BEACH EROSION CONTROL REPORT ON COOPERATIVE STUDY OF CONNECTICUT

SUMMARY OF REPORTS

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
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BEACH EROSION CONTROL REPORT ON COOPERATIVE STUDY OF CONNECTICUT

SUMMARY OF REPORTS

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SUMMARY OF REPORTS

SYLLABUS

This report summarizes the recommendations for construction of projects for protection and improvement of shore areas throughout Connecticut which have been included in ten prior reports prepared by the Division Engineer, each of which deals with a separate part of the State. The report has been prepared in compliance with the requirement of the basic agreement for the study that a composite report be prepared for the State summarizing the recommendations contained in the individual reports.

Historical and background information concerning the study is included since it was felt that it would be of general interest and would assist in the understanding of the recommendations. Such information consists of dates of initiation of the study and the submission of the separate reports, the House Documents in which they were published, the State and Federal authority under which the study was conducted, its purpose and cost. The manner of conduct of the work and information concerning the detailed work program are included. The Federal policy governing the recommendations for Federal aid in construction of projects is explained. Action subsequent to submission of the study reports by the Division Engineer up to the end of September 1957 is described in an appendix. This includes authorization of Federal aid for the construction of projects recommended in those reports which have already reached and been acted upon by Congress and the actual construction of projects which were recommended as a result of the study.

1. Start of the Study. A cooperative beach erosion control study covering the entire coast of the State of Connecticut was initiated by the Connecticut Flood Control and Water Policy Commission on July 22, 1947, by application to the Corps of Engineers, United States Army. The application was approved by the Chief of Engineers on August 28, 1947.

2. Authority. The authority of the State Flood Control and Water Policy Commission to conduct the study was established by Special Act 515 of the 1947 General Assembly which appropriated $75,000 to the Commission as Connecticut's share of a survey and study to be made by the Beach Erosion Board of the United States Army, Corps of Engineers. The Federal authority was established by Section 2 of Public Law 520, 71st Congress, approved July 3, 1930, as amended and supplemented, which authorized the Chief of Engineers of the United States Army under the direction of the Secretary of War to cause investigations and studies to be made in cooperation with the appropriate agencies of various States to devise effective means of preventing erosion by waves and currents. Public Law 520 authorized the Chief of Engineers to organize the Beach Erosion Board to furnish technical assistance in the conduct of studies and to review the reports of the investigations. It also provided that no Federal funds be spent for this purpose unless the appropriate State agency cooperated with the United States by contribution of funds or services. By executive ruling the amount of this contribution has been established as one-half of the cost of the study.

3. Cost of the Study. The cost of the study was $150,000 of which $75,000 was contributed by the State of Connecticut and $75,000 by the United States.

4. Purpose. The purpose of the study was to determine the most suitable methods of stabilizing and improving the shore line, the advisability of adopting projects for such work, the public interest therein and the share of the cost, if any, to be borne by the United States.

5. Division of the State into Study Areas. The State shore line having a total length of about 177 miles was divided into eleven physiographical units varying in length from 8.5 to 31.5 miles for purposes of study and preparation of separate reports. The location of the study areas are shown on Plate 1. The areas which were most critically affected by erosion were given priority in the order of study as listed below.

Area	Location
1	Ash Creek to Saugatuck River (Fairfield, Westport)
2	Hammonasset River to East River (Clinton, Madison, Guilford)
3	New Haven Harbor to Housatonic River (West Haven, Milford)
4	Connecticut River to Hammonasset River (Old Saybrook, Westbrook, Clinton)
5	Pawcatuck River to Thames River (Stonington, Groton)
6	Niantic Bay to Connecticut River (Waterford, East Lyme, Old Lyme)
7	Housatonic River to Ash Creek (Stratford, Bridgeport)
8	Noroton River to Byram River (Stamford, Greenwich)
9	East River to New Haven Harbor (Guilford, Branford, East Haven, New Haven)
10	Thames River to Niantic Bay (New London, Waterford)
11	Saugatuck River to Noroton River (Westport, Norwalk, Darien)

The order of study was later revised to permit preparation of the Area 9 report after Area 7 followed by a combined report on Areas 8 and 11 and finally a report on Area 10.

6. Conduct of the Study. All the work involved in the study was accomplished by the United States through the U. S. Army Engineer Division, New England, Corps of Engineers, located in Boston, Massachusetts. The Beach Erosion Board, located in Washington, D. C., assisted in the preparation of the detailed work programs, furnished technical assistance, and reviewed the study reports prepared by the New England Division. The reports were also reviewed by the Chief of Engineers. Close contact was maintained throughout the study with the cooperating agency, the State Flood Control and Water Policy Commission, (now the Water Resources Commission) to assure that the study was accomplished in a manner that would meet the needs of Connecticut. The cooperating agency reviewed all the findings of the study prior to their submission to the Chief of Engineers in final report form by the Division Engineer of the New England Division, and made many valuable suggestions which were included in the final reports.

7. The Detailed Work Program. The detailed work program consisted of the following:

a. Field Surveys. Soundings and elevations were obtained on 332 profiles at selected locations extending across the beaches seaward to depths of 8 to 18 feet for comparison with existing and future surveys and for use in preparing plans of protection. The high water line and existing structures were located along approximately 125 miles of shore for preparation of maps of the areas, determination of shore line changes by comparison with prior surveys and general study purposes. Bench marks, triangulation and traverse stations were established for all field surveys and were connected with existing systems.

b. Material Investigation. Probings were made at about 300 locations both on and offshore to determine the general character of material available for beach building. Beach samples were obtained at 271 locations and 46 borings were obtained in West Haven and Milford. Beach samples and borings were analyzed to determine grain size characteristics.

c. Photography. Vertical aerial photographs were taken of the entire coastal area of the State at a scale of approximately 1 to 5,000. Approximately 2,400 ground photographs were taken, many repeated at intervals to show changes occurring along the shore.

d. Field Inspections. Detailed inspections were made of the entire shore to obtain information concerning the location, length, use, facilities, width, composition, littoral drift, structures, development and erosion or storm damages at all beach areas.

e. Collection of Data and Information. State agencies, cities, towns and some private groups and individuals were contacted concerning their problems and needs. Information on value of all shore property and the boundaries of publicly owned shores was collected from the cities and towns. Newspaper files of the principal cities and towns were searched for accounts of storm damages. Wind and storm records were obtained from the United States Weather Bureau. A wide variety of information was collected from public agencies and private companies or individuals including maps, charts, publications, and reports covering geology, taxation, pollution, topography, tides, hydrography, oyster grounds, recreational facilities, population, wild life refuges, state and town plans for development and other pertinent subjects.

f. Drafting. All surveys were plotted and 130 tracings were prepared for use as plates in the reports. Tracings showed locations of study areas and beaches, wind diagrams, hurricane paths, typical shore structures, comparative shore line and offshore

depth contours, comparative profiles, survey maps including topography, development, profiles, beach samples, borings, probings and oyster grounds. Tracings also contained detailed plans of protection and improvement. In addition, 88 plates of photographs were prepared to illustrate typical problems and shore conditions.

g. Office Studies. Study, classification and analysis was made of all available information. Study was made of data on geology, description and composition of beaches, winds, storms, tides, waves, shoreline and offshore depth changes and existing protective structures. Problems were considered and practicable plans of protection were prepared. Costs and benefits of proposed projects were estimated and economic justification determined. The Federal share of the cost of the proposed projects was determined in accordance with Federal policies established by Public Law. Recommendations were prepared for adoption of projects by the United States involving contribution of Federal funds. Recommendations were also prepared for adoption of projects by local interests without Federal aid and general methods most suitable for protection of all shore areas which might need protection were determined.

8. Study Reports. Ten separate reports were prepared covering the eleven areas listed in Paragraph 5. One report was prepared for each area except Areas 8 and 11 which were included in one report. The reports consisted of text, appendices and plates. The scope of the reports is indicated by the division of the state shoreline into over 200 separate units for purposes of description, consideration of shore processes and problems and development of plans of protection and improvement. Appendices were used freely so as not to encumber the text of the reports with detailed data, computations and incidental information. Reports of the Division Engineer as listed below were reviewed by the Beach Erosion Board and Chief of Engineers and were transmitted to Congress, all in accordance with statutory requirements. Some of the reports have already been printed by the United States Government Printing Office in House Documents and the numbers of the documents are tabulated.

Area	Date of Division Engineers Report	House Document Number
1	February 7, 1949	454, 81st Congress, 2nd Session
2	February 7, 1949	474, 81st Congress, 2nd Session
3	May 4, 1951	203, 83rd Congress, 1st Session
4	June 29, 1951	514, 82nd Congress, 2nd Session
5	January 4, 1952	31, 83rd Congress, 1st Session
6	May 2, 1952	84, 83rd Congress, 1st Session
7	December 17, 1952	248, 83rd Congress, 2nd Session
9	August 12, 1955	395, 84th Congress, 2nd Session
8 & 11	July 27, 1956	
10	March 29, 1957	

The House Documents also contain the reports of the Beach Erosion Board and the Chief of Engineers, comments of the Connecticut Flood Control and Water Policy Commission and the Bureau of the Budget and a letter by the Secretary of the Army transmitting all of the above to Congress.

9. Policy Governing Federal Aid in Construction. The policy of Federal aid in the construction of works for the restoration and protection of shores against erosion by waves and currents was originally established by Public Law 727, 79th Congress, approved August 13, 1946, which provided for Federal participation in the cost of protecting publicly owned property. Public Law 727 was amended by Public Law 826, 84th Congress, approved July 28, 1956, so that Federal aid now applies also to shores other than public if there is a benefit such as that arising from public use or from the protection of nearby public property or if the benefits to those shores are incidental to the project. The Federal contribution toward the construction of protective works for non-Federally owned shores is limited to a maximum of one-third of the total cost. No Federal contribution toward maintenance is authorized, but under certain conditions Federal contribution may be made toward periodic beach nourishment for a length of time specified by the Chief of Engineers in each case. The plan of protection must be specifically adopted and authorized by Congress after investigation and study by the Beach Erosion Board. Furthermore, recommendations for Federal contributions to the local agencies for Federal shares of the construction costs include the requirements that plans and specifications be approved by the Chief of Engineers. In the reports on Areas 1, 2, 3 and 7, local interests were also required to (a) adopt the projects, (b) assure maintenance during their useful lives as may be required to serve their intended purpose, (c) provide at their own expense all necessary lands, easements and rights-of-way, (d) hold and save the United States free from all claims for damages that may arise before, during or after prosecution of the work, (e) assure that water pollution that would endanger the health of bathers will not be permitted and (f) assure continued public ownership of public property and its administration for public use only. In the reports on Areas 8, 9 and 11, the requirements that local interests adopt the projects and hold and save the United States free from claims for damages were not included and the public ownership clause was changed to apply only during the economic life of the project. The policy established by Public Law 727 was used in determining Federal aid for Areas 1 through 7, inclusive and Area 9. The policy established by Public Law 826 was considered in determining Federal aid for Areas 8, 10 and 11.

10. Recommendations of the Study. It was recommended that the United States adopt 20 projects authorizing Federal participation in the first cost of protective and improvement measures. In accordance with statutory requirements, the amount of Federal participation was limited to one-third the first cost of the portion of projects for protection or improvement of publicly owned shores. It was also

recommended that local interests consider adoption of 29 other projects which were not found to have sufficient evaluated public benefits to warrant a recommendation for Federal participation in the cost of construction but which did have enough evaluated benefits to warrant construction by local interests at their own expense. Practicable projects were developed for protection or improvement of other locations but were not recommended because sufficient benefits were not or could not be evaluated to show that they were economically justified. Methods of protecting or improving other areas were discussed when detailed development of projects did not appear necessary but where advice might be desired or useful for local interests. All economically justified projects and 18 others which were considered but not recommended are described in the following paragraphs. The total cost and the Federal share, if any, of the cost of the projects estimated at the time of study are also included. These estimates for many projects, particularly those in the earlier reports, are low according to present day price levels. The recommendations are listed geographically by cities and towns, from east to west across the state. The study area number is given so that reference can be made to the area reports for more detailed information.

11. Projects Recommended for Adoption by the United States.

a. Hammonasset Beach, Madison (Area 2). Widen the beach at the state park by direct placement of sand fill and construct one groin and two training walls to protect and improve the bathing beach and eliminate the hazard to bathers.

Estimated total cost	$384,000
Estimated Federal share of cost	128,000
Estimated non-Federal share of cost	256,000

b. Middle Beach, Madison (Area 2). Construct riprap revetment along the toe of the sea wall to protect it and the shore road or as an alternate plan, contingent upon provision of facilities for public use, place sand fill in front of the sea wall and construct one groin to provide similar protection and improve the public bathing beach.

Estimated total cost	Revetment plan	$ 33,000
	Groin and fill plan	51,000
Estimated Federal share of cost	Revetment plan	11,000
	Groin and fill plan	17,000
Estimated non-Federal share of cost	Revetment plan	22,000
	Groin and fill plan	34,000

c. Guilford Point (Jacobs) Beach, Guilford.* (Area 9). Construct one groin to protect the restored public beach.

Estimated total cost	$ 13,200
Estimated Federal share of cost	4,400
Estimated non-Federal share of cost	8,800

* The project recommended by the Division Engineer was for widening the beach and construction of one groin entirely at the cost of local interests. The Chief of Engineers, in accordance with the report of the Beach Erosion Board, recommended Federal participation in the cost of constructing the groin to protect the beach to be restored by placement of fill from a Federal navigation project.

d. Lighthouse Point Park, New Haven. (Area 9). Construct one groin to reduce losses of beach material at the public bathing beach.

Estimated total cost	$ 12,000
Estimated Federal share of cost	4,000
Estimated non-Federal share of cost	8,000

e. Prospect Beach, West Haven. (Area 3). Widen the beach by direct placement of sand fill and construct eight groins to protect the shore highway and development and to improve the public beach for recreational use.

Estimated total cost	$213,600
Estimated Federal share of cost	64,000
Estimated non-Federal share of cost	149,600

f. Woodmont Shore, Milford. (Area 3). Widen the beach by direct placement of sand fill and construct five groins to protect public roads and the residential development and to improve the public shore for recreational use.

Estimated total cost	$151,800
Estimated Federal share of cost	35,300
Estimated non-Federal share of cost	116,500

g. Gulf Beach, Milford. (Area 3). Widen the public bathing beach by direct placement of sand fill to protect and improve it.

Estimated total cost	$ 31,000
Estimated Federal share of cost	10,300
Estimated non-Federal share of cost	20,700

h. Silver to Cedar Beaches, Milford. (Area 3). Widen the beaches by direct placement of sand fill and construct eleven groins, if needed, all to protect the shore road, shore structures and residential development and to improve the public and private beaches for recreational use.

Estimated total cost	$455,000
Estimated Federal share of cost	15,200
Estimated non-Federal share of cost	439,800

i. Short Beach, Stratford. (Area 7). Widen the beach by direct placement of sand fill to protect the cottage development and restore and improve the public bathing beach.

Estimated total cost	$ 72,500
Estimated Federal share of cost	24,150
Estimated non-Federal share of cost	48,350

j. Seaside Park, Bridgeport. (Area 7). Widen the beach by direct placement of sand fill to protect the park development and improve the shore for public recreational use.

Estimated total cost	$317,500
Estimated Federal share of cost	105,800
Estimated non-Federal share of cost	211,700

k. Jennings Beach and Ash Creek, Fairfield. (Area 1). Construct one jetty to stabilize the public beach and inlet and eliminate the hazard to bathers caused by the inlet currents and, if necessary, excavate a jetty foundation and inlet channel.

Estimated total cost	$ 66,000
Estimated Federal share of cost	22,000
Estimated non-Federal share of cost	44,000

l. Sasco Hill Beach, Fairfield. (Area 1). Widen the beach by direct placement of sand fill and construct one groin to protect and improve the public bathing beach.

Estimated total cost	$ 42,000
Estimated Federal share of cost	14,000
Estimated non-Federal share of cost	28,000

m. Southport Beach, Fairfield. (Area 1). Widen the beach by direct placement of sand fill and construct one groin to protect and improve the public bathing beach.

Estimated total cost	$ 30,000
Estimated Federal share of cost	10,000
Estimated non-Federal share of cost	20,000

n. Burial Hill Beach, Westport. (Area 1). Contingent upon construction of a training wall under the Sherwood Island State Park project, widen the public beach by direct placement of sand fill to protect and improve it for recreational use.

Estimated total cost	$ 16,500
Estimated Federal share of cost	5,500
Estimated non-Federal share of cost	11,000

o. Sherwood Island State Park, Westport. (Area 1). Widen the public bathing beach by direct placement of sand fill and construct two training walls and one groin to protect and improve it for recreational use.

Estimated total cost	$342,000
Estimated Federal share of cost	114,000
Estimated non-Federal share of cost	228,000

p. Compo Beach, Westport. (Area 1). Widen the beach by direct placement of sand fill and construct two groins to protect the development and protect and improve the public bathing beach for recreational use.

Estimated total cost	$114,000
Estimated Federal share of cost	38,000
Estimated non-Federal share of cost	76,000

q. Calf Pasture Beach Park (East Shore), Norwalk. (Area 11). Widen the beach by direct placement of sand fill and lengthen two existing groins to protect the park development and improve the public bathing beach.

Estimated total cost	$230,000
Estimated Federal share of cost	76,000
Estimated non-Federal share of cost	154,000

r. Cove Island, Stamford.(Area 8). Widen the beach by direct placement of sand fill and construct one jetty to protect and improve the public shore for recreational use.

Estimated total cost	$207,000
Estimated Federal share of cost	69,000
Estimated non-Federal share of cost	138,000

s. Cummings Park, Stamford. (Area 8). Widen the beach by direct placement of sand fill and enlarge one existing groin and one existing jetty to protect the development and restore and improve the public bathing beach.

Estimated total cost	$102,000
Estimated Federal share of cost	34,000
Estimated non-Federal share of cost	68,000

t. Greenwich Point, Greenwich. (Area 8). Widen the beach by direct placement of sand fill to protect the development and restore and improve the public bathing beach.

Estimated total cost	$150,000
Estimated Federal share of cost	50,000
Estimated non-Federal share of cost	100,000

12. Projects Recommended for Consideration of Adoption by Local Interests.

a. Eastern Point Beach Park, Groton. (Area 5). Widen the beach by direct placement of sand fill and construct one groin to improve and protect the public bathing beach.

Estimated total cost $ 30,000

b. White Sand Beach, Old Lyme. (Area 6). Widen the beach by direct placement of sand fill and construct one groin to protect the beach, cottage development and public buildings and to restore losses of the public bathing area.

Estimated total cost $ 66,200

c. Plum Bank Beach, Old Saybrook. (Area 4). Widen the beach by direct placement of sand fill and construct one groin to protect the cottage development and enlarge the public and private bathing beach areas.

Estimated total cost $ 59,000

d. Great Hammock Beach, Old Saybrook. (Area 4). Widen the beach by direct placement of sand fill to protect the cottage development.

Estimated total cost $ 22,000

e. Saybrook Manor, Old Saybrook. (Area 4). Widen the beach by direct placement of sand fill to protect the cottage development and improve the private bathing beach.

Estimated total cost $ 12,500

f. Chalker Beach, Old Saybrook. (Area 4). Widen the beach by direct placement of sand fill to protect the cottage development.

Estimated total cost $ 50,000

g. Grove Beach, Westbrook. (Area 4). Construct one groin to impound a protective beach to protect the cottage development.

Estimated total cost $ 23,000

h. Webster Point to Seaview Beach, Madison. (Area 2). Widen the beach by direct placement of sand fill to protect the shore structures and residential development.

Estimated total cost $ 38,000

i. Seaview Inlet to East Wharf, Madison. (Area 2). Widen the beach by direct placement of sand fill and construct one groin to protect the shore structures and the residential development.

Estimated total cost $ 62,500

j. East Wharf to Middle Beach, Madison. (Area 2). Widen the beach by direct placement of sand fill and construct one groin to protect shore structures and the residential development.

Estimated total cost $ 59,000

k. Middle Beach to Madison Beach Club, Madison. (Area 2). Construct riprap revetment along the toe of the sea wall to protect it and the residential development or as an alternate plan place sand fill in front of the sea wall and construct one groin to provide similar protection and improve the private bathing beach.

Estimated total cost	Revetment plan	$ 25,000
	Groin and fill plan	50,000

l. Madison Beach Club to West Wharf, Madison. (Area 2). Widen the beach by direct placement of sand fill and construct one groin to protect the shore structures and residential development and improve the private beach.

Estimated total cost $ 60,000

m. West Wharf to Garvin Estate, Madison. (Area 2). Construct one groin to protect the private beach.

Estimated total cost $ 16,000

n. Garvin, Hotchkiss and Gunther Estates, Madison. (Area 2). Widen the beach by direct placement of sand fill and construct two groins and one jetty to protect shore structures and the residential development.

Estimated total cost $ 99,000

o. Overshores to Lee Manor, Madison. (Area 2). Widen the beach by direct placement of sand fill and construct one jetty to protect the residential development.

Estimated total cost $ 36,000

p. Canoe Harbor, Madison. (Area 2). Widen the beach by direct placement of sand fill and construct one groin to protect the residential development.

Estimated total cost $ 75,000

q. Seafield Beach to Highlands, Madison. (Area 2). Widen the beach by direct placement of sand fill and construct five groins to protect shore structures and the residential development.

Estimated total cost $210,000

r. Highlands to Hogshead Point, Madison. (Area 2). Construct riprap revetment along the toes of sea walls to protect them and the residential development.

Estimated total cost $ 39,000

s. Circle Beach, Madison. (Area 2). Widen the beach by direct placement of sand fill and construct one groin to protect the residential development.

Estimated total cost $ 52,000

t. Circle Beach to End of Half Mile Road, Guilford. (Area 2). Widen the beach by direct placement of sand fill and construct one groin to protect the residential development.

Estimated total cost $ 33,000

u. Momauguin Beach, East Haven. (Area 9). Widen the beach by direct placement of sand fill, extend one groin and construct three other groins, if needed, all to protect the residential, cottage and private recreational beach development.

Estimated total cost $166,000

v. Silver Sands Beach, East Haven. (Area 9). Widen the beach by direct placement of sand fill, construct one groin and, if needed, construct four other groins all to protect the cottage development and restore the private beach.

Estimated total cost $190,000

w. West Silver Sands Beach, East Haven. (Area 9). Widen the beach by direct placement of sand fill, construct one groin and, if needed, construct four other groins all to protect the cottage and private recreational beach development and restore the beach.

Estimated total cost $220,000

x. Burwell Beach, Milford. (Area 3). Widen the beach by direct placement of sand fill and construct one groin to protect the residential development.

Estimated total cost $ 41,500

y. Fairfield Beach, Fairfield. (Area 1). Widen the beach by direct placement of sand fill and construct seven groins to protect the cottage and private recreational beach development.

Estimated total cost $340,000

z. Pine Creek Beach Area, Fairfield. (Area 1). Widen the beach by direct placement of sand fill and construct one training wall to protect and improve the shore and prevent closure of Pine Creek inlet.

Estimated total cost $ 64,000

aa. Greens Farms, Westport. (Area 1). As an alternate to the preferred recommendation that the residential development be protected by maintenance of existing walls, if desired, widen the beach by direct placement of sand fill and construct six groins.

Estimated total cost $305,000

bb. Compo Mill Beach Association, Westport. (Area 1). Widen the beach by direct placement of sand fill and construct one groin to protect the residential development.

Estimated total cost $ 73,000

cc. Old Mill Beach to Hills Point, Westport. (Area 1). As an alternate to the preferred recommendation that the shore and road be protected by maintenance of existing walls and revetment, widen the beach by direct placement of sand fill and construct one groin.

Estimated total cost $ 49,000

13. Projects Considered - Not Recommended.

a. West View, Groton. (Area 5). Widen the beach by direct placement of sand fill and construct one groin to protect the cottage development.

Estimated total cost $ 44,000

b. Bushy Point Beach, Groton. (Area 5). Construct a riprap dike to close the breach.

Estimated total cost $ 32,000

c. Jupiter Point, Groton. (Area 5). Construct a dumped riprap mound to protect the cottage development.

Estimated total cost $ 17,000

d. Shore Opposite Mitchell Junior College, New London. (Area 10). Construct one groin to protect the existing sandy beach.

Estimated total cost $ 11,700

e. Neptune Park and Ocean Beach, New London. (Area 10). Widen the south end of the beach at Neptune Park and the north end of Ocean Beach by direct placement of sand fill to protect the residential development at the former location and restore losses of the public beach at the latter location.

Estimated total cost $ 64,000

f. Goshen Cove Inlet, Waterford. (Area 10). Inclose the inlet in a culvert and construct revetment along the banks of the inlet channel or as an alternate construct two riprap jetties at the inlet and revetment along the banks of the inlet channel to maintain flow into Goshen Cove.

Estimated total cost	Culvert plan	$ 39,000
	Jetty plan	80,000

g. Giants Neck, East Lyme. (Area 6). Widen the beach by direct placement of sand fill for development of a private bathing beach.

Estimated total cost $ 15,600

h. Borough of Fenwick, Old Saybrook. (Area 4). Construct a dumped riprap wall to prevent continued recession of the shore and protect residences.

Estimated total cost $ 34,500

i. Chapman Beach, Westbrook. (Area 4). Widen the beach by direct placement of sand fill to protect the residential development and improve the private bathing beach.

Estimated total cost $ 34,500

j. West Beach, Westbrook. (Area 4). Widen the beach by direct placement of sand fill to protect the cottage development and the walled section of the public beach.

Estimated total cost $ 34,500

k. Shell Beach, East Haven. (Area 9). Widen the beach by direct placement of sand fill and construct one groin to protect the cottage development.

Estimated total cost $ 80,000

l. Bradley Point, West Haven. (Area 3). Widen the beach by direct placement of sand fill and construct one groin to protect the residential development.

Estimated total cost $ 22,000

m. Oyster River Point to Oyster River, West Haven. (Area 3). Widen the beach by direct placement of sand fill and construct groins, if needed, all to protect the residential development.

Estimated total cost $ 95,000

n. Point No Point to Long Beach, Stratford. (Area 7). Widen the beach by direct placement of sand fill, construct one groin and, if needed, construct one more groin, all to protect the cottage development.

Estimated total cost $145,300

o. Long Beach (the breach), Stratford. (Area 7). Construct a riprap dike or restore the bar by direct placement of sand fill to close the breach.

Estimated total cost	Riprap dike plan	$ 43,750
	Sand fill plan	51,550

p. Long Beach (west of the breach); Stratford. (Area 7). Widen the beach and increase its elevation by direct placement of sand fill and construct two groins to protect the cottage development.

Estimated total cost $241,700

q. Calf Pasture Beach Park (South Shore), Norwalk. (Area 11). Construct two groins to reduce erosion and loss of public beach.

Estimated total cost $ 40,000

r. Byram Point, Greenwich. (Area 8). Extend and repair the existing jetty to reduce losses of beach material at the private bathing beach.

Estimated total cost $ 19,000

Appendix

Action Subsequent to Submission of Study Reports

1. General. - Information concerning the authorization of Federal aid for recommended protective and improvement measures and the construction of beach erosion control projects by the United States, the State of Connecticut, and local communities up to the end of September 1957, is included in the following paragraphs.

2. Authorization of Federal Aid. - The River and Harbor Act of May 17, 1950, authorized Federal participation in the amount of one-third of the first cost of protective and improvement measures for Jennings, Sasco Hill and Southport Beaches in Fairfield and Burial Hill, Sherwood Island State Park and Compo Beaches in Westport. The River and Harbor Act of September 3, 1954, authorized Federal participation for protective and improvement measures for Hammonasset Beach and Middle Beach in Madison, Prospect Beach in West Haven, Woodmont Shore, Gulf Beach and Silver to Cedar Beaches in Milford, Short Beach in Stratford and Seaside Park in Bridgeport, the amount of the participation, in the case of shores which were part public and part private, being limited to one-third the first cost of the projects for protection and improvement of the publicly owned shores. Congress has not yet acted upon recommendations for Federal participation in projects for Guilford Point (Jacobs) Beach in Guilford, Lighthouse Point Park in New Haven, Calf Pasture Beach Park in Norwalk, Cove Island and Cummings Park in Stamford and Greenwich Point in Greenwich.

3. Construction of Projects. - (a) Jennings Beach and Ash Creek, Fairfield. - This project established a precedent by being the first to receive funds appropriated and contributed by the State of Connecticut to assist in the construction of a beach erosion control project at a town beach. Using funds contributed in equal amount by the State and Town, the Town of Fairfield undertook construction of the jetty (see Plate 6, Fig. 1) which had been recommended at the mouth of Ash Creek. The jetty was completed in June, 1951, at a cost of approximately $43,000. No dredging was necessary. The project was completed before Federal funds were appropriated. In 1956, after appropriation of funds by Congress, one-third the cost of the work performed, representing the authorized Federal share was paid by the United States, one-half to the State of Connecticut and one-half to the Town of Fairfield.

(b) Hammonasset Beach, Madison. - The Connecticut Park and Forest Commission working through the Connecticut Public Works Department has constructed the recommended project at Hammonasset Beach

consisting of widening the beach by direct placement of sand fill, construction of two steel sheet pile training walls at Toms Creek and a riprap groin at Hammonasset Point (see Plate 2). The work performed from February to June 1955 completed the project at a cost of approximately $489,000. The authorized Federal share of the project equal to one-third of the cost of the above work was paid by the United States to the State of Connecticut during 1956.

(c) Short Beach, Stratford. - The recommended project for widening Short Beach by direct placement of sand fill was completed by the United States as a by-product of a Federal navigation improvement in the Housatonic River (see Plate 3). Fill for the beach widening was excavated by hydraulic dredging of the navigation channel and it was placed on Short Beach during June and July, 1955. The fill created a beach of larger dimensions than had been recommended in the cooperative study.

(d) Silver to Cedar Beaches, Milford. - A portion of the recommended project for widening the shore from Silver to Cedar Beaches by placement of sand fill was also completed by the United States by using material obtained from the hydraulic dredging of the Federal navigation improvement in the Housatonic River (see Plates 4 and 5). The fill was placed on Cedar and Laurel Beaches along the western part of the project area which was closest to the site of the dredging. The work was performed from July to August 1955 resulting in more widening than recommended along Cedar Beach. Fill was placed along only the westerly portion of Laurel Beach resulting generally in less widening than recommended. The fill placed represents approximately ten percent of the quantity recommended for the entire Silver to Cedar Beaches project.

(e) State-wide Construction Program. - The State of Connecticut undertook a State-wide program of construction of shore protection and improvement projects during 1955. The State Flood Control and Water Policy Commission which had been the cooperating agency in the cooperative beach erosion control study was authorized to carry out the work. State funds in the amount of $2,000,000 were provided by a bond issue for the biennium ending June 1957. An additional $2,000,000 was appropriated to continue the work during the biennium ending June 1959. The State commission was authorized to provide for State payment of the total cost of projects for State parks or State-owned land and of two-thirds the cost of projects for municipally-owned property, the remaining one-third to be the obligation of the local authority. For privately-owned property, the cost of projects was pro-rated as one-third to the State and two-thirds to the local authority. Flood and erosion control boards were formed by municipalities to act as the local authority to deal with the State Commission. The State Commission entered into agreements with the United States, represented by the Division Engineer of the New England Division, Corps of Engineers, for those projects for which contribution of Federal funds had been authorized and for which Federal funds

had been appropriated. Upon the request of the State commission, the New England Division undertook the engineering and construction of the authorized Federal project for Prospect Beach, West Haven. The engineering and construction for all other projects were undertaken by the Connecticut Public Works Department. The work performed and the status of projects under this program are described below.

(1) White Sands Beach, Old Lyme. - The project recommended for local interests was initiated by construction of a riprap groin during December 1956 and January 1957 and completed by widening of the beach by direct placement of trucked sand fill during the period January-May, 1957. The project cost approximately $72,000. All costs are being borne by the State and the Town of Old Lyme.

(2) Middle Beach, Madison. - The authorized Federal project consisting of revetment of the toe of the sea wall by placement of riprap was constructed in its entirety from March to June, 1957, at a cost of approximately $25,000.00, one-third of which is being borne by the United States, and the remaining two thirds by the State of Connecticut and the Town of Madison.

(3) Guilford Point (Jacobs) Beach, Guilford. - The recommended riprap groin was constructed during December 1956 and January 1957 at a cost of approximately $46,000.00, one-third of which will be borne by the United States if Congress adopts the recommended project and appropriates funds therefor, the remaining two-thirds to be borne by the State of Connecticut and the Town of Guilford. Beach widening by placement of sand fill is required to complete the project. Fill available from dredging of the Federal navigation improvement in Guilford Harbor which it was expected would be used for the necessary beach widening was unsatisfactory in composition and was therefore not used.

(4) West Silver Sands Beach, East Haven. - The required portion of the project recommended for local interests was completed by construction of a riprap groin at Caroline Creek from April to June 1957, and widening of the beach by direct placement of sand fill obtained by hydraulic dredging in Long Island Sound during the period June-August 1957. No work has been done on the four groins recommended as deferred construction to be built, if needed to reduce losses of the sand fill. The approximate cost of the completed work is $240,000.00, all of which is to be borne by the State of Connecticut and local interests in the Town of East Haven.

(5) Prospect Beach, West Haven. - The authorized Federal project was completed by widening the beach by direct placement of sand fill obtained by hydraulic dredging in Long Island Sound during February 1957 and construction of eight riprap groins from

February to May 1957 (see Plate 7). The total cost of the work was approximately $349,000.00, thirty percent of which is being borne by the United States and the remainder by the State of Connecticut and the Town of West Haven.

(6) Gulf Beach, Milford. - The authorized Federal project was completed by widening the beach by direct placement of sand fill obtained by hydraulic dredging in Long Island Sound during April-May 1957. The cost of the work was approximately $63,000.00, of which one-third is being borne by the United States and the remainder by the State of Connecticut and the Town of Milford.

(7) Seaside Park, Bridgeport. - The authorized Federal project was completed by widening the beach by direct placement of sand fill obtained by hydraulic dredging in Long Island Sound during February-March 1957 (see Plate 8). The cost of the work was approximately $480,000.00, of which $150,000.00 is being borne by the United States and the remainder by the State of Connecticut and the City of Bridgeport.

(8) Sasco Hill Beach, Fairfield. - That portion of the authorized Federal project consisting of construction of a riprap groin was initiated by the Town of Fairfield during 1953 and completed by the State of Connecticut during September-December 1956, all at a cost of approximately $26,500.00. One-third of the cost of the work is being borne by the United States, and the remainder by the State and Town. Beach widening by direct placement of sand fill is required to complete the project.

(9) Southport Beach, Fairfield. - The authorized Federal project was partly completed by construction of a riprap groin during the period September-December 1956 at a cost of approximately $27,000.00, of which one-third is being borne by the United States and two-thirds by the State of Connecticut and the Town of Southport. Beach widening by direct placement of sand fill is required to complete the project.

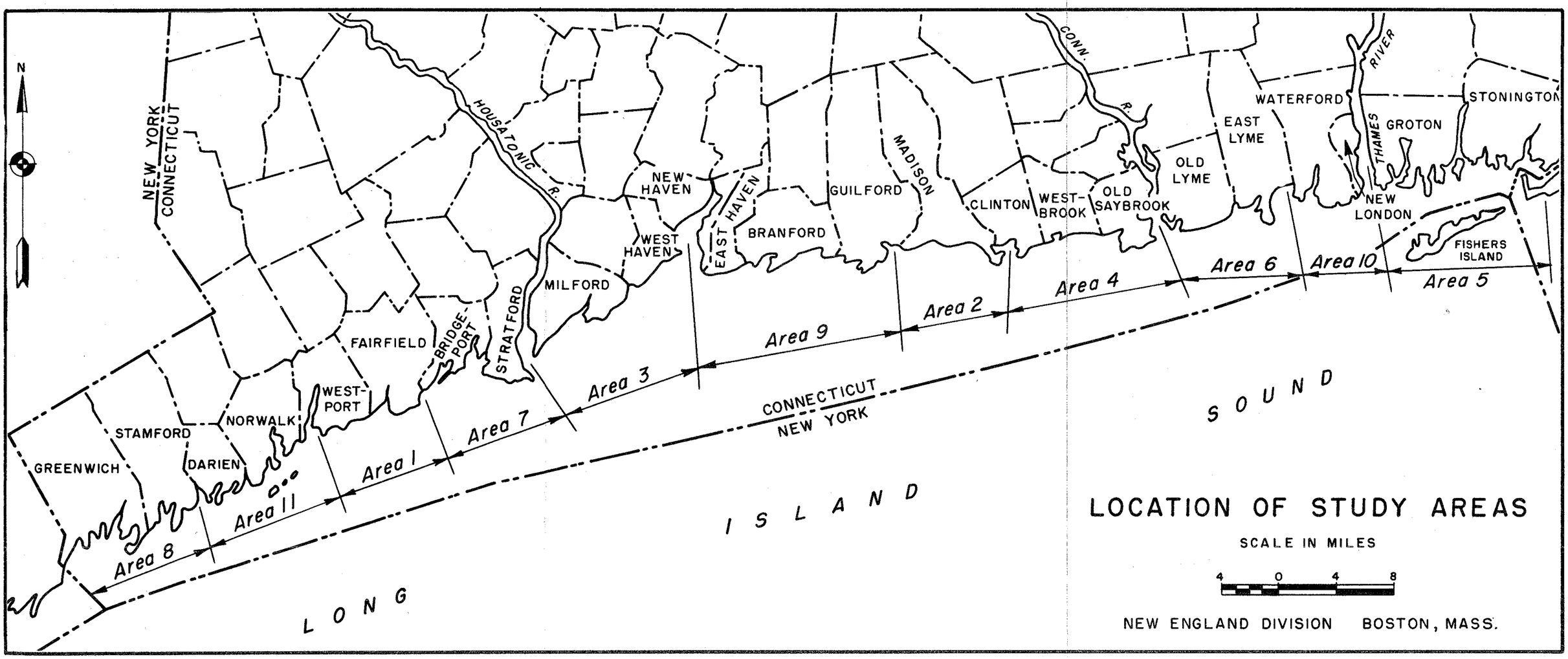
(10) Burial Hill Beach, Westport. - The authorized Federal project was completed by widening the beach by direct placement of sand fill obtained by hydraulic dredging in Long Island Sound during June 1957. The work cost approximately $18,000.00, of which one-third is being borne by the United States and two-thirds by the State of Connecticut and the Town of Westport.

(11) Sherwood Island State Park, Westport. - The authorized Federal project was completed by construction of a riprap groin during July-October 1956 (see Plate 6, Fig. 2), two timber training walls from September 1956 to February 1957 and by widening of the beach by direct placement of sand fill obtained by hydraulic dredging in Long Island Sound during June 1957. The cost of the work was approximately $560,000.00, of which one-third is being borne by the United States and two-thirds by the State of Connecticut.

(12) Compo Beach, Westport. - The authorized Federal project was partly completed by construction of two riprap groins (see Plate 6, Fig. 3), during May-July 1956 at a cost of approximately $65,000.00, one-third of which is being borne by the United States and two-thirds by the State of Connecticut and the Town of Westport. Beach widening by direct placement of sand fill is required to complete the project.

CORPS OF ENGINEERS

U. S. ARMY



LOCATION OF STUDY AREAS

SCALE IN MILES

4 0 4 8

NEW ENGLAND DIVISION BOSTON, MASS.

PLATE I

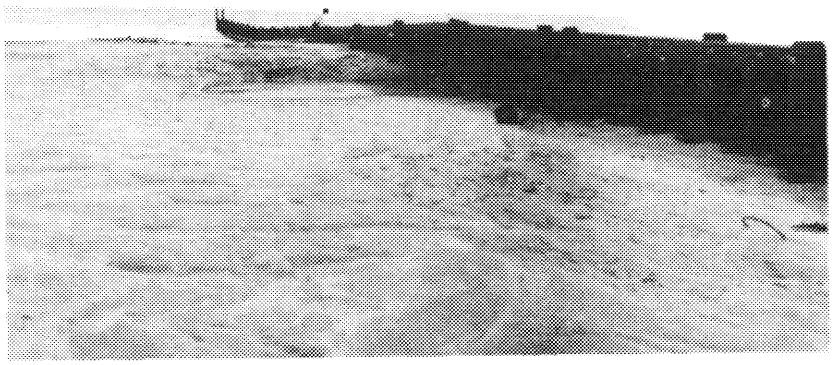


FIG. 1. HAMMONASSET BEACH, MADISON. May 6, 1955. East training wall at Toms Creek completed prior to beach widening.

FIG. 2. HAMMONASSET BEACH, MADISON. June 20, 1955. Beach widening by hydraulic placement of fill in progress.

FIG. 3. HAMMONASSET BEACH, MADISON. May 6, 1955. Groin at Hammonasset Point completed prior to beach widening.

FIG. 1. SHORT BEACH, STRATFORD. Aug. 11, 1947. Narrow public beach fronting the sea wall. Compare with widened beach in Fig. 2, below.

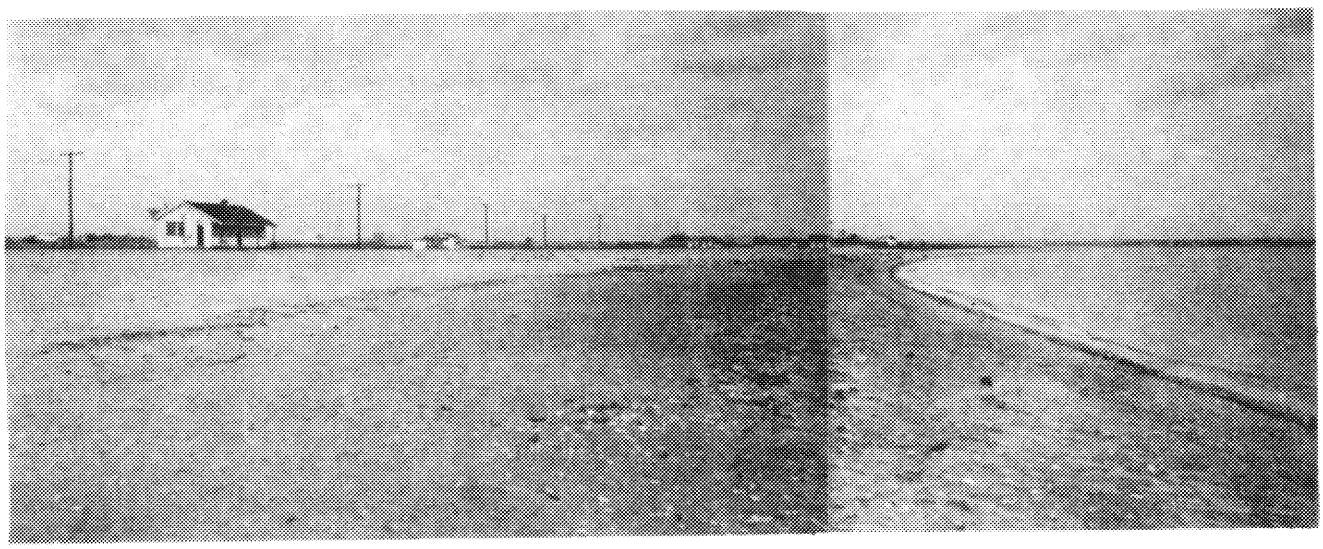


FIG. 2. SHORT BEACH, STRATFORD. Nov. 16, 1956. Beach was widened 16 months previously using fill from hydraulic dredging of Housatonic River navigation channel. The fill widened the beach about 150 feet covering the sea wall shown in Fig. 1, above.

FIG. 1. CEDAR BEACH, MILFORD. Sept. 3, 1947. Cottage development at the waters edge. Compare with widened beach in Fig. 2, below.

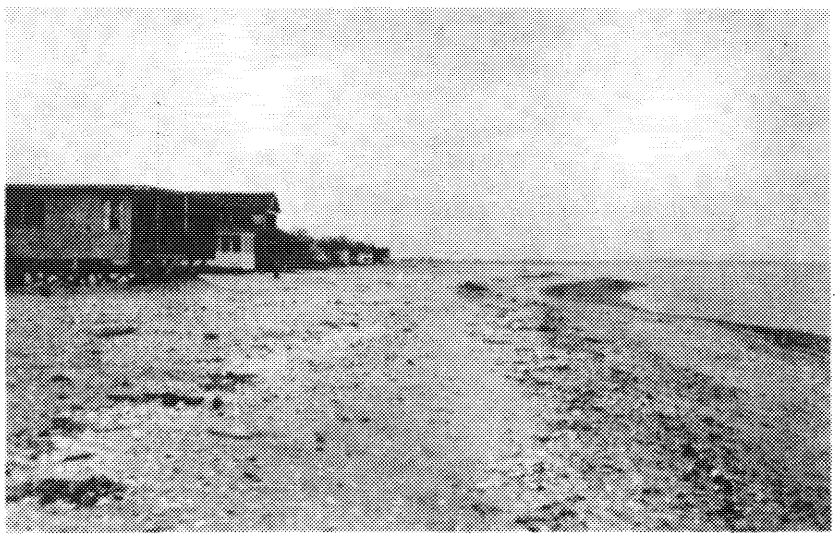


FIG. 2. CEDAR BEACH, MILFORD. Nov. 16, 1956. Beach was widened 15 months previously using fill from hydraulic dredging of Housatonic River navigation channel. Waters edge has been moved over 100 feet seaward. Compare with Fig. 1, above.

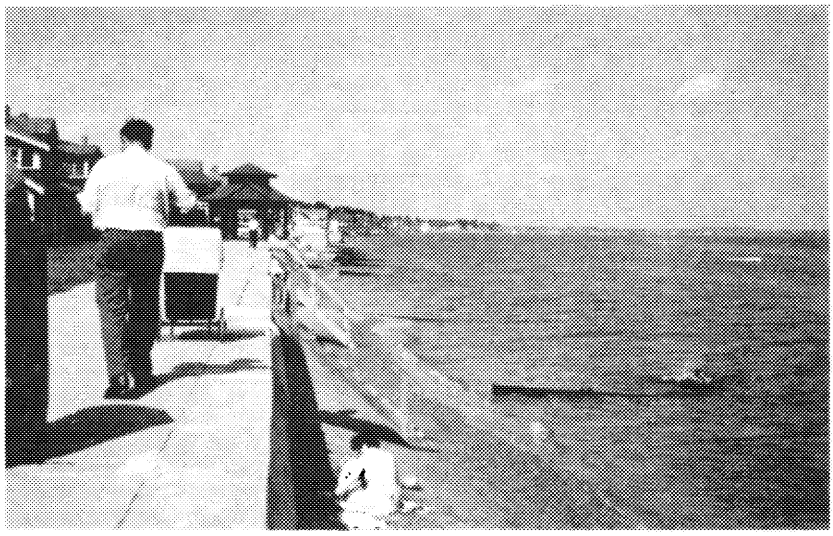


FIG. 1. LAUREL BEACH, MILFORD. Sept. 3, 1947. Narrow beach and groins front the sea wall. Compare with widened beach in Fig. 2, below.

FIG. 2. LAUREL BEACH, MILFORD. Nov. 16, 1956. Beach was widened 15 months previously using fill from hydraulic dredging of Housatonic River navigation channel. Compare with narrower beach in same area shown in Fig. 1, above.

FIG. 1. JENNINGS BEACH, FAIRFIELD. April 1, 1951. Sand tight core and heavy cap and slope stones in Ash Creek jetty.

FIG. 2. SHERWOOD ISLAND STATE PARK, WESTPORT. Nov. 15, 1956 Groin at west limit of park built prior to beach widening.

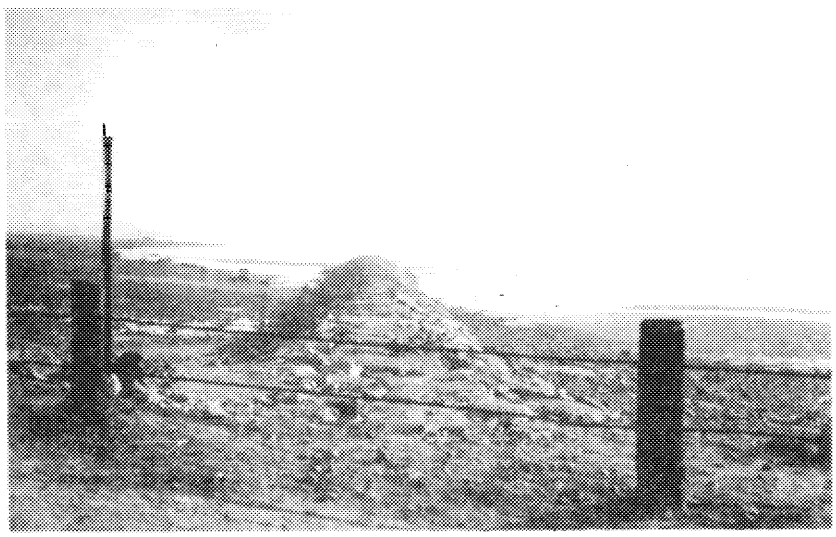


FIG. 3. COMPO BEACH, WESTPORT. Nov. 15, 1956. Groin at Hills Point completed prior to beach widening.

FIG. 1. PROSPECT BEACH, WEST HAVEN. Dec. 4, 1956
Coarse eroded shore at low tide before improvement.
Compare with widened beach in Fig. 2, below.

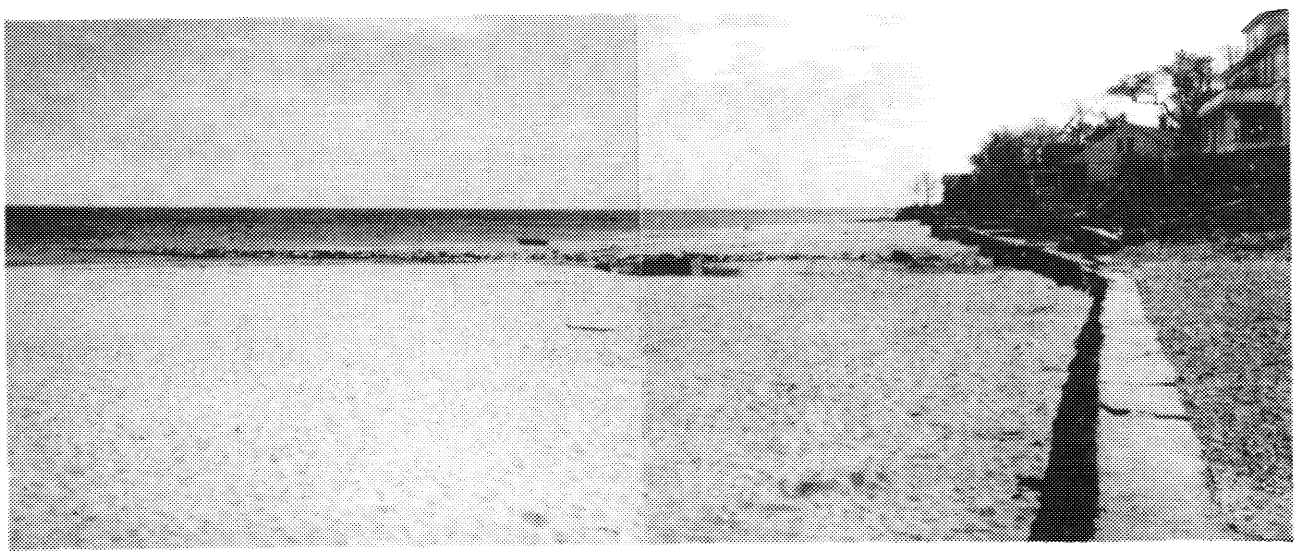


FIG. 2. PROSPECT BEACH, WEST HAVEN. May 3, 1957.
After improvement by placement of a wide protective sandy beach and construction of a riprap groin in front of the sea wall. Compare with Fig. 1, above.

FIG. 1. SEASIDE PARK, BRIDGEPORT. February 28, 1957. Waters edge at sea wall and fronting riprap revetment before improvement. Compare with widened beach in Fig. 2, below.

FIG. 2. SEASIDE PARK, BRIDGEPORT. May 3, 1957. After improvement by placement of a protective sand beach, 125 feet wide at high tide, in front of the existing sea wall. Sand fill was obtained by hydraulic dredging directly offshore. Compare with Fig. 1, above.