



AERIAL VIEW, STEEL PIER AT ATLANTIC CITY, N. J., MAR. 7, 1962.
United Press International photograph

AERIAL VIEW, ATLANTIC CITY, N. J., MAR. 7, 1962, LOOKING NORTHWEST
OVER ALBANY AVENUE ACROSS INTRACOASTAL WATERWAY
Photograph by The Evening Bulletin, Philadelphia, Pa.



ATLANTIC OCEAN TIDAL FLOODS OF 1960 AND 1962 ON ABSECON ISLAND, NEW JERSEY

Introduction.--The approximate areas inundated by the Atlantic Ocean storm tides of Sept. 12, 1960, and Mar. 6 and 7, 1962, on Absecon Island, N. J., are shown on a topographic map base to record the flood hazard in graphical form. Frequency relations derived from tidal records are presented for estimating the probability of future tidal floods.

Tidal records.--Two tide gages on Absecon Island provide a continuous record of tide elevations with the effects of waves and other short-duration variations dampened.

The U.S. Coast and Geodetic Survey gage on the Atlantic Ocean at Atlantic City, was located on Million Dollar Pier during the period August 1911 to December 1920, and since December 1922 has been located on Steel Pier at a point about 1500 feet from shore. The elevations of the annual maximum tide and annual mean sea level at this gage are shown in figure 1.

Flooding of Absecon Island is associated with extreme tides of the Atlantic Ocean. Wind-driven waves overtop sea walls and other protective works along the open coast while tidal flows pass through Absecon Inlet and Great Egg Harbor Inlet into the Beach Thoro fare and canals of the back bay areas to surround the island. Flood inundation progresses inland from all sides. The extent and depth of flooding are affected by the velocity, direction, and duration of winds which accompany storm tides.

Although much of the low-lying tidal marsh shown on the map beyond Beach Thoro fare and Clam Thoro fare, opposite Absecon Island, is subject to inundation, the area is outside the limits of this study; thus flood data there are not shown.

Tide records, topographic base maps, and other essential data were furnished by the U.S. Coast and Geodetic Survey.

Floodmark elevations, overflow data, and other information pertaining to the 1960 flood were obtained from the U.S. Corps of Engineers; the Atlantic City Electric Co., the City Engineers of Atlantic City, Ventnor City, Margate City, and Borough of Longport; and from many local residents and business firms. The 1962 flood data were obtained by the U.S. Geological Survey, Mar. 8-11, 1962.

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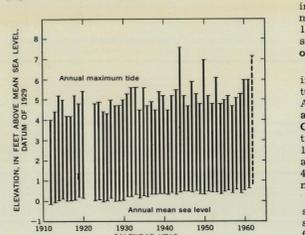


FIGURE 1.—ANNUAL MAXIMUM TIDE AND ANNUAL MEAN SEA LEVEL AT ATLANTIC OCEAN AT ATLANTIC CITY, N. J., 1912-61.

The Atlantic City Electric Co. has maintained a tide gage since January 1955 on Beach Thoro fare at its powerplant located north of the railroad bridges near McKinley Avenue (extended) in Atlantic City. In addition to the Beach Thoro fare gage records, the elevations of the 1944 and 1950 floods tides in the gage area were obtained during recent field investigations. Before 1962, the 1944 and 1950 tides on Beach Thoro fare 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	Elevation in feet above mean sea level, datum of 1929		
	Annual mean sea level	High tide on Atlantic Ocean at Steel Pier gage	High tide on Beach Thoro fare at powerplant gage near McKinley Avenue
Mar. 6-7, 1962	+0.5	7.2	8.3
Sept. 12, 1960	+5	6.0	6.3
Oct. 20, 1950	+4	6.1	
Nov. 24, 1950	+3	7.0	7.7
Nov. 1, 1947	+4	5.9	
Sept. 14, 1944	+4	7.6	7.8
Nov. 10, 1932	+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:

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 Thoro fare 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	5.1	6.6
5	5.8	6.2
1.1	5.1	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 Thoro fare 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 Thoro fare gage for that tide;
- (3) The 1912-52 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.

Variations 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:

- Marmor, 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.

TIDAL FLOODS, ATLANTIC CITY AND VICINITY, NEW JERSEY

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