DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
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METHOD OF TEST FOR DEFLECTION OF PLASTIC TRAFFIC SIGNAL FACE

A. SCOPE

This test method describes the procedure for simulating a wind loading on a plastic traffic signal face and the measurement of the noload permanent set (deflection) after removal of the load.

B. APPARATUS

1. Source the following material.

   a. Base 2 in. x 6 in. x 78 in. long channel.
   b. Two unistruts, 64 in. long.
   c. Brace to support unistrut.
   d. One 12 in. long section of 1.5 in. diameter standard steel pipe with 2 in. of thread at one end.

2. Two locknuts (type used for signal face housing mounting).

3. One Steel washer .375 in. thick with 2 in. I.D. and 2.875 in.O.D..

4. One serrated nylon washer inserted between plastic signal section and the metal mounting assembly.

5. Three 2 in. diameter pulleys mounted on unistrut.

6. Three "weight holders" with attached cables and weights.

7. Gravity-activated bubble-protractor device.

C. TEST PROCEDURE

1. Mount the traffic signal face (complete with lenses, hoods, back plates and miscellaneous hardware) on a rigid frame for front loading as shown in Figure 1 and for back loading as shown in Figure 2.

2. Apply a test load that will simulate 70 mph wind load applied perpendicular to the signal face. The appendix on page 5 provides a formula to determine the required test loads for a specified wind load

3. Record the angle of deflection under the pre-load conditions (with weight-holders attached) and with the bubble protector attached to the top of the signal face as shown in Figures 1 and 2.

4. Apply test load slowly and equally, distributed between the three signal sections. Apply test load for a period of 24 hours.

5. After 24 hours, remove the test loads and immediately record the angle of deflection with the bubble protractor.

6. The duration of the test load may be shortened to one hour if the no-load permanent set is less than 95 % of that specified. The test shall be continued for the full 24 hours if the one-hour permanent set is greater than 95 % of that specified.

7. The permanent set shall be the difference in deflection between the pre-load conditions recorded under (3) and after the one-hour or 24-hour period recorded under (6) or (5).

D. REPORTING OF RESULTS

Report test results on Form TL-6039. Report the angle of deflection (permanent set) in degrees, any damage to the signal face or back plate, and whether the test results were obtained under the one-hour or 24-hour test period.

E. DEFINITIONS

The following definitions shall apply to all California Test Methods that relate to Traffic Signal Heads.
A SIGNAL SECTION is a single light unit consisting of a housing, reflector, lamp receptacle, lamp, lens, door and visor.
A SIGNAL FACE is an arrangement of signal sections which controls one or more traffic movements in a single direction.
A SIGNAL HEAD is an assembly of one or more signal faces.
A STANDARD SIGNAL FACE is composed of all 8 in. or all 12 in. sections.
A COMBINATION SIGNAL FACE is composed of 8 in. and 12 in. sections.
A SIGNAL LENS is that part of the optical unit which redirects the light coming directly from the light source and its reflector.

F. CALCULATION

See Figure 3 on Page 5.

H. 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

End of Text
(California Test 605 contains 5 pages)

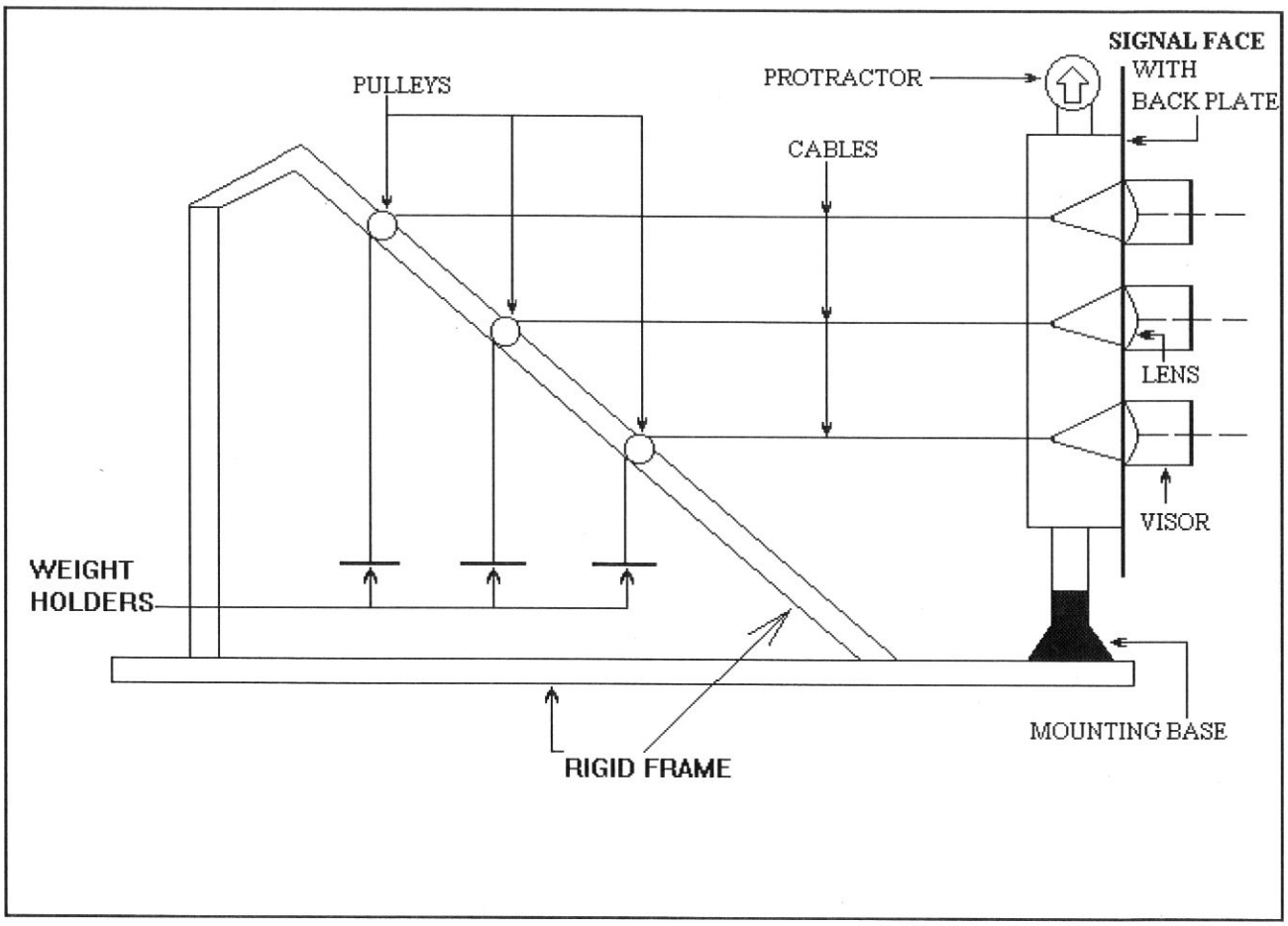


FIGURE 1. Loading Applied to Front of Signal Face

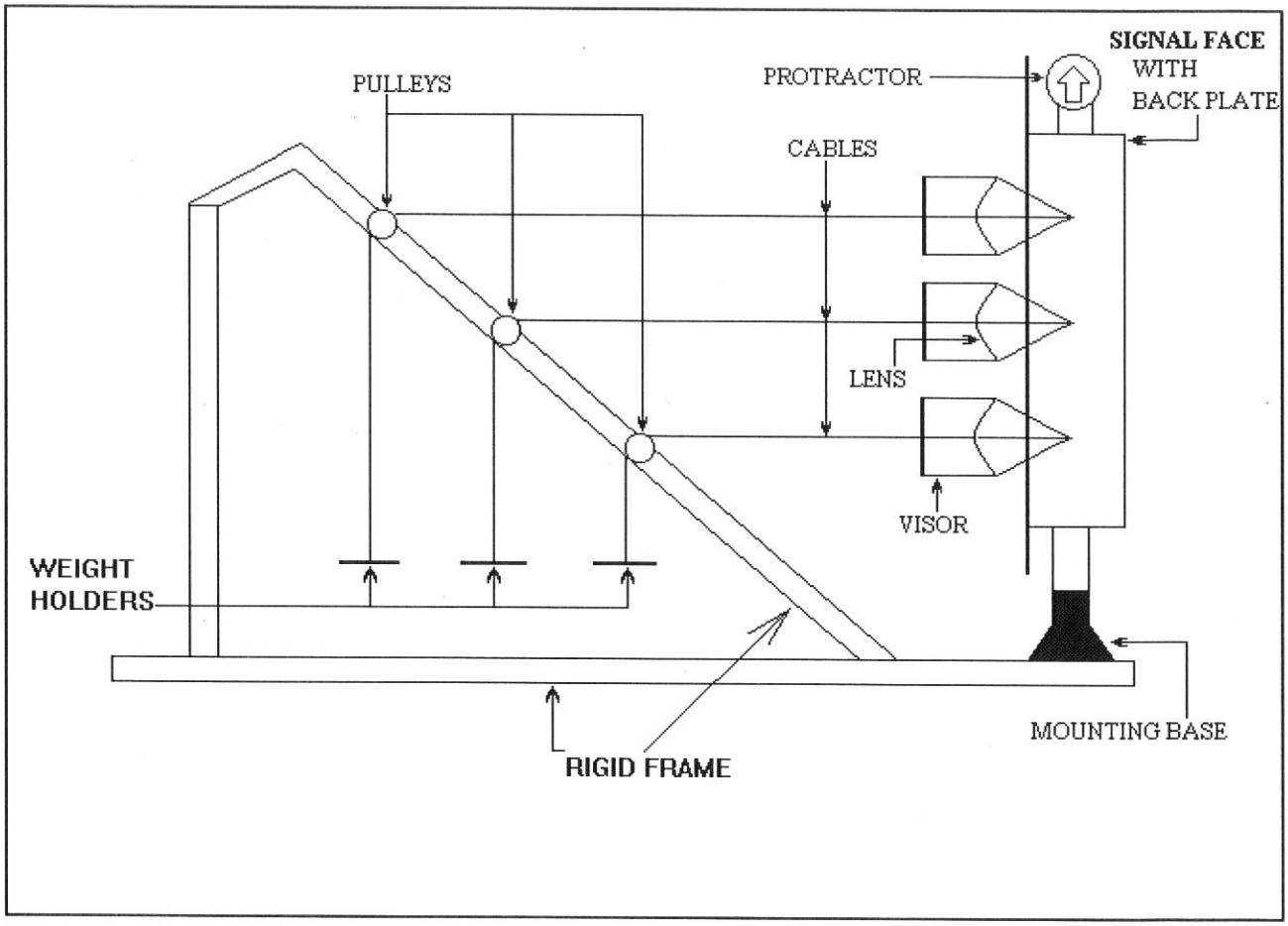
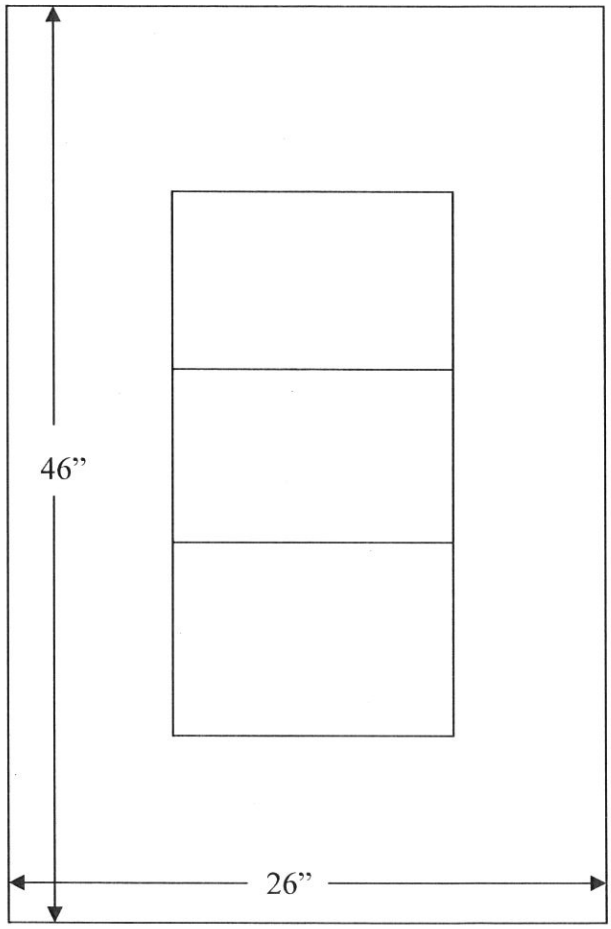


FIGURE 2. Loading Applied to Back of Signal Face



Wind Pressure:
$P = .00256 \times V^2$

P – pressure per square foot
V – Wind velocity (mph)

Wind Load:
F = A x P x cd

F – Force
A – Surface area (ft^2)
P – Wind pressure (psf)
Cd – Drag coefficient (1.4 for a small flat surface)

Total test load = F

Section load = Total test load / 3

Example:

Wind velocity = 70 mph
Surface area = 8.3 ft^2
Cd = 1.4 (small flat surface)

$P = .00256 \times (70)^2$
P = 12.54 psf

$F = 8.3\ ft^2 \times 12.54\ psf \times 1.4$
F = 145.7 lbs

Section load = 145.7 / 3
Section load = 48.57 lbs. By rounding off, a section load of 49 lbs will be acceptable.

Figure 3. Calculation of Test Load For Typical 200mm Signal Face