INSTALLATION OF STRONG-MOTION SEISMOGRAPH AT EL CENTRO, CALIFORNIA

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The author provides exact information on an aspect of the famous El Centro earthquakes which are used quite often in the dynamic analyses for various structures. During discussions on the applicability of the input-loss concept (Yamahara, 1970) to the El Centro earthquake records, the author has experienced several occasions to notice that exact knowledge is lacking in general concerning how the accelerograms of the El Centro earthquakes were actually recorded.

Building: Fig. 1 shows an exterior view of the Southern Sierra Power Company Terminal Station at El Centro, California, in which the seismic recording instrument is located. The building is two stories high (if the half basement is considered a story) of very heavy concrete construction and is very heavily reinforced. The building is 60×80 feet in size. It was originally built to house a gas engine, which at that time was the largest on the Pacific Coast. In Fig. 2 the dotted lines represent the foundation of the old engine, and this foundation is shown in detail in Fig. 3. The portion in the center of the block (shown cross-hatched) was removed when the old engine was broken and junked.

In addition to this massive piece of concrete inside the building which, as shown in Fig. 3, extends into the ground about 20 feet below the basement floor, the walls of the building are of heavy construction, being 12 inches thick, and flaring out to a greater thickness underground, and being further strengthened by the buttresses at sides and corners.

Fig. 1. Southern Sierra Power Co. Terminal Station

Fig. 2. Building Plan

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Fig. 3. Foundation of Old Engine

Fig. 4. Seismograph Room

There is one interior cross wall 10 inches thick as shown in Fig. 2, and the rest of the building is without interior columns.

The seismograph room is underneath the stairway, and walls around the room are of concrete. Plan and cross-section of the room is shown in Fig. 4.

Geology: The alluvium beneath E1 Centro is quite certainly hundreds of feet deep and its thickness may actually be several thousands of feet. The surface material is soft silt. The alluvial strata consist mainly of silt and other soft lake beds with some beds of gravel and sand. It is material deposited by the Colorado River on its alluvial fan or delta. The depth to the water is probably some tens of feet. Dynamic properties of the foundation material are not exactly known. The alluvium at E1 Centro is part of a huge bed of loose detritus laid down in a trough formed by subsidence of slices several miles wide between branches of the San Andreas fault.

The input loss of earthquake power: The length in N-S direction of the Southern Sierra Power Company Terminal Station is 80 feet as shown in Fig. 2 and the wave velocity in the vicinity of the ground surface is estimated on the basis of the data (Duke and Leeds,

1962) at $V = 1200$ ft/sec. Then, according to Yamahara (1970), the number defined by equation (12) in his paper can be calculated as follows:

$$n = \frac{80}{0.01 \times 1200} \simeq 6.7$$

If the effective input motion is computed with respect to the N-S component of E1 Centro earthquake May 18, 1940, by using $n \doteq 7$, it can be seen that the maximum acceleration had been reduced by about 4.5% prior to reaching the seismograph installed on the foundation slab.

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