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OPERATION OF BRIDGE PROFILOGRAPH AND EVALUATION OF PROFILES

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "SAFETY AND HEALTH" in Section B of this method. It is the responsibility of the user of this method to consult and use appropriate safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

A. SCOPE

The operation of the Bridge Profilograph, the procedure for determining the "counts per 30 m" from the profilograms, and the procedure for locating individual high points in excess of a specified limit are described in Parts 1, 2, and 3, respectively, of this test method.

B. SAFETY AND HEALTH

Prior to operating equipment, Caltrans testers are required to read Caltrans Laboratory Safety Manual: Part C, Section 1. Safe Laboratory Practices and Section 2, Field Operations and Testing. Users of this method do so at their own risk.

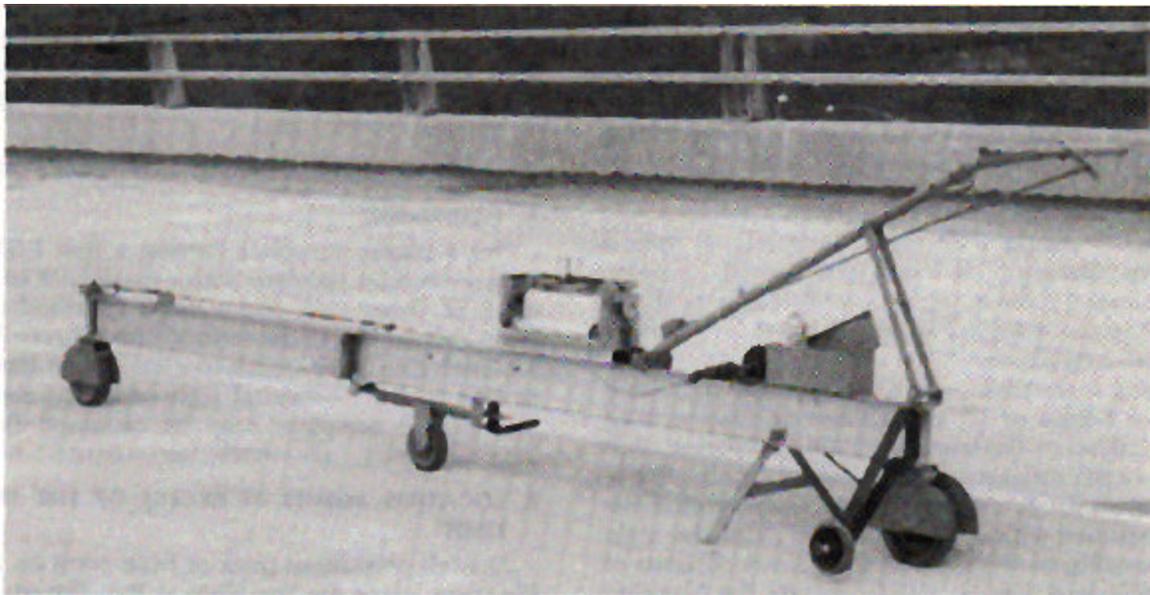


Figure 1
Bridge Profilograph

**PART 1: OPERATION OF THE BRIDGE
PROFILOGRAPH**

A. EQUIPMENT

The Bridge Profilograph consists of a frame 3.66 m long 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. The profilogram is recorded on a scale of 1:180 longitudinally and 1:1 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.

B. OPERATION

The Bridge Profilograph is transported in two pieces that readily bolt together. The recorder is mounted by use of two spring clips on each end. A cable is connected from the profile wheel to the recorder for the vertical scale movement, and a speedometer cable hookup to the rear wheel is used for the horizontal scale movement.

In operation, the profilograph should be moved at a speed no greater than a walk. Too high a speed will result in a profilogram that is difficult to evaluate. The deck surface should be swept clean of any loose material along the paths to be profiled, and the wheels should be kept clean and free of particles, which may become embedded in the tires. Initial profiles should normally be obtained at approximately each planned wheel path of each traffic lane. Calibration of the profilograph should be checked periodically. The horizontal scale can be checked by running a known distance and scaling the result on the profilogram. If the scale is in error more than ± 2 percent, the rear wheel of the profilograph should be replaced with one of proper diameter. The vertical scale is checked by putting a board of known thickness under the profile wheel and again scaling the result on the profilogram. If the scale is in error, the cause of the incorrect height should be determined and corrected.

**PART 2: DETERMINATIONS OF COUNTS
PER 30 m FROM PROFILOGRAMS**

A. PROCEDURE

To determine the "counts per 30 m," use a plastic scale 40 mm wide and 166.7 mm long to represent a bridge deck length of 30 m at a scale of 1:180. Such a plastic

scale may be obtained from the Transportation Laboratory in Sacramento. Near the center of the scale is an opaque blanking band 3.8 mm wide extending the entire length of 166.7 mm. On either side of this band are scribed lines 2 mm 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."

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 (see 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 1 mm. 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 0.6 mm or more and extend longitudinally for 3.8 mm 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 30 m 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 30 m. If not, the last section should be scaled to determine its length, and then that portion of 30 m should be prorated to equivalent 30 m. For example:

Section Length	Counts, mm each 30 m
30 m	5
30 m	4
30 m	2
18.3 m (2.0 counts in 18.3 m prorated to 30 m)	3.3

**C. LIMITATIONS OF COUNT IN 30 m
SECTIONS**

When the specifications limit the profile count in "any 30 m 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.

D. LIMITS OF COUNTS

Profiles of the first and last 2 m 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 18 m prior to each structure or approach slab and continuing to at least 8 m onto the bridge deck.

PART 3. DETERMINATION OF HIGH POINTS

A. EQUIPMENT

Use a plastic template having a line 33.3 mm 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 33.3 mm line corresponds to a horizontal distance of 6 m on the horizontal scale of the profilogram.) The plastic template may be obtained from the Transportation Laboratory in Sacramento.

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 6 m. In such cases, a shorter chord length shall 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 6 m as possible, but in no case exceed this value.

When the distance between prominent low points is greater than 6 m, make the ends of the scribed line intersect the profile trace when the template is in a

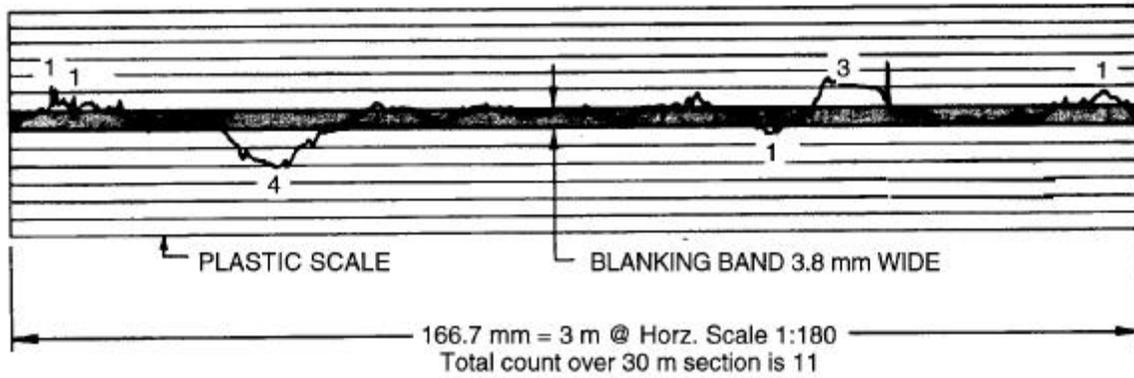
nearly horizontal position. A few examples of the procedure are shown in Figure 3.

REFERENCES:

None

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METHOD FOR OBTAINING PROFILE COUNTS



TYPICAL CONDITIONS

Scallops are areas enclosed by profile line and blanking band. (Shown crosshatched in this sketch.)

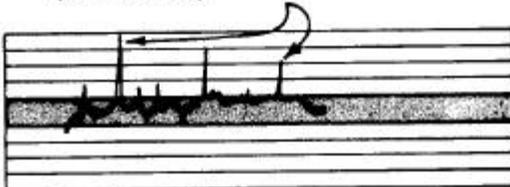


Small projections which are not included in the count.



SPECIAL CONDITIONS

Rock or dirt on deck (not counted)



Double peaked scallop. (Only highest part counted)

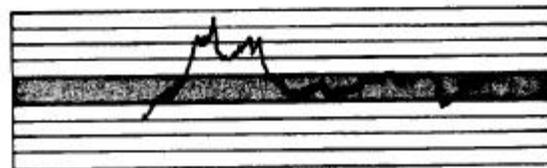
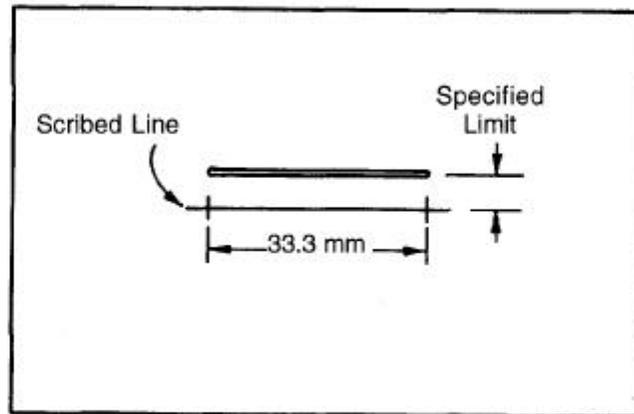


FIGURE 2

**METHOD FOR PLACING TEMPLATE WHEN
LOCATING BUMPS TO BE REDUCED**



PLASTIC BUMP TEMPLATE

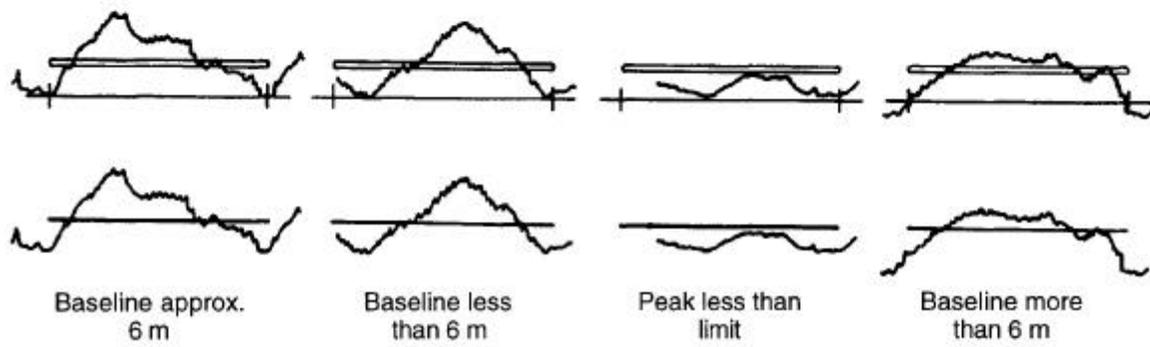


FIGURE 3