STRONG-MOTION RECORDS FROM THE COLUMBIA BAY, ALASKA, EARTHQUAKES OF JULY 12 AND SEPTEMBER 7, 1983

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The Alaskan earthquakes of July 12 and September 7, 1983, located in the Prince William Sound area, were recorded by strong-motion accelerographs operated by the U.S. Geological Survey (USGS) in Anchorage, Whittier, and Valdez (Figure 1 of preceding article). The records from these two earthquakes provide the most complete set of data and show the largest ground accelerations yet observed for any Alaskan shock. Nine instruments were triggered by the July 12 earthquake including two at the nearest stations in Valdez, approximately 45 km epicentral distance, where peak accelerations of .32 g and .13 g were recorded at the High School and City Hall (Figure 1). Records of the September 7 event from the same two sites do not show this large variation in acceleration although ground motion was significantly lower than during the July 12 earthquake (compare the two High School records in Figure 1).

Table 1, a summary of peak horizontal accelerations recorded during the two earthquakes, indicates that maximum values at Anchorage (145 to 150 km) were approximately .03 g during both events. The present Anchorage network consists of eight accelerographs, three ground instruments, three units in the 7-story Alaska Hospital and two units in the 22-story Anchorage Westward Hotel. The upper level records from the September 7 earthquake recorded at the Alaska Hospital, exhibit characteristics dominated by the first and second translational modes of the structure (Figure 1). This building is instrumented in the same manner as that required by the Uniform Building Code (UBC), i.e., with one accelerograph at the lowest level, one at a mid-level and the third near the top of the building. The instruments are interconnected for simultaneous starting and timing signals.

The UBC method of instrumentation, originally pioneered by Los Angeles in 1965, provides only rudimentary information concerning dynamic building response during a potentially damaging earthquake. Although this recording scheme was considered adequate under the technology constraints of that time, analyses of numerous records from the magnitude 6.5 San Fernando earthquake indicated there was insufficient data for a rigorous analysis of any one structure. Subsequently, with the development of central-recording remote-transducer systems, more adequate techniques for instrumenting buildings were proposed. This new scheme calls for the siting of accelerometers throughout the structure to record three sets of deformation modes in buildings with rigid floor systems: two sets primarily horizontal translational motion and the third set primarily torsional motion. When flexible floor systems are considered, the sensors are located to detect in-plane bending as well (Reference 1). Considering the level of seismicity in Alaska and the recent construction of larger buildings, it seems appropriate to instrument some of the newer structures with a recording system that will more effectively define building response to strong earthquake motion.

REFERENCE

Rojahn, C., and Matthieson, R. B., 1977, Earthquake Response and Instrumentation of Buildings, Journal of the Technical Councils of ASCE, December 1977, p. 1-11.

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Table 1

PEAK HORIZONTAL ACCELERATIONS FROM THE EARTHQUAKES
OF 12 JULY AND 7 SEPTEMBER, 1983

Station	12 July Peak Accel. (g) Distance	7 September Peak Accel. (g) Distance	Station	12 July Peak Accel. (g) Distance	7 September Peak Accel. (g) Distance
Anchorage	(150 km)	(145 km)			
Alaska Hospital					
1st floor	.03	.03			
4th floor	.04	.05			
7th flor	.08	.09	Valdez	(45 km)	(55 km)
Anchorage Westward Hotel			City Hall	.13	.06
Basement	.03	.04	Dock Co.	b	.08
22nd fl.	.07	.07	High School	.32	.09
Alaska Pacific U.	a	a	Whittier	(90 km)	(80 km)
Federal Bldg.	.03	.03	Dock Co.	c	.08
USGS Bldg.	.03	.03			

[a] Only one trigger. Earthquake date unknown.

[b] Power cable disconnected.

[c] No record for unknown reasons.

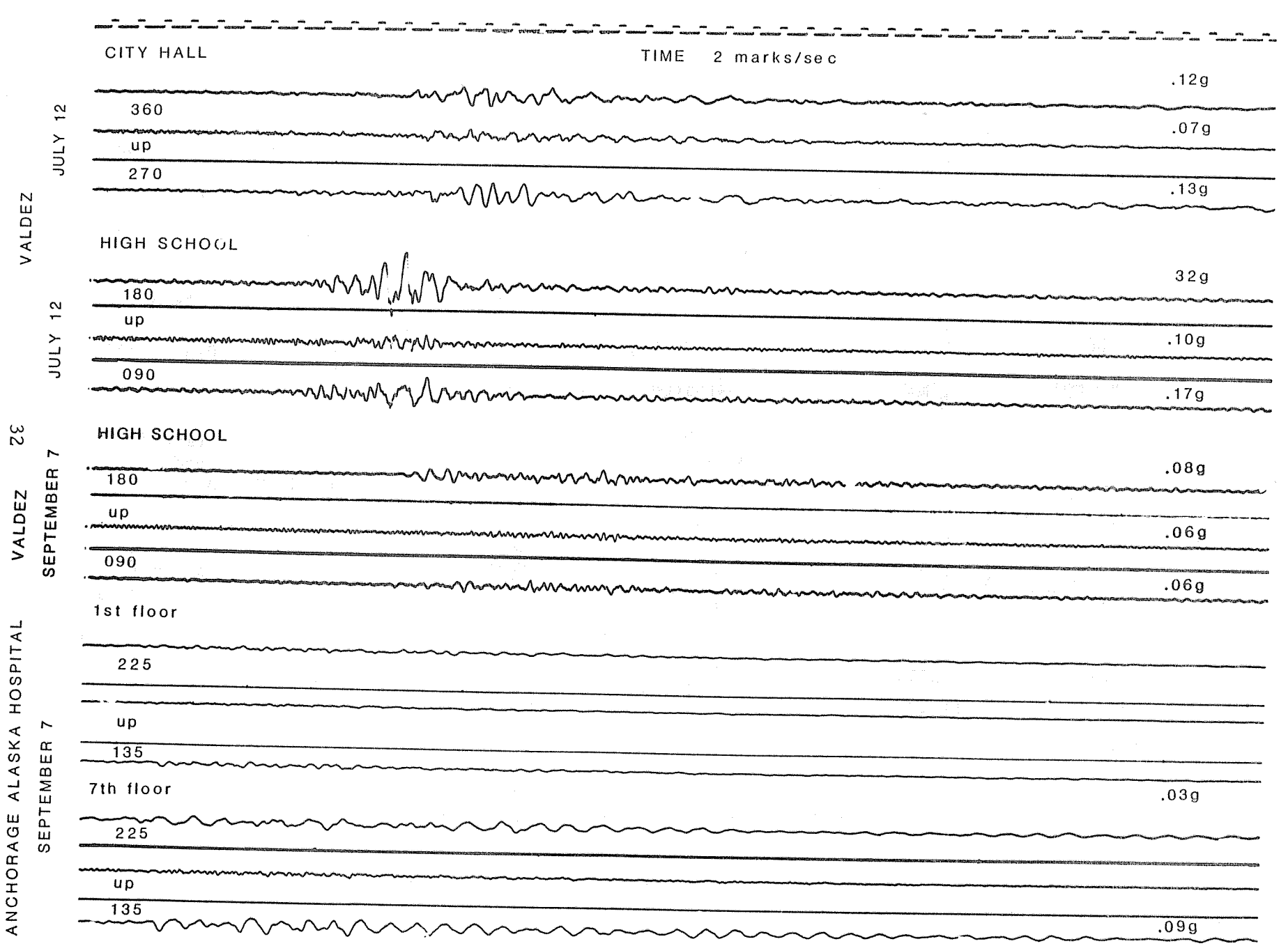

Figure 1. Selected records from the July 12 and September 7 earthquakes.