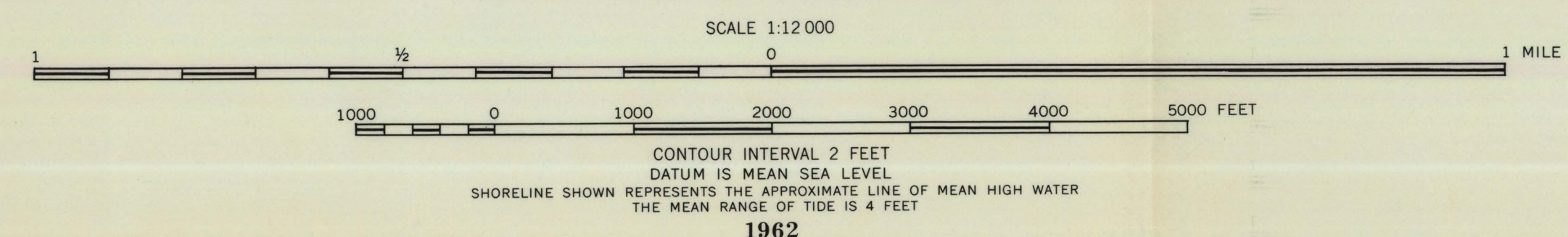




Base from U.S. Coast and Geodetic Survey topographic maps, scale 1:10,000

TIDAL FLOODS, ATLANTIC CITY AND VICINITY, NEW JERSEY

By D. M. Thomas and George W. Edelen, Jr.



The Atlantic City Electric Co. has maintained a tide gage since January 1955 on Beach Thorofare at its powerplant located north of the railroad bridges near McKinley Avenue (extended) in Atlantic City. In addition to the Beach Thorofare gage records, the elevations of the 1944 and 1950 floods in the gage area were obtained during recent field investigations. Before 1962, the 1944 and 1950 tides on Beach Thorofare were the greatest known since at least 1912. Data pertaining to some of the highest tides of record at Atlantic City are listed in the following table.

Date	Annual mean sea level	Elevation in feet above mean sea level, datum of 1929	High tide on Atlantic Ocean at Steel Pier gage	High tide on Beach Thorofare at powerplant gage near McKinley Avenue
Mar. 6-7, 1962	+0.5	7.2	8.3	
Sept. 12, 1960	+0.5	6.0	6.3	
Oct. 26, 1960	+0.4	6.1		
Nov. 24, 1960	+0.3	7.0	7.7	
Nov. 1, 1947	+0.4	6.9		
Sept. 14, 1944	+0.4	7.6	7.8	
Nov. 10, 1932	+0.2	5.6		

Mean sea level.--Annual mean sea level, which is the average of hourly heights of the tide from a calendar year of tidal record, varies from year to year, and has shown a rising trend at tidal gaging stations along the Atlantic Coast. The rise in mean sea level at Atlantic City is shown in figure 1. The rise of about 0.7 foot since 1912 is considered to have significantly affected the heights of some storm tides.

Elevations.--Water-surface elevations shown in this atlas are referred to mean sea level datum of 1929, a nationally used datum to which Absecon Island bench marks of the U.S. Coast and Geodetic Survey and the New Jersey Geodetic Control Survey are referred. Other well known tidal datum planes in use at Atlantic City are 1924-42 mean high water, which is 2.21 feet above mean sea level datum of 1929, and 1924-42 mean low water, which is 1.87 feet below mean sea level datum of 1929.

Storm-tide frequency.--Frequency of high storm tides at Atlantic City is derived from a statistical evaluation of the tidal records. The frequency, expressed as the relation of recurrence interval to elevation of high tides at Atlantic City, is shown in figure 2 and is tabulated below:

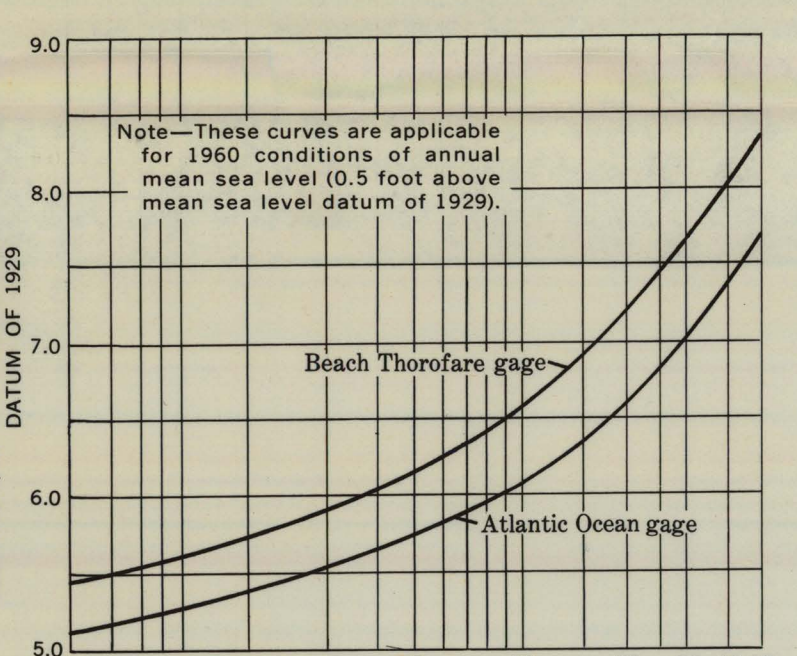


FIGURE 2.—FREQUENCY OF HIGH TIDES AT ATLANTIC CITY, NEW JERSEY

Recurrence interval, as applied to flood events, is the average number of years within which a given event will be equaled or exceeded once. It is emphasized that recurrence intervals are average values which cannot be used to predict time of occurrence. Because large errors may result, the frequency curves should not be extrapolated beyond the limits shown.

Because of the gradual variation in annual mean sea level (fig. 1), adjustments to the recorded tide elevations were made before defining the frequency relation shown in figure 2. The adjustment is the difference between annual mean sea level of 1960 and the annual mean sea level of the year of each extreme tide used to define the frequency relation. Thus, the curves shown in figure 2 are applicable to periods of annual mean sea level about 0.5 foot above sea level datum of 1929, as was experienced in 1960 and several other recent years.

Recurrence interval (years)	Elevation of high tide in feet above mean sea level, datum of 1929	
	Atlantic Ocean at Steel Pier gage	High tide on Beach Thorofare at powerplant gage near McKinley Avenue
50	7.7	8.4
40	7.4	8.0
30	7.1	7.7
20	6.6	7.2
10	6.1	6.6
5	5.8	6.2
1.1	6.1	5.5

Recurrence interval is inversely related to the chance of an event being equaled or exceeded in any one year. Thus, the 1962 tide on the Atlantic Ocean at the Steel Pier gage, an event with a 34-year recurrence interval (fig. 2) has a 1 chance in 34 of being equaled or exceeded in any one year. Also, the 1960 tide at the Beach Thorofare gage, an event of about 6-year recurrence interval, has a 1 chance in 6 of being equaled or exceeded in any one year.

The high-tide frequency relations are applicable to the gage sites only. However, inferences about the likelihood of future flooding may be made if the following assumptions are valid:

- (1) The frequency of high tide at all points along the Absecon Island oceanfront is equivalent to the frequency determined at the Atlantic Ocean tide gage for that tide;
- (2) The frequency of a high tide at all points along the canals and waterways along the northwest side of Absecon Island is equivalent to the frequency determined at the Beach Thorofare gage for that tide;
- (3) The 1912-62 period from which the frequency curves were developed provide a representative sample of long-term tide occurrences; and
- (4) The mean sea level will remain at about 0.5 foot above sea level datum of 1929. Some of the inferences which may be made about future flooding, based on these assumptions are: (1) there is less than 1 chance in 6 that flooding will occur along the oceanfront in any one year; (2) there is 1 chance in 34 that flooding along the oceanfront as severe as that of 1962 will occur in any one year; (3) there is 1 chance in 6 that flooding along the canals and waterways on the northwest side of Absecon Island as severe as that of 1960 will occur in any one year; and (4) there is 1 chance in 47 that flooding from the canals and waterways as severe as that of 1962 will occur in any one year.

Variances in maximum tide elevations.--Water surface elevations for the maximum tides of 1960 and 1962 varied from point to point on Absecon Island. Maximum water surface elevations shown are generally averages of several observations determined from flood marks, and observations of local residents. The maximum elevation at the Steel Pier tide gage during the flood of Mar. 6 and 7, 1962, representing the elevation of the Atlantic Ocean along the open coast, was 7.2 feet. However, wind-driven waves, breaking over sea walls, embankments, and other barriers, were unable to return through these barriers, and raised the water surface in many places to a higher elevation than indicated by the Steel Pier tide gage.

Extent of flooding.--Areas where water-surface elevation exceeded street curb elevation are shown as flooded. However, because a detailed survey of the interior of each city block was not made, the flood boundaries shown are only approximate.

Depth of flooding.--At any point depth of flooding can be estimated by subtracting the ground surface elevation from water surface elevation determined by interpolating between maximum tide elevations shown on the map. Approximate ground elevations can be estimated from information indicated by contours on the map, although more accurate elevations can be obtained by leveling to bench marks.

Additional information.--Additional information pertaining to floods on Absecon Island, N. J., may be obtained at the District office of the U.S. Geological Survey, Trenton, N. J. Descriptions of tidal characteristics, tidal records, and tidal datums may be obtained from the following published reports:

- Manner, H. A., 1951, Tidal datum planes: U.S. Department Commerce, Coast and Geodetic Survey Spec. Pub. 135.
- Harris, D. L., and Lindsay, C. V., 1957, An index of tide gages and tide gage records for the Atlantic and Gulf Coasts of the United States: U.S. Department Commerce, Weather Bureau National Hurricane Research Proj. Rept. 7.