
12.50	Trout Gulch Road	Omni Rubberized	2 ea.-9
13.18	State Park Drive	Concrete	2 ea.-8
13.50	Mar Vista Drive	Asphalt	2 ea.-9
13.95	Estates Drive	Concrete	? (Shown as private)
14.15	Pot Belly Beach Rd	Asphalt	? (Shown as private)
15.70	Monterey Ave.	Omni Rubberized	2 ea.-9A
16.38	47th Ave	Asphalt	2 ea.-9A; 1 ea.-8
16.75	41st Ave	Omni Rubberized	2 ea.-9A
16.88	38th Ave	Concrete	1 ea.-9A, 1 ea.-9
17.21	30th Ave	Concrete	2 ea.-8
17.87	17th Ave.	Omni Rubberized	1 ea.-9A; 1 ea.-9
18.6	7th Avenue	Concrete	2 ea.-8
19.3	Seabright Avenue	Concrete	1 ea.-3***
19.4	Mott	Asphalt	1 ea.-1R
19.85*	Cliff and Beach	Asphalt	1 ea-1R (Casino)
19.91*	Westbrook Street	Asphalt	1 ea.-1R (Casino)

Table 7

Highway Overheads and Vehicular Public Grade Crossings
Watsonville to Davenport

Public Grade Crossings			
Milepost No.	**Name of Street or Roadway**	**Type of Surface**	**Warning System per CPUC GO-75C Standards**
19.86	Main Street	Asphalt	1 ea.-1R (Casino)
20.11	Pacific Street	Asphalt	1 ea.-8-A
20.49*	Laurel Street	Asphalt	2 ea.-9A Tail of Wye Ownership Ends at MP 20.54
20.90*	California Street	Concrete	1 ea.-1R
20.93*	Bay Street	Concrete	1 ea.-1R
21.03*	Lennox Street	Asphalt	1 ea.-1R
21.13*	Palm Street	Closed	Closed
21.19*	Dufour Street	Asphalt	1. ea.-1R
21.25*	Belleview Street	Asphalt	1 ea.-1-R
21.29*	Younglove Avenue	Asphalt	1. ea.-1-R
21.37*	Seaside Street	Asphalt	1 ea.-1-R
21.40*	Rankin Street	Asphalt	1. ea-1-R
21.42*	Almar Avenue	Concrete	1 ea.-1-R
21.54*	Fair Avenue	Concrete	1 ea.-1-R
21.70*	Swift Avenue	Concrete	1 ea.-1-R
22.20	Natural Bridges Drive	Timber	2. ea.-9
31.28	State Route #1	Asphalt	2 ea.-9

* Union Pacific Milepost Numbers not shown in the field. Estimated UP numbers are shown.

** Union Pacific Signal Case shows old SP No. 102.99. Estimated UP number is shown.

*** W is for Wig Wag, former CPUC No. 3.

See Table 8 for diagrams of CPUC Grade Crossing Warning Systems per GO-75C.

Note: In addition to the public at-grade crossings shown above, there are approximately 47 private at-grade crossings, some of which are for pedestrians. There are several spur track street crossings one of which has 2 ea. flashing lights (No. 8) grade

Table 7

Highway Overheads and
Vehicular Public Grade Crossings
Watsonville to Davenport

crossing warning system according to old records. A private pedestrian crossing and fire road at about milepost 9.9 has No. 8 flashing lights.

Highway Overheads*

Milepost	Name
2.73	State Route-1 (Dual)
12.03	Rio Del Mar (Note 1)
19.41**	East Cliff Drive
19.52	Amusement Park Ride
20.04	West Cliff Drive
29.99	Overhead Viaduct (Note 2)
30.39	Overhead Viaduct (Note 2)

Note 1 - Structure maintenance may be responsibility of the railroad.
Note 2 - Structure shown in UP track chart but not verified in field. May be abandoned utility lines.

* The term "Overhead is sometimes synonymous with "Highway Overpass."

** The SCCRTC has determined that the City of Santa Cruz has made an agreement with Union Pacific to assume the Railroad's responsibility for maintaining the East Cliff Drive overpass.

Table 6

Total Weight of Rail and OTM by Classification on the Santa Cruz Subdivision
Main Track

From Appendix B		Worn Rail, See Table 2	Note 1	Note 2			Note 3	
				Relay Rail and OTM			Scrap Rail and OTM (NT)	Scrap Rail and OTM (GT)
Track Miles	Weight of Rail (lb/yd)	Rail (NT)	OTM (NT)	Class 1	Class 2	Class 3		
0.30	75	35.6	10.3	---	---	---	45.9	40.9
12.84	90	1,831.0	567.6	---	---	---	2,398.6	2,134.7
0.55	110	101.1	34.4	---	---	---	135.5	120.6
4.08	112	763.8	267.3	---	---	824.9	206.2	183.5
0.07	113	13.2	5.4	---	18.6	---	---	---
*9.46	112/113 CWR	1,778.5	711.4	---	---	2,489.9	---	---
1.03	132	227.3	100.0	---	294.6	---	32.7	29.1
2.23	136	507.1	228.2	---	661.8	---	73.5	65.4
0.40	132 CWR	88.3	35.3	---	123.6	---	---	---
ST 30.96	---	5,345.9	1,959.9		1,098.6	3,314.8	2,892.4	2,574.2

Side Tracks and Spur Tracks

0.92	90	131.2	42.0	---	---	---	173.2	154.1
0.30	110	55.2	19.3	---	---	---	74.5	66.3
0.20	112	37.4	15.0	52.4	---	---	---	---
ST 1.42	---	223.8	76.3	52.4	---	---	247.7	220.4
T 32.38		5,569.7	2,036.2	52.4	1,098.6	3,314.8	3,140.1	2,794.6

Note 1: The weight of OTM is calculated by using Southern Pacific's track standards (see Table 10 for samples) and applying the weight per unit of OTM such as 13 lbs for an 11" long 90 lb tie plate, 60 lbs for a pair of 90 lb joint bars or 0.85 lbs for a 6" long cut spike. See Table 11 for more details.

Note 2: Rail Classification is detailed in Table 11. Note 3 Scrap Classification is based on both physical condition and obsolescence.

* Field inspection shows mostly 112 lb CWR non-controlled cooled, Santa Cruz to Davenport.

THE WOODSIDE CONSULTING GROUP

Table 5

Santa Cruz Subdivision
Weight of Rail by Milepost and Percent of Weight of Rail in Track
Main Track

Rail Weight lb yd	TM Milepost 0.43 to 5.00	TM Milepost 5.00 to 10.00	TM Milepost 10.00 to 15.00	TM Milepost 15.00 to 20.00	TM Milepost 20.00 to 25.00	TM Milepost 25.00 to 30.00	TM Milepost 30.00 to 31.39	Total TM	Percent %
75 lb	---	---	---	---	0.30	---	---	0.30	1
90 lb	3.15	2.23	3.49	3.22	0.75	---	---	12.84	41
110 lb	0.20	0.22	0.07	---	0.06	---	---	0.55	2
112 lb	---	1.87	0.74	1.47	---	---	---	4.08	13
113 lb	---	---	0.07	---	---	---	---	0.07	1
112/113 lb CWR	0.50	---	---	---	2.89	4.80	1.27	9.46	31
132 lb	0.72	0.11	0.10	0.10	---	---	---	1.03	3
136 lb	---	0.17	0.53	0.21	1.0	0.20	0.12	2.23	7
132	---	0.40	---	---	---	---	---	0.40	1
Total	4.57	5.00	5.00	5.00	5.00	5.00	1.39	30.96	100

Side Tracks and Spur Tracks

Average Wt.	Description	Total TM
110 lb	8 each spur tracks, average length on R/W 200 TF (1,600 TF)	0.30
90 lb	1 each runaround track about, Milepost 2.6 (1,000 TF)	0.20
112 lb	1 each runaround track about, about Milepost 21.7 (1,000 TF)	0.20
90 lb	Santa Cruz Wye Track including Tail of Wye, Milepost 20.54 (3,800 TF)	0.72
Total	Approximate Total TM	1.42

Total Branch Main, Siding and Spur 32.38 TM

Turnouts

Range of Wt.	Types of Frogs (# 9's & # 10's)	
90 lb to 136 lb	Railbound Manganese, Self Guarded Manganese, Springrail	Total Turnouts – 16 ea.

THE WOODSIDE CONSULTING GROUP

Table 4

Analysis of Ferrous Scrap
Shipping Costs and Most Likely Point of Sale

Origin: Watsonville, CA	Railroad Miles[1]	Cost per NT @ 2¢/Ton Mile[3]	Cost Per GT
To: San Francisco	100	$2.0	$2.2
Los Angeles	370	7.4	8.3
Seattle	1000	20.0	22.4
Chicago	2363	47.3	53.0
St. Louis	2289	45.8	51.3
Houston	2211	44.2	49.5

(1) Source: U.S. Railroad Distance Table Rand McNally Atlas.
NT = 2,000 lbs.
GT = 2,240 lbs.

Scrap Prices From Table 3

Origin: Watsonville, CA	Most Likely Price FOB Destination	Less Cost of Freight	Net Price
To: San Francisco	$74/GT	$2.2	$71.8/GT
Los Angeles[2]	90/GT	8.3	81.7
Seattle	76/GT	22.4	53.6
Chicago	185/GT	53.0	132.0
St. Louis	221/GT	51.3	169.7
Houston	156/GT	49.5	106.8

(2) Los Angeles Electric Furnace @ $123/GT requires "1 ft long and under." Delivered to domestic consumers implies that ferrous scrap is prepared for the furnace.

(3) The latest Association of American Railroads (AAR) "Facts" edition states that the average revenue per ton-mile for all commodities is 2.263 cents. Waste and Scrap materials had an average revenue per ton of $18.2. The average revenue per ton of all commodities is $20.7 per ton. Thus scrap materials are 87.9% less than the average commodity hauled. From this we can estimate that recyclable freight revenue per ton mile is about 2 cents.

Note: Prepared scrap such as "shredded," "bundles," rails 2 ft. and under, plate and structures 5 ft. and under bring higher scrap prices since they are ready for the furnace without added expense.

Table 3

IRON AGE SCRAP Price Bulletin

FERROUS SCRAP PRICES

These are prices obtained in trade based on representative tonnages per gross ton (2,240 pounds) delivered to the consumer unless otherwise stated. The broker buying price is the price of scrap delivered to the consumers minus the freight and commission. The broker buying price thus represents the price of processed scrap loaded onto railroad cars, trucks, or barges FOB the processor or dealer's yard. Prices are the opinions of *Scrap Price Bulletin* editors and correspondents, based on contacts with dealers, brokers, generators, processors, and users in the industry on the effective date above.

Effective February 23, 2004

Los Angeles

Prices delivered to export yards per gross ton on cars:			
No. 1 hvy. melting	90.00	to	92.00
No. 2 hvy. melting	87.00	to	89.00
Shredded scrap	105.00	to	107.00
Prices delivered to domestic consumers per gross ton on cars:			
No. 1 hvy. melting	122.00	to	124.00
No. 2 hvy. melting	117.00	to	119.00
Shredded scrap	142.00	to	144.00
No. 1 dealer bundles	152.00	to	154.00
No. 2 bundles	109.00	to	111.00
Machine shop turnings	101.00	to	103.00
Shoveling turnings	91.00	to	93.00
Elec. furnace, 1 ft. and under (foundry)	123.00	to	125.00
Cupola cast	123.00	to	125.00

San Francisco

Prices delivered to export yards per gross ton on cars:			
No. 1 hvy. melting	74.00	to	76.00
No. 2 hvy. melting	68.00	to	70.00
Shredded scrap	82.00	to	84.00
Brokers' buying prices for domestic markets per gross ton on cars:			
No. 1 hvy. melting	68.00	to	70.00
No. 2 hvy. melting	60.00	to	62.00
Shredded scrap	73.00	to	75.00
No. 1 dealer bundles	56.00	to	58.00
No. 2 bundles	56.00	to	58.00
Machine shop turnings	56.00	to	58.00
Cupola cast	101.00	to	103.00

Seattle

Prices delivered to export yards per gross ton on cars:			
No. 1 hvy. melting	76.00	to	78.00
No. 2 hvy. melting	76.00	to	78.00
Shredded scrap	94.00	to	96.00
Prices delivered to domestic consumers per gross ton on cars:			
No. 1 hvy. melting	110.00	to	112.00
No. 2 hvy. melting	104.00	to	106.00
Shredded scrap	112.00	to	114.00
No. 2 bundles	97.00	to	99.00
Cupola cast	140.00	to	142.00
Mixed yard cast	109.00	to	111.00

Chicago

No. 1 hvy. melting	245.00	to	246.00
No. 2 hvy. melting	242.00	to	243.00
No. 1 dealer bundles	284.00	to	285.00
No. 2 bundles	201.00	to	202.00
No. 1 busheling	285.00	to	286.00
Shredded scrap	271.00	to	272.00
Machine shop turnings	201.00	to	202.00
Shoveling turnings	201.00	to	202.00
Cast iron borings	190.00	to	191.00
Plate and structurals, 5 ft. and under	268.00	to	269.00
Plate and structurals, low alloy, 2 ft. and under	300.00	to	301.00
Plate and punchings, low alloy, 1/4 in. and heavier	305.00	to	306.00
No. 1 RR hvy. melting	268.00	to	269.00
Scrap rails, random length	184.00	to	185.00
Reroller rails	229.00	to	230.00
Rails, 2 ft. and under	301.00	to	302.00
No. 1 machinery cast	279.00	to	280.00
Cupola cast	273.00	to	274.00
Stove plate	274.00	to	275.00
Steel car wheels	283.00	to	284.00
Stainless (processor/brokers' buying prices):			
18-8 bundles and solids	1,475.00	to	1,500.00
18-8 turnings	1,375.00	to	1,400.00
430 bundles and solids	275.00	to	300.00
430 turnings	225.00	to	250.00

St. Louis

Brokers' buying prices per gross ton on cars:			
No. 1 hvy. melting	187.00	to	188.00
No. 2 hvy. melting	182.00	to	183.00
No. 1 busheling	254.00	to	255.00
No. 1 dealer bundles	254.00	to	255.00
No. 2 bundles	194.00	to	195.00
Shredded scrap	250.00	to	251.00
Machine shop turnings	184.00	to	185.00
Shoveling turnings	209.00	to	210.00
Cast iron borings	189.00	to	190.00
No. 1 RR hvy. melting	221.00	to	222.00
Rails, 5 ft. and under	248.00	to	249.00
Plate and structurals, 5 ft. and under	221.00	to	222.00
Cupola cast	216.00	to	217.00
Unstripped motor blocks	151.00	to	152.00

Houston

Brokers' buying prices per gross ton on cars:			
No. 1 hvy. melting	156.00	to	157.00
No. 2 hvy. melting	151.00	to	152.00
Machine shop turnings	118.00	to	119.00
Shredded scrap	198.00	to	199.00
Plate and structurals, 2 ft. and under	218.00	to	219.00
Plate and structurals, 5 ft. and under	171.00	to	172.00
Unstripped motor blocks	139.00	to	140.00
Cupola cast	179.00	to	180.00

Table 2

Tonnage of Various Weights of Rail per Track Mile

Weight of Rail in lbs per Yard	NT per TM New	NT per TM Worn	GT per TM Worn
75	132.0	118.8	106.1
90	158.4	142.6	127.3
110	193.6	183.9	164.2
112	197.1	187.2	167.2
113	198.9	188.9	168.7
132	232.3	220.7	197.1
136	239.4	227.4	203.1

Note 1. One Track Mile (TM) consists of 2 rails, each one mile long.

Note 2. Each Net Ton (NT) weighs 2,000 lb.

Note 3. Each Gross Ton (GT) weighs 2,240 lb.

Note 4. Worn 75 lb and 90 lb rail, mostly 90 years old, is reduced in weight by 10% because of wear and corrosion. Rail 110 lb to 136 lb is reduced in weight by 5% because of wear.

Note 5. It should be noted that the rail is not always rolled to the nominal weight. While Southern Pacific's 75 lb CS and 90 lb ARA-A rails were exactly 75 lb and 90 lb per yard, SP's 112 lb rail was 112.3 lb/yd and the 132 lb was 132.4 lb/yd. This Study uses the nominal weights in calculations which are either exactly correct or within 0.1% to 0.3%. Such differences are not considered statistically significant in a Study of this type.

Table 1

UNION PACIFIC RAILROAD
ROSEVILLE AREA
TIMETABLE #3

Effective 0001 Sunday, June 22, 2003

SANTA CRUZ SUBDIVISION (0955)

Mile Post	Rule 6.3	CP #'s	Radio Display: Watsonville Jct. to Davenport -1414 WEST ▼ STATIONS ▲ EAST		Sta. #'s	Siding Feet
0.0	YL		WATSONVILLE JCT. (1.8)	Y	CO092	
1.8	YL TWC		WATSONVILLE (18.6)	Y	CB101	
20.4	YL		SANTA CRUZ (11.5)	TY	CB120	
31.9	TWC		DAVENPORT		CB131	
			(31.9)			

SI-01 MAIN TRACK AUTHORITY

TWC between:
MP 3.3 and MP 19.3;
MP 20.9 and MP 31.9.
Yard Limits between:
MP 0.0 and MP 3.3;
MP 19.3 and MP 20.9.

SI-02 MAXIMUM SPEED TABLE

Maximum Speed	MPH
Between Mileposts 0.0 and 31.9 (Except as Below)	10

SI-03 OTHER SPEED RESTRICTIONS

Maximum Speed — MPH

1. Thru Sidings & Turnouts (No Exceptions.)
2. Dual Control Switch Turnouts (No Exceptions.)
3. Misc. Speed Restrictions (No Exceptions.)

SI-04 MAIN TRACK DESIGNATIONS - None.

SI-05 MILEPOST EQUATIONS - None.

SI-06 DTC BLOCK LIMITS - None.

SI-07 ITEM 13 TRAIN DEFECT DETECTORS - None.

COAST SUBDIVISION (0950)

Santa Cruz Industrial Lead: (0955) from Watsonville Jct. 31.9 miles west to Davenport; Maximum speed 10 MPH all track is FRA Excepted Track except between MP 19.3 and MP 20.9. 6-axle locomotives are prohibited from operation on entire lead.
Derail on both tracks MP 31.5.
Remote Control Area Limits between:
MP 0.0 and MP 15.0.

Business Tracks	MP	Sta.#'s
Capitola	15.7	CB115
Seabright	19.2	CB118
Santa Cruz	20.4	CB120
Eblis	21.6	CB121
Davenport	31.9	CB131

SI-08 RULES ITEMS

Rule 6.20: Derail on main track and siding at MP 31.5.
Rule 35.5.: Remote Control Area:
Limits: MP 0.0 and MP 15.0. All Main Track, Industrial Leads and yard tracks.

SI-09 FRA EXCEPTED TRACKS

Main track and all connecting yard and industry tracks MP 0.0 to MP 19.3, and MP 20.9 to MP 31.9.

SI-10 BUSINESS TRACKS

Track Name	MP	STA. #'S
Capitola	15.7	CB115
Seabright	19.2	CB118
Eblis	21.6	CB121

SI-11 INDUSTRIAL LEADS - None.

SI-12 TONNAGE RESTRICTIONS - None.

SI-13 TRAIN MAKE-UP RESTRICTIONS - None.

SI-14 MISC. INSTRUCTIONS

Restricted Tracks: 6-axle units are prohibited from operating on the Santa Cruz Subdivision.

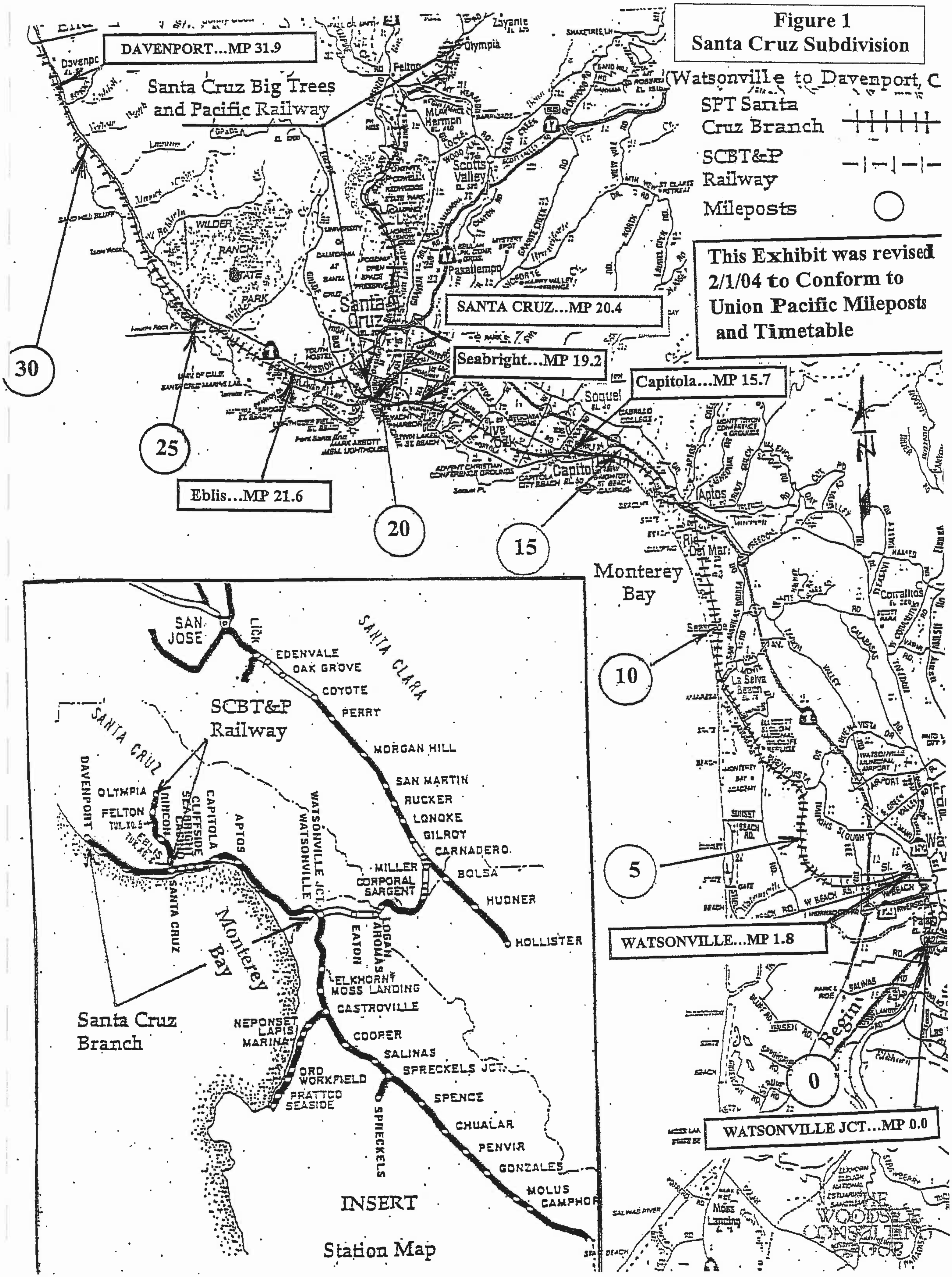


Figure 1
Santa Cruz Subdivision