STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

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METHOD OF TEST FOR OPERATION OF BRIDGE PROFILOGRAPH AND EVALUATION OF PROFILES

A. SCOPE

This test method describes the operation of the Bridge Profilograph, the procedure for determining the "counts per 100 ft" from the profilograms, and the procedure for locating individual high points in excess of a specified limit.

B. EQUIPMENT

Bridge Profilograph - consists of a 12 ft long frame supported on one wheel at each end with an outrigger wheel for balancing support (see Figure 1). The profile is recorded from the vertical movement of a wheel attached at the midpoint of the frame and is in reference to the mean elevation of the end wheels in contact with the deck surface.

Profilogram - is recorded on a scale of 1 in. = 15 ft longitudinally and 1 in. = 1 in. vertically.

Motive Power - is supplied manually from the push handle in the rear. Steering is accomplished by rotating the handle grip to move the front wheel.

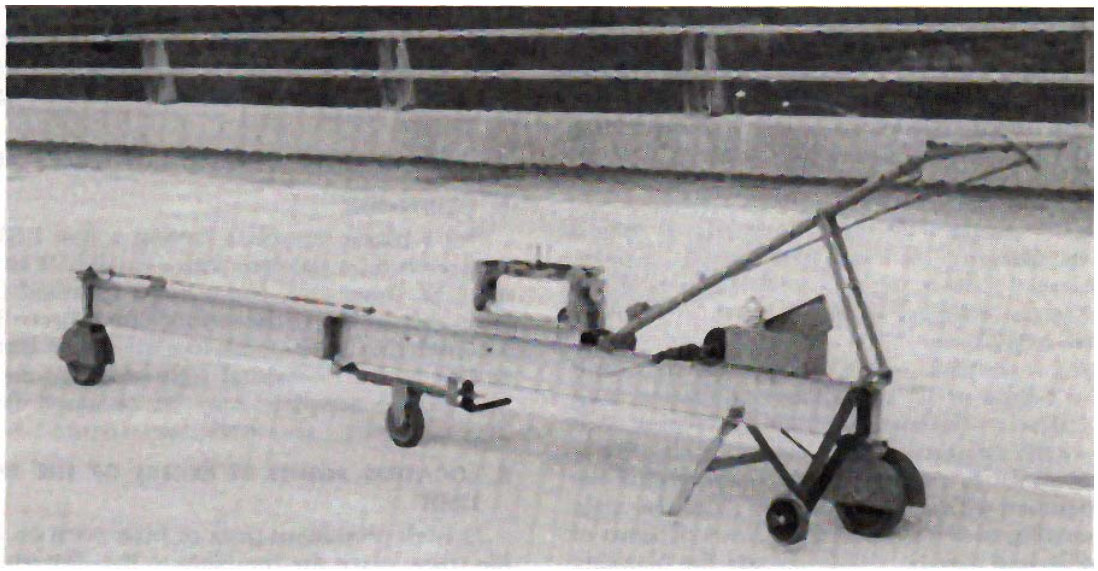

FIGURE 1. Bridge Profilograph

PART 1: OPERATION OF THE BRIDGE PROFILOGRAPH OPERATION

1.A. OPERATION

The Bridge Profilograph is transported in 2 pieces that readily bolt together. Mount the recorder using 2 spring clips on each end. Connect the cable from the profile wheel to the

recorder for the vertical scale movement. Connect the speedometer cable hookup to the recorder for the horizontal scale movement.

When operating the profilograph, move at a speed no greater than a walk. Moving too fast will result in a profilogram that is difficult to evaluate. Sweep the deck surface clean of any loose material along the paths to be profiled. Keep the profilograph's wheels clean and free of particles, which may become embedded in the tires. Obtain profiles in accordance with the specifications for the project.

1.B. CALIBRATION

Check the profilograph's calibration periodically.

1. The horizontal scale can be checked by running a known distance and scaling the result on the profilogram. If the horizontal scale is in error of more than ± 2 % (0.02 in.), the rear wheel of the profilograph should be replaced with one of proper diameter and other causes should be investigated and corrected if found.

2. The vertical scale is checked by putting a gage or sturdy material of known thickness under the profile wheel and scaling the result on the profilogram. If the vertical scale is in error of more than ± 2 % (0.02 in.), the cause of the incorrect height should be investigated and corrected if found.

PART 2: DETERMINATIONS OF COUNTS PER 100 FEET FROM PROFILOGRAMS

2.A. PROCEDURE

To determine the "counts per 100 ft," use a plastic scale 1.70 in. wide and 6.66 in. long to represent a bridge deck length of 100 ft at a scale of 1 in. = 15 ft.

Near the center of the scale is an opaque blanking band 0.15 in. wide extending the entire length of 6.66 in. On either side of this band are scribed lines 0.10 in. apart, parallel to the opaque band. These lines serve as a convenient scale to measure deviations of the profile line above or below the blanking band. These deviations are called "scallops."

2.B. METHOD OF COUNTING

Place the plastic scale over the profile in such a way as to "blank out" as much of the profile as possible. When this is done, any scallops that appear above and below the blanking band will be approximately balanced (Figure 2).

Starting at the right end of the scale, measure and total the height of all the scallops appearing both above and below the blanking band, measuring each scallop to the nearest 0.05 in. (half a tenth of an inch). Write this total on the profile sheet near the left end of the scale together with a small mark to align the scale when moving to the next section. Short portions of the profile line may be visible outside the blanking band, but unless they project 0.03 in. or more and extend longitudinally for 0.15 in. or more on the profilogram, they are not included in the count (see Figure 2 for illustration of these special conditions).

When scallops occurring in the first 100 ft are totaled, slide the scale to the left, aligning the right end of the scale with the small mark previously made and proceed with the counting in the same manner. The last section counted may or may not be an even 100 ft. If not, the last section should be scaled to determine its length and then that portion of 100 ft should be prorated to equivalent 100 ft. For example:

Section Length	Counts (tenths of an inch per 100 ft)
100 ft	4
100 ft	3
100 ft	2
60 ft	3.33*

* Calculation for equivalent count:

Example: 2.0 counts in 60 ft prorated to 100 ft

$$\frac{2.0}{60} = \frac{C}{100} \quad \text{where: C = prorated count}$$

$$\text{Therefore, } C = \frac{2.0 \times 100}{60} = 3.33$$

2.C. LIMITATIONS OF COUNT IN 100-FOOT SECTIONS

When the specifications limit the profile count in "any 100-foot section," the scale is moved along the profile and counts made at various locations to find those sections, if any, that do not conform to specifications. The limits are then noted on the profile and can be later located on the deck surface prior to grinding.

2.D. LIMITS OF COUNTS

Profiles of the first and last 6 ft of the section being tested cannot be obtained until the adjoining pavement or bridge section is in place. At such time that the concrete bridge approach pavement is to be evaluated, profiles should be obtained starting at least 60 ft prior to each structure or approach slab and continuing to at least 25 ft onto the bridge deck.

PART 3. DETERMINATION OF HIGH POINTS

3.A. EQUIPMENT

Use a plastic template having a line 1.33 in. long scribed on one face with a small hole or scribed mark at either end, and a slot a specified distance from and parallel to the scribed line (Figure 3). The 1.33 in. line corresponds to a horizontal distance of 20 ft on the horizontal scale of the profilogram.

3.B. LOCATING POINTS IN EXCESS OF THE SPECIFIED LIMIT

At each prominent peak or high point on the profile trace, place the template so that the small holes or scribe marks at each end of the scribed line intersect the profile trace to form a chord across the base of the peak or indicated bump. The line on the template need not be horizontal. With a sharp pencil, draw a line using the narrow slot in the template as a guide. Any portion of the trace extending above this line will indicate the approximate length and height of the deviation in excess of the specified limit.

There may be instances where the distance between easily recognizable low points is less than 20 ft. In such cases, a shorter chord length must be used in making the scribed line on the template tangent to the trace at the low points. It is the intent, however, of this requirement that the baseline for measuring the height of bumps will be as nearly 20 ft as possible, but in no case exceed this value.

When the distance between prominent low points is greater than 20 ft, make the ends of the scribed line intersect the profile trace when the template is in a nearly horizontal position. A few examples of the procedure are shown in Figure 3.

C. HEALTH AND SAFETY

It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Prior to handling, testing or disposing of any materials, testers must be knowledgeable about safe laboratory practices, hazards and exposure, chemical procurement and storage, and personal protective apparel and equipment.

Caltrans Laboratory Safety Manual is available at:

http://www.dot.ca.gov/hq/esc/ctms/pdf/lab_safety_manual.pdf

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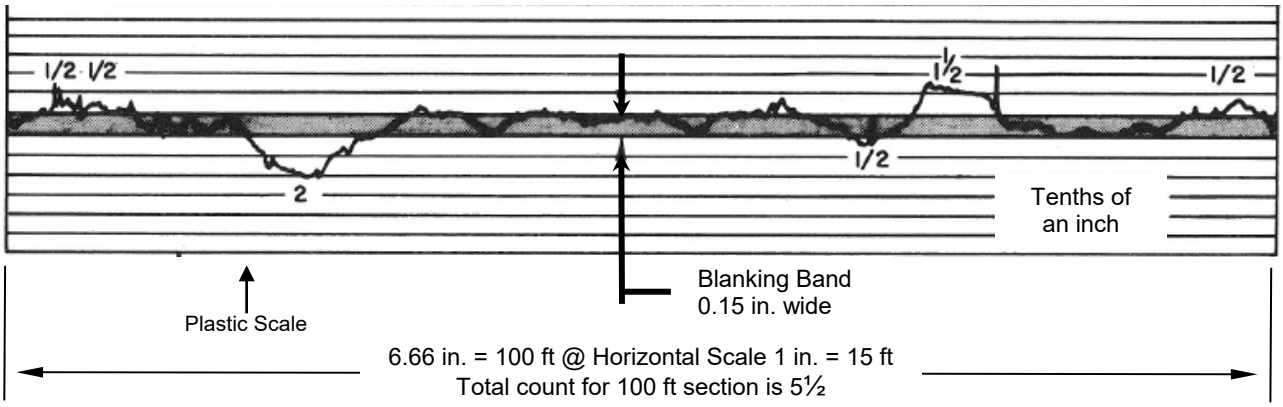
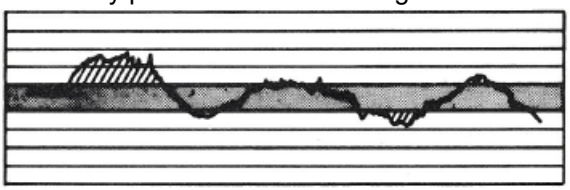
(California Test 547 contains 6 pages)

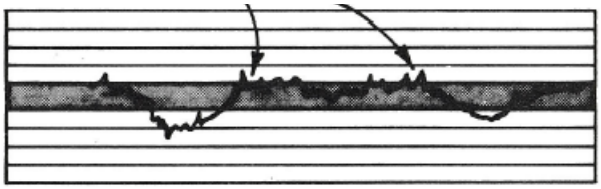


TYPICAL CONDITIONS

Scallops are areas enclosed by profile line and blanking band

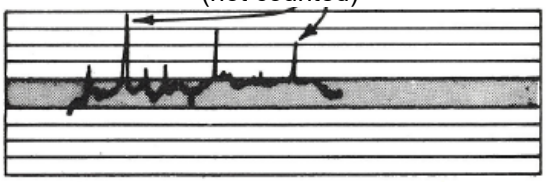


Small projections which are not included in the count



SPECIAL CONDITIONS

Rock or dirt on deck (not counted)



Double peaked scallop (only highest part counted)

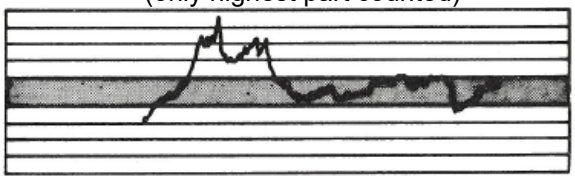
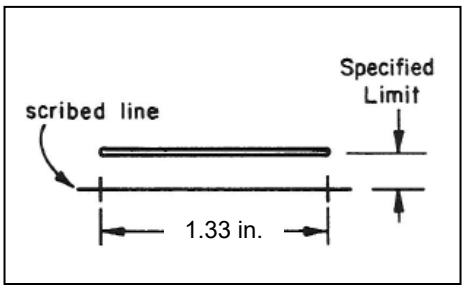
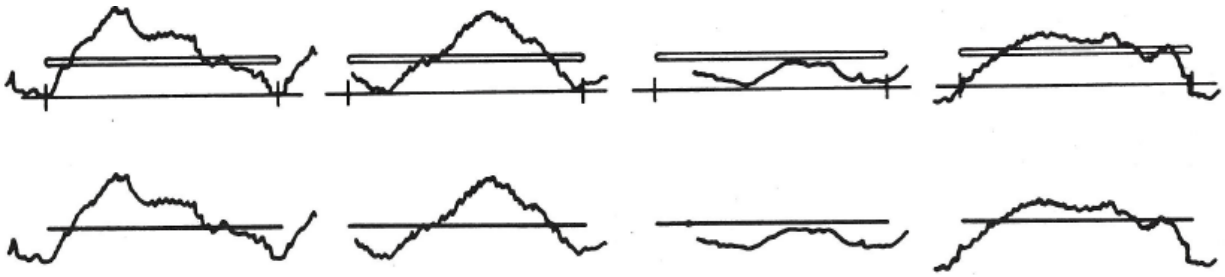


FIGURE 2. Method for Obtaining Profile Counts



Plastic Bump Template



Baseline Approx. 20 ft	Baseline Less than 20 ft	Peak Less than Limit	Baseline Greater than 20 ft

FIGURE 3. Method for Placing Template When Locating Bumps to Be Reduced