California Public Utilities Commission

SUPPLEMENTAL REPORT

— Railroad Bridge Inspections Implementation Plan —

Item 8660-001-0461—California Public Utilities Commission

No later than September 1, 2014, the Commission shall report on its implementation plan for inspecting rail bridges. Specifically, the report shall include information regarding (1) what initial, annual, and ongoing training the Commission will require its bridge inspectors to receive; (2) what process the Commission will use to identify and prioritize which rail bridges will be inspected each year, and (3) which rail bridges will be inspected in 2014-15.

(1) Initial, Annual, and Ongoing Training

Initial Training

All Railroad Operations Safety Branch Associate Track Inspectors who specialize in bridge inspections will be required to attend three initial courses in bridge inspections within the first year[1] of their appointment. The number of required courses will depend on previous experience and training of the individual entry level bridge inspector. A fourth course provided by the American Railway Engineering and Maintenance-of-Way Association (AREMA), will only be required as an "initial" course if it is offered within the first year of the inspectors' appointments. Initial training will depend on course scheduling by independent organizations and availability within California, unless out of state travel can be authorized.

The Federal Railroad Administration (FRA) enforces the Code of Federal Regulations (CFR) Title 49, part 237, Bridge Safety Standards. The FRA bridge program employs five railroad bridge specialists to cover more than 80,000 railroad bridges in the entire United States. The bridge specialist assigned to California also covers 10 other states. However, FRA does not currently offer certification courses for railroad bridge inspectors, nor do they have plans to do so anytime soon.

Consequently, the CPUC is exploring creative alternatives to accomplish it training goals. We anticipate working with state and federal sister agencies, engaging universities and contracting with private providers. We will explore bringing trainings to California if that is less expensive than sending staff to off-site locations.

FRA Mentorship. The FRA has agreed to support the efforts of the CPUC railroad bridge program through on the job training and mentorship, to the extent practicable. The FRA assigned California bridge specialist is scheduled to deliver a presentation on railroad bridge inspections to all CPUC railroad safety inspectors in October. He will include a condensed example of a bridge inspection at a nearby railroad bridge. Further training and mentorship by FRA will be ongoing, based on availability of FRA Bridge staff while working in California.

Federal Railroad Administration

[1] One year is the normal amount of time to train and certify CPUC inspectors under current processes. While these inspectors will not be certified by FRA, the same amount of time for training will be a minimum.

Topic:	Railroad Bridge Inspection	**Contact Name:**	Roger Boraas (USDOT Structural Engineer)
Location:	California	**Contact Phone:**	720-489-5012 (w) 303-204-6645 (m)
Fees:	Free	**Contact Email:**	roger.boraas.dot.gov
Duration:	2 days		
Dates:	October 2014*		
Initial/Ongoing/Annual:	Initial / ongoing	**Website:**	

*Will request additional training as new inspectors are hired.

Potential Bridge Training Organizations for CPUC Staff

1. J.L. Patterson & Associates, Inc. (JLP). JLP performs track-work engineering and designs for all types of rail projects including light rail transit, commuter and freight rail. Focus of the course includes compliance with Federal Code of Federal Regulations, Title 49, Part 214 Subpart B, "Bridge Worker Safety Standards." Course will teach participants to hammer sound, drill, and plug timber bridges.[2] Climbing may be required. JLP may provide additional initial training in worker safety for bridge inspections.

J.L. Patterson & Associates, Inc.			
Topic:	Railroad Bridge Inspection	**Contact Name:**	Jay Craft (Assistant VP)
Location:	Sacramento Field Instruction	**Contact Phone:**	(714) 348-1639 (m)
Fees:	$14,000 total	**Contact Email:**	jcraft@jlpatterson.com
Duration:	5 days		
Dates:	TBD*		
Initial/Ongoing/Annual:	Initial	**Website:**	

*After new CPUC railroad safety inspectors for bridges are hired.

2. CSX Railroad Education and Development Institute. The purpose of the CSX Bridge Inspection Training course is to equip participants with the proper terminology, techniques, and criteria used to inspect and rate the condition of railroad bridges. Upon completion, participants will be able to: (1) identify bridge sections and substructures, (2) describe the inspection criteria for various types of bridges, and (3) complete a bridge inspection and associated reports.

CSX Railroad Education and Development Institute

[2] At this time, the CPUC does not anticipate performing invasive inspection procedures, such as "drilling and plugging" timber bridge pilings as mentioned in this description. Instead, the CPUC intends to accompany and/or to verify such procedures during or after they are performed by railroad company inspectors. It is notable that the FRA bridge inspectors perform "observations" rather than "inspections," to distinguish between the regulatory oversight activity and the railroad's direct responsibility. This is consistent with 49 CFR Part 212.101, which states that the purpose of regulatory inspections is to determine the extent to which the railroads have fulfilled their obligations to inspect and maintain their system, and to train and supervise their inspectors. "The FRA and participating States do not conduct inspections… for the railroads…." (49 CFR212.1019(b)(1), underlining added.)

Topic:	Railroad Bridge Inspection	**Contact Name:**	Michael Raupach (Manager of Training Programs)
Location:		**Contact Phone:**	(814) 442-6883 (m) (404) 367-2877 (w)
Fees:		**Contact Email:**	
Duration:	5 days		
Dates:	TBD*		
Initial/Ongoing/Annual:	Initial	**Website:**	http://www.csx.com/share/wwwcsx_mura/assets/File/Customers/Services_and_Partners/REDI/Bridge_Inspection_6-2012.pdf

*After new CPUC railroad safety inspectors for bridges are hired.

Note: The CSX Railroad Education and Development Institute is located in Atlanta, Georgia, and will require out-of-state travel authority.

3. **American Railway Engineering and Maintenance-of-Way Association (AREMA).** These seminars are designed to give the railway professional an understanding of what is involved in inspecting bridges, culverts, and tunnels to ensure they are safe for the passage of trains. AREMA offers one initial-level-only seminar for railroad bridge inspection and does not provide advanced field training. The intent is to provide participants a basis for knowing when to ask an expert about a potential concern. The instructors teach the participant how to recognize early signs of issues that, if not addressed, can develop into serious problems. The Bridge Inspection Seminar is based on the AREMA Bridge Inspection Handbook published in 2008. Seminar instructors are experienced railroad bridge professionals.

AREMA			
Topic:	Bridge Inspection & Streambed Scour	**Contact Name:**	Desirée Knight
Location:	Sacramento 125 I Street	**Contact Phone:**	(301) 459-3200 ext: 703
Fees:	$900/person	**Contact Email:**	dknight@arema.org
Duration:	4 days		
Dates:	Aug 4-7, 2014*		
Initial/Ongoing/Annual:	Initial	**Website:**	https://www.arema.org/files/seminars/AREMA_Bridge-Scour_Aug_CA_2014.pdf

* Fifteen PUC railroad inspectors attended this class. When new bridge-specific inspectors are hired, the CPUC will contact AREMA to identify the next available course.

Note: This course was held in California in August 2014, and subsequent courses will likely be held out-of-state. If courses are held out of state, the CPUC will request out-of-state travel authority.

Annual and Ongoing Training

After the initial training courses are complete, supplemental and advanced training will take place on an annual basis for those who have previously received initial training. Along with ongoing OJT and mentorship by FRA, the railroad safety bridge inspectors will be required to take at least one of the following courses per year. They will be encouraged to attend more than one course annually if and when they are offered.

1. California Department of Transportation (Caltrans). Caltrans bridge-inspection training classes cover timber, concrete, and steel *highway* bridge inspections. The training includes methods to identify bridge element defects, condition rating scores, the need for load-capacity evaluations, and repair-work orders.

Caltrans			
Topic:	Highway Bridge Inspection	**Contact Name:**	Michael B. Johnson
Location:	Sacramento	**Contact Phone:**	(916) 227-8768
Fees:	Free to State of CA	**Contact Email:**	michael_b_johnson@dot.ca.gov
Duration:	1 day		
Dates:	June 24, 2014*		
Initial/Ongoing/Annual:	Annual and Ongoing	**Website:**	www.dot.ca.gov

*One CPUC engineer attended this training class. Caltrans will notify the CPUC of subsequent ongoing training that Caltrans provides to its highway bridge inspectors.

2. HDR, Inc. An engineering firm that provides a bridge inspection, management, and operations program. HDR provides in-depth and routine condition inspections, fracture critical member inspections, scour inspections, non-destructive testing evaluations, rating analyses, and recommendations for rehabilitation or strengthening.

HDR, Inc.			
Topic:	Railroad Bridge Inspection	**Contact Name:**	Pat Casey (PE)
Location:	Sacramento	**Contact Phone:**	(925) 974-2546
Fees:		**Contact Email:**	pat.casey@hdrinc.com
Duration:			
Dates:	TBD*		
Initial/Ongoing/Annual:	Annual and Ongoing	**Website:**	http://www.hdrinc.com/

*The CPUC training officer will schedule annual training sessions.

3. University of Tennessee Center for Transportation Research - Tennessee Transportation Assistance Program (TTAP). TTAP specializes in roadway and highway engineering and offers courses in timber and steel bridges. TTAP has intermediate expertise in concrete bridges.

University of Tennessee			
Topic:	Railroad Timber / Steel Bridge Inspection and Maintenance	**Contact Name:**	David Clarke
Location:	Sacramento	**Contact Phone:**	(865) 974-1812
Fees:	$8,300 total for unlimited class size	**Contact Email:**	dclarke@utk.edu
Duration:	4 days		
Dates:	TBD		
Initial/Ongoing/Annual:	Annual and Ongoing	**Website:**	

Additional Training Providers

The CPUC training officer will also contact the following organizations to determine whether they provide appropriate training opportunities for the CPUC railroad safety bridge inspectors.

1. **University of Wisconsin**–Madison Department of Engineering Professional Development. The University of Wisconsin has a degree program and professional development courses for the railroad industry. One course is titled, "Fundamentals of Railway Bridge Engineering and Management." This course would be an optimal initial course for the railroad safety bridge inspectors. The syllabus states that the attendees will gain a working knowledge of basic railway bridge engineering and design under the AREMA Manual for Railway Engineering; understand basic bridge design; receive the latest information about design procedures, materials, and methods used in current railway bridge engineering practices; learn about bridge ratings and the Code of Federal Regulations, Title 49, Part 237 bridge management compliance; and work through design examples and case studies. It will be held November 18-20, 2014 in Jacksonville, Florida. If railroad bridge inspectors are hired by November 1, 2014, the CPUC will try to enroll them in this course. After that date, the CPUC training officer will contact this vendor to identify dates of course offerings in out years. **Note: While some special arrangement for off-site or on-line training may be possible, this course may also require out-of-state travel authority.**

2. **National Academy of Railroad Sciences (NARS).** A collaborative partnership between Johnson County Community College and BNSF Railway. NARS provides employee training and certification to the North American rail industry and the American Short Line Regional Railroads Association. Located in Overland Park, Kansas.

3. **C&S Companies**. C&S provides engineering, architectural, planning, and construction management services for the rail, highway, port, and aviation industries. With regard to railroads, C&S provides inspection and design services for freight railroads and passenger railroads. In addition, C&S develops and supports railroad Bridge Management Programs and designs bridge upgrades and repairs.

4. **Modjeski and Masters**. A bridge engineering firm that provides complete bridge design, bridge rehabilitation, and bridge inspections. Their estimated budget for an unlimited number of students for a four-day seminar including field instruction in Sacramento is $96,000.

5. Industry-related seminars. Railroad Operations Safety Branch Associate Track Inspectors who specialize in bridge inspections will monitor the training practices of the railroads that operate in California through their annual seminars and railroad training break-out sessions.

(2) Process the Commission Will Use To Identify and Prioritize Which Rail Bridges Will Be Inspected Each Year

Step 1: Build a Bridge Inventory

The CPUC will build an inventory of all railroad bridges in the state. In order to categorize the bridges to prioritize the inspections, the bridge inventory will include essential data fields such as geographic coordinates, feature spanned, structural type, length, load capacity, age, and latest renovation date.[3]

The CPUC has started to populate a database to house a bridge inventory. Sources of data include: Internet searches, geographical information system (GIS) maps of waterways and railroad intersects, solicitations to CalTrain and two short-line railroads,[4] and a website of railroad bridge enthusiasts.[5] Although the CPUC possesses ownership and location information on approximately 1,000 of the over 5,000 bridges in California, it has load capacity information on only approximately 90 bridges.

To complete the bridge inventory, the CPUC has been working with the Federal Railroad Administration (FRA) to access the railroads' bridge inventories. Federal law, 49 Code of Federal Regulations, Part 237 (49 CFR Part 237) requires all track owners to adopt a bridge management program that identifies inspection requirements, including an accurate inventory of bridges and the essential data fields identified above. 49 CFR Part 237 also requires track owners to make the program documents and records available for inspection and reproduction by the FRA. Although the CPUC possesses federal authority to provide an enhanced investigative and surveillance capability through assumption,[6] the CPUC is working through the FRA to ensure the railroads do not imply an FRA-approval of the entire bridge management programs, when the CPUC is merely accessing the inventory. This is expected to be a slow and tedious process because the FRA employs just one bridge specialist to cover 10 western states, including California. Because the two largest railroads in California own the majority of the track in California, a comprehensive inventory needs to include their inventories. The CPUC, working through the FRA, has begun negotiations with the two large railroads in an effort to obtain their bridge inventories.

[3] Minimum inventory requirements according to 49 CFR 237
[4] A short-line railroad is an independent railroad company that operates over a relatively short distance.
[5] http://bridgehunter.com/
[6] Via 49 CFR Part 212.

The CPUC expects to compile a substantially complete bridge inventory by December 31, 2015.

Step 2: Identify Most Critical Criteria and Prioritize Bridges for Inspection

The bridge risk criteria have been split into two categories: the probability of failure and the consequence of failure.

The probability of failure depends on physical characteristics of the bridge and frequency of traffic, including the following:

1. Age of initial construction or subsequent reinforcement.
2. Structure type (open deck or ballast deck).
3. Bridge composition (wood, concrete, or steel).
4. Bridge design (simple beam, truss, arch, cantilever).
5. Length of span.
6. Bridge load ratings.
7. Frequency of traffic.
8. Frequency of traffic with heavy loads, such as steel, timber, and fuel in tank cars.
9. Whether the bridge is part of a span that includes a steep decline/incline with sharp curvature.
10. Proximity to seismic fault.

The consequence of failure depends on the external characteristics that would be affected in the course of a bridge failure. Criteria to prioritize bridges for inspection based on the consequence of failure include the following:

1. Frequency of hazardous materials traffic.
2. Adjacent features, such as population density, proximity to schools and hospitals, proximity to industrial facilities with flammable or explosive tanks, proximity to sensitive habitats or endangered species, proximity to fragile water bodies (such as fresh drinking water, etc.)
3. Proximity of crossovers, crossings, and double-slip switches to determine whether trains would "bottleneck" on the bridge.

The CPUC's method to identify and prioritize which rail bridges will be inspected are modeled after a methodology used by the Pennsylvania Department of Transportation (PDOT).[7] PDOT inspected a sample of 30 bridges. PDOT's methodology to choose those 30 bridges examined factors such as age, size of river spanned, number of bridges in each structural type, and bridge lengths within each superstructure type. The formula produced a weighted factor that was used to proportionally determine how many of the 30 samples would be selected from each bridge type. The exact bridges within each type were then randomly chosen to comprise the previously determined number of total

[7] Laman, Jeffrey A., PhD, and Robert C. Guyer. *Condition Assessment of Short-line Railroad Bridges in Pennsylvania*. Tech. no. FHWA-PA-2010-003-SU 022. Harrisburg, PA: Pennsylvania Dept. of Transportation & Pennsylvania State University, 2010. Performing organization: Thomas D. Larson Pennsylvania Transportation Institute

samples per bridge type. For example, if the factor for concrete arch bridge types was 10 and the sum of the factors for all bridge types was 100, then 3 concrete arch bridges (10% of 30) were randomly selected. The process was then repeated for the remaining bridge types until a total of 30 bridges were chosen to be inspected.

The CPUC plans to use slightly different approach to select a sample than PDOT. One of PDOT's primary considerations was bridge length, which is directly proportional to the cost of bridge repair or replacement. Instead, the CPUC will use bridge age because age is more directly related to risk. In California, the repair or replacement cost is borne by the track owner, not taxpayers. As such, cost, although important, is not essential to identify the state's most vulnerable bridges.

The CPUC will also differ from PDOT when choosing bridges for inspection. Rather than using a random selection, the CPUC will choose specific bridges within each structural type based on the consequences of failure, such as adjacent population and size of water body spanned.

To prioritize bridges for inspection, the staff will first review causal factors of actual bridge failures. After determining the most frequent causes, the staff will apply weights to each factor identified above, depending on how critical that factor influenced the bridge failure. The bridges will be ranked in the order of which has the highest risk of failure, based on whether it possesses the characteristics that occur the most frequently in bridge failures, as well as the other characteristics and consequential impacts identified above.

The staff will apply the data to geographic information system software in order to more closely identify the riskiest bridges based on probability, with the riskiest locations based on the consequence of failure.

Consequence factors and probability factors will be multiplied together to obtain a final "risk factor score." The 30 railroad bridges with the highest risk factors will be identified and scheduled for inspection.

Once the 30 inspections are completed, the bridges will be scored based on observed conditions of risk in the field (Appendix A, Observation Form: items 28-29) and given a combined score of 2-14 based on the inspection scores recorded for substructure and superstructure conditions. The inspection results will be used to extrapolate findings onto the entire population of railroad bridges. The initial inspection scores will be used to identify the likelihood of risk for the remaining bridges in the inventory going forward. For example, if timber bridges are shown to have the lowest structural integrity scores, they will be more highly prioritized in evaluating which bridges to inspect first for future inspections. The CPUC will incorporate the structural condition scores and geographic factors in a formula to prioritize the remaining bridges.

For demonstration purposes only, Appendix B illustrates this statistical method using a small inventory of 99 California railroad bridges.[8] The bridges are stratified with each stratum consisting of one of seven bridge types. The formula used to produce the 30 samples shown in Appendix B used age and size of

[8] Source of data: http://bridgehunter.com/

river spanned factors.[9] The second list shows the 30 bridges that were ultimately selected for inspection. The formula that the CPUC will use to select the 30 samples will be different from the one used in the example shown in Appendix B. The formula will be determined using the inventory information available immediately prior to commencement of inspections. The formula will have a single standard deviation factor rather than two. That factor will be a composite score based on the best available structural and environmental information.[10]

The expected load on some bridges will undoubtedly change over time. New materials and protocols may be developed to increase bridge safety. Earthquakes, fires, floods, landslides and accidents can affect the integrity of bridges. Further, population growth in the proximity of bridges can change the consequences of bridge failure. This process is dynamic and will be updated continually.

(3) Rail bridges to be inspected in 2014-15

The prioritization method described in Item 2 will determine which bridges will be inspected in 2014-15. The CPUC expects to hire the bridge inspectors by December 1, 2014. The first year will include intensive bridge inspection training. In early January 2015, the CPUC will run the calculations to determine which bridges should be prioritized based on best-available data. We expect the bridge inspectors to inspect the top 10-15 bridges in the latter half of fiscal year 2014-15, and the full 30 initial

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$$n_h = \frac{(n)(N_h)(\sigma_{Ah})(\sigma_{Rh})}{\sum_{n=1}^{h}(N_h)(\sigma_{Ah})(\sigma_{Rh})}$$

n = sample size (30)
N_h = number of bridges in h stratum
σ_{Ah} = standard deviation of age in h stratum
σ_{Rh} = standard deviation of size of river in h stratum
h = 7 strata

10

$$n_h = \frac{(n)(N_h)(\sigma_{Ch})}{\sum_{n=1}^{h}(N_h)(\sigma_{Ch})}$$

n = sample size (30)
N_h = number of bridges in h stratum
σ_{Ch} = standard deviation of composite factor in h stratum
h = 7 strata

inspections to be completed by December 31, 2015.[11] Thereafter, the CPUC will immediately continue additional inspections.

As new bridges are added to the database and as additional data are collected beyond the initial 30 sample inspections, the prioritization method can be improved and adjusted iteratively on a regular basis. For example, steel bridges may score differently in the subsequent inspections than they did in the initial inspections. They would therefore be assigned a higher prioritization score in the next round of prioritization calculations.

As a safety measure, the two bridge inspectors will work as a team. Assuming the inspection team can perform two inspections per day, and allowing two days per week for travel, one day to write up the findings, and 49 weeks of work per year, they can perform about 98 inspections per year. At a rate of 98 bridges per year, it would take approximately 50 years to complete inspections on all of California's 5,000-plus bridges.

Not all bridges will need to be inspected in the short term. Newer bridges are often constructed with short concrete spans due to cost and maintainability considerations. If a bridge receives a low-risk score, it can be scheduled for an inspection in out years.

As more inspections are completed, some bridges may need follow-up inspections. For example, 49 CFR 237 requires track owners to include load capacities in their bridge management programs. Some inspections may cause the CPUC to question the correctness of the stated load capacities. If a bridge with a questionable load capacity contains many of the risk factors described above, the CPUC will schedule an expedited follow-up inspection by a qualified bridge engineer. Such an inspection could be performed by a FRA bridge specialist or a bridge engineer on loan from Caltrans.

[11] The first year, we anticipate low productivity due to a steep learning curve. In out years, we anticipate approximately 98 bridge inspections per year.

Appendix A

Railroad Bridge Observation Form

Item #	INSPECTION DATA	
25	Last General Inspection Date	
26	Diving Inspection Required?	
27	Date of Last Diving Inspection	
28	Superstructure Condition	
29	Substructure Condition	
30	Channel Condition	
31	Culvert Condition	
	MISCELLANEOUS DATA	
32	Latitude	
33	Longitude	
34	Photos Associated	If Y paste link in this box
35	Vertical Clearance	
36	Superstructure Notes	
37	Substructure Notes	
38	Channel Notes	
39	Culvert Notes	
40	RMSR Issued & Notes	
41	FRA Form 96 issued & Notes	

	28	Superstructure Condition is the condition of all structural members above the bearings. Bearings and the deck are included in the superstructure. Culvert type structures should have this item coded 8 - NA.
	29	Substructure Condition is the condition of the piers, abutments, piles, fenders, footings, or other components. Culverts should have this item coded 8 - NA. The substructure condition is independent of the deck and superstructure. For non-integral superstructure and substructure units, the substructure shall be considered as the portion below the bearings. For structures where the substructure and superstructure are integral, the substructure shall be considered as the portion below the superstructure.
	30	Channel Condition is the condition associated with the flow of water through the bridge, such as stream stability and the condition of the channel, riprap slope protection or stream control devices such as spur dikes. Bridges not over waterways will have the item coded 8 - NA.
	31	Culvert Condition is the overall condition of the alignment joints, structural condition, and other items associated with culverts. Note any significant blockage of culvert.

Appendix B

Method to derive makeup of 30 sample bridges based on 99 bridges

Structural Type	Count (N)	River StdDev. (RSD)	Age StdDev. (ASD)	Factor (N*RSD*ASD)	% of Factor Sum	Sample Size (% of factor sum * 30)	[rounded]
CAR	8	0.87	26.82	185.84	5.6%	1.69	**2.00**
DPG	16	0.86	33.66	465.21	14.1%	4.23	**4.00**
DTR	17	0.89	31.45	476.90	14.4%	4.33	**4.00**
PPG	4	0.83	30.74	101.97	3.1%	0.93	**1.00**
PTR	4	0.87	6.60	22.86	0.7%	0.21	**0.00**
TPG	3	0.82	37.19	91.09	2.8%	0.83	**1.00**
TTR	47	0.90	46.39	1957.15	59.3%	17.79	**18.00**
Sum	99	-	-	3301.02	100%	30.00	**30.00**

Based on the example above using 99 bridges, the following 30 bridges would be scheduled for an inspection.

30 Samples to be Inspected

Bridge#	Owner	Bridge Type	Type Code	Spanned Feature	River Score	Year Built	Age
1		Concrete Arch	CAR	Applegate Road	1	1927	87
6	UP	Closed-Spandrel Arch	CAR	Santa Ana River	3	1904	110
13	NWPR	Deck Plate Girder	DPG	Corte Madera Creek	4		10
19	SPRR	Deck Plate Girder	DPG	Rubio Wash	2	1930	84
21	UP	Deck Plate Girder	DPG	Stenner Creek	2	1903	111
23	BNSF	Deck Plate Girder	DPG	Tuolumne River	3		10
25	UP	Swing	DTR	Sacramento River	4	1911	103
31	US Forest Service	Warren Deck Truss	DTR	Kings River	3		10
36	UP	Warren Deck Truss	DTR	Doney Creek	4	1939	75
41	UP	Warren Deck Truss	DTR	Salt Creek/Lake Shasta	4	1942	72
44	UP	Pony Plate Girder	PPG	Crown Valley Rd	1		10
50		Pony/Through Plate Girder	TPG	Arroyo de Laguna	1	1860	154
53	NWPR	Through Truss	TTR	Eel River	4	1913	101
54	UP	Through Truss	TTR	Mojave River	3		10
55	UP	Pratt Through Truss	TTR	Mojave River	3	1938	76
58	UP/BNSF	Warren Through Truss	TTR	American River	4	1910	104
59	UP/BNSF	Warren Through Truss	TTR	American River	4		10
64	Sonoma-Marin	Through Truss	TTR	Petaluma River	3	2010	4
67	BNSF/UP	Through Truss	TTR	Truckee River	2	1907	107
71	NWPR	Warren Through Truss	TTR	Petaluma River	4		10
77	BNSF	Through Truss	TTR	San Joaquin River	3	1930	84
80	UP	Through Truss	TTR	Sespe Creek	2	1902	112
83	UP	Through Truss	TTR	CA 70	1	1909	105

84		Through Truss	TTR	Feather River	4		10
85	UP	Through Truss	TTR	Santa Paula Creek	2	1916	98
86	UP	Warren Through Truss	TTR	US 101	1	1961	53
87		Warren Through Truss	TTR	Los Angeles River	4	1930	84
88	UP	Pratt Through Truss	TTR	Sacramento River	2	1901	113
90	UP	Through Truss	TTR	Sacramento River	2	1901	113
99	UP	Through Truss	TTR	North Fork Feather River	2		10