

12305 THRU 12309

Diag. Cht. No. 369-4 & Insert

Form 504

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTIVE REPORT

Type of Survey Shoreline
Field No. Ph-20,000-845 Office No. T-12305 thru T-12309

LOCALITY

State New Jersey
General locality Hackensack River
Locality Kearny Pt. to Little Ferry

1962-63

CHIEF OF PARTY

J.E. Waugh, Div. Photo. Wash., D.C.

LIBRARY & ARCHIVES

DATE May 1964

USCGA-DC 5087

12305 THRU 12309

DESCRIPTIVE REPORT - DATA RECORD

T-12305 thru 12309

PROJECT NO. (II):

Project 20,000-845

FIELD OFFICE (III):

CHIEF OF PARTY

J. E. Waugh

PHOTOGRAMMETRIC OFFICE (III):

OFFICER-IN-CHARGE

Washington, D. C.

INSTRUCTIONS DATED (II) (III):

April 15, 1963

METHOD OF COMPILATION (III):

Wild B-8 stereoplotter and graphic

MANUSCRIPT SCALE (III):

1:9,600

STEREOSCOPIC PLOTTING INSTRUMENT SCALE (III):

1:30,000 & 1:10,000

DATE RECEIVED IN WASHINGTON OFFICE (IV):

DATE REPORTED TO NAUTICAL CHART BRANCH (IV):

APPLIED TO CHART NO.

DATE:

DATE REGISTERED (IV):

GEOGRAPHIC DATUM (III):

N.A. 1927

VERTICAL DATUM (III):

MEAN SEA LEVEL EXCEPT AS FOLLOWS:

Elevations shown as (25) refer to mean high water

Elevations shown as (5) refer to sounding datum

i.e., mean low water or mean lower low water

REFERENCE STATION (II):

LAT.:

LONG.:

☐ ADJUSTED☐ UNADJUSTED

PLANE COORDINATES (IV):

STATE

ZONE

Y =

X =

ROMAN NUMERALS INDICATE WHETHER THE ITEM IS TO BE ENTERED BY (II) FIELD PARTY, (III) PHOTOGRAMMETRIC OFFICE,
OR (IV) WASHINGTON OFFICE.

WHEN ENTERING NAMES OF PERSONNEL ON THIS RECORD GIVE THE SURNAME AND INITIALS, NOT INITIALS ONLY.

DESCRIPTIVE REPORT - DATA RECORD

FIELD INSPECTION BY (II):		DATE:
MEAN HIGH WATER LOCATION (III) (STATE DATE AND METHOD OF LOCATION): (See project instructions) The MHWL was located by field inspection on infra-red photographs flown very close to MHW		
PROJECTION AND GRIDS RULED BY (IV): A. Roundtree		DATE 4-29-63
PROJECTION AND GRIDS CHECKED BY (IV): R. Grygo		DATE 5-16-63
CONTROL PLOTTED BY (III): R. A. Carter		DATE 5-27-63
CONTROL CHECKED BY (III): J. Phillips		DATE 5-27-63
RADIAL PLOT OR STEREOSCOPIC CONTROL EXTENSION BY (III): R. Kelly		DATE 5-63
STEREOSCOPIC INSTRUMENT COMPILATION (III): J. Battley, J. Phillips R. A. Carter	PLANIMETRY X	DATE 5-63 - 8-63
	CONTOURS None	DATE
MANUSCRIPT DELINEATED BY (III): J. Phillips, R. A. Carter, H. Lucas		DATE 5/63 - 8/63
SCRIBING BY (III):		DATE
PHOTOGRAMMETRIC OFFICE REVIEW BY (III):		DATE
REMARKS:		

DESCRIPTIVE REPORT - DATA RECORD

CAMERA (KIND OR SOURCE) (III):

PHOTOGRAPHS (III)

NUMBER	DATE	TIME	SCALE	STAGE OF TIDE
62W 2300 thru 2308	12 Nov. 1962	12:41 - 12:45	1:30,000	Bridging Photography
62W 2311 thru 2320	12 Nov. 1962	12:49 - 12:54	1:30,000	
62K 365-371	"	0923-0925	1:10,000	* MHW
62K 386-393	"	0946-0948	1:10,000	"
62K 583-592	"	1407-1409	1:10,000	"
62K 411-418	"	1007-1009	1:10,000	"
62K 604-612	"	1417-1420	1:10,000	"

TIDE (III)

		RATIO OF RANGES	MEAN RANGE	SPRING RANGE
REFERENCE STATION:				
SUBORDINATE STATION:				
SUBORDINATE STATION:				
WASHINGTON OFFICE REVIEW BY (IV):		DATE:		
PROOF EDIT BY (IV):		DATE:		
NUMBER OF TRIANGULATION STATIONS SEARCHED FOR (II):	RECOVERED:	IDENTIFIED:		
NUMBER OF BM(S) SEARCHED FOR (II):	RECOVERED:	IDENTIFIED:		

NUMBER OF RECOVERABLE PHOTO STATIONS ESTABLISHED (III):

NUMBER OF TEMPORARY PHOTO HYDRO STATIONS ESTABLISHED (III):

REMARKS:

* The infrared is tide controlled photography and was flown at MHW. (See project instructions)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
WASHINGTON 25, D.C.

IN REPLY, PLEASE ADDRESS THE
DIRECTOR, COAST AND GEODETIC
SURVEY, AND NOT THE SIGNER
OF THIS LETTER, AND REFER TO

NO. 6320A/AKH/shm

April 15, 1963

Chief, Cartographic Branch

Instructions, Office, Project 20,000-845, Hackensack River
New Jersey

Reference: Instructions, Field Operations for MHW mapping
Project 20,000-845, Hackensack River, N. J.

1. General

This Bureau has entered into a reimbursable agreement with State of New Jersey to provide photogrammetric shoreline surveys of the Hackensack River from Kearny Point upriver to a latitude of 40° 51'.

The agreement also includes two sets of semi-controlled mosaics at contact print scale.

2. Assignment

- .01 Aerotriangulation and compilation is assigned to the Cartographic Branch.
- .02 The preparation of the uncontrolled mosaics is also assigned to the Cartographic Branch.

3. Photography

The area is covered by both panchromatic and infra-red photography and shall be used as follows:

- .01 Panchromatic photography taken at 1:30,000 scale, exposures 62W 2300 thru 2320. This photography shall be used for bridging purposes and compilation of back limits of marsh. Horizontal control has been identified on a set of these photographs.
- .02 Infra-red tide controlled photography at a scale of 1:10,000 taken very close to MHW.

Four tide staffs were used, several flights at various stages of tide close to MHW were flown.

The tide staffs, exposure numbers and references to MHW are listed below. For compilation of the MHWL, street pattern and buildings immediately along the shore of the river use pass 3 in strip 1, pass 2 in strip 2, pass 2 in strip 3 and passes 1 and 4 in strip 4.

Field inspection of the shoreline has been delineated on a set of these photographs.

The remaining passes may be used for reference as an aid in interpretation of detail.

Strip 1 - Kearney Pt. Tide Staff - MHW 7.22 ft.

<u>Pass No.</u>	<u>Time</u>	<u>Tide Height</u>	<u>Ref. to MHW</u>	<u>Exposures</u>
1	0902-0904	6.9	-0.3	62K 351-357
2	0915-0917	7.1	-0.1	" 358-364
3	0923-0925	7.2+	0	" 365-371
4	0930-0932	7.3+	+0.1	" 372-378

Strip 2 - Laurel Hill Tide Staff - MHW 6.11 ft.

<u>Pass No.</u>	<u>Time</u>	<u>Tide Height</u>	<u>Ref. to MHW</u>	<u>Exposures</u>
1	0943-0945	6.0	-0.1	62K 379-385
2	0946-0948	6.1	0	" 386-393
3	0953-0955	6.2	+0.1	" 394-400

Strip 3 - Secaucus Tide Staff - MHW 7.29 ft.

<u>Pass No.</u>	<u>Time</u>	<u>Tide Height</u>	<u>Ref. to MHW</u>	<u>Exposures</u>
1	1001-1003	7.4	+0.1	62K 401-410
2	1407-1409	7.3	0	" 583-592
3	1411-1413	7.2	-0.1	" 593-603

Strip 4 - Little Ferry Tide Staff - MHW 7.54 ft.

<u>Pass No.</u>	<u>Time</u>	<u>Tide Height</u>	<u>Ref. to MHW</u>	<u>Exposures</u>
1	1007-1009	7.5	0	62K 411-418
2	1011-1012	7.6	+0.05	" 419-426
3	1017-1020	7.7	+0.15	" 427-434
4	1417-1420	7.5	0	" 604-612
5	1422-1424	7.4	-0.15	" 613-621
6	1427-1429	7.3	-0.25	" 622-630

Note - This station was flown based on readings at Secaucus because of lack of radio communication. The aircraft relayed the tide heights to base after photography to verify results.

- .03 Infra-red tide controlled photographs at a scale of 1:10,000 taken at +1.0' above MHW. This photography shall be used to supplement the 1:30,000 panchromatic (paragraph 3.01) for compilation of back limits of marsh, railroad lines and roads going across the marsh areas. Exposure numbers, times and tide heights are as follows:

<u>Station</u>	<u>Average Tide Height</u>	<u>Ref. to MHW</u>
Kearny Point	8.2	+1.0
Laurel Hill	7.0	+0.9
Secaucus	8.2	+0.9
Little Ferry	8.4	+0.9

Exposures 62L 435 thru 543 from 11:26 a.m. to 12:07 p.m.

4. Maps

Five shoreline surveys, Nos. T-12305 thru 12309 at a scale of 1:9,600 will be compiled.

5. Mosaics

Two sets of semi-controlled mosaics (at an approximate scale of 1:10,000) will be prepared. One set will be prepared using the photography as outlined in 3.03 and another set using the photography as outlined in 3.02.

6. Data

Ruled projections, bridging data, contact prints, a project diagram, B-8 diapositives, control data and geographic names sheets will be furnished.

7. Aerotriangulation

- .01 The area shall be bridged to provide control for compilation by the Wild B-8.

- .02 Sufficient pass points shall be established to enable the compilation section to orient both sets of photography outlined in paragraph 3.02 and 3.03 for compilation of detail by the Wild B-8 and/or graphic methods.

8. Compilation

- .01 Compilation shall be by Wild B-8 and/or graphic methods.
- .02 Along the river proper, show all shoreline structures. Limit the road pattern to those immediately back of the shore within approximately 800 feet.
- .03 In the marsh area show all main roads and railroad lines traversing the marsh areas since these are significant landmark features.
- .04 A limited field examination of the MHWL along the river was made in late November 1962. The primary purpose of this examination was to determine with what accuracy the mean high water line could be mapped in the marsh areas. A graphic representation of the probable accuracy has been shown on overlays of the mosaics #1 and #2. Copies will be furnished.
- .05 Shoreline for areas indicated on the overlays in red (\pm 20 foot accuracy) shall be scribed with a black solid line of standard weight.
- .06 Shoreline for areas indicated on the overlays in blue (\pm 50 foot accuracy) shall be shown with a black dashed line of standard weight.
- .07 Limit lines for the back limits of marsh will be of varying accuracy and in many cases will serve only to indicate the change from marsh to fast ground. This line shall be symbolized with a short dash long dash line of a weight less than 8.05 and 8.06.
- .08 In the places shown in green on the overlay it will be impossible to map even an approximate MHWL. These areas shall be symbolized with a "grass in water" symbol.
- .09 The accuracies stated in paragraphs 8.05, 8.06 and 8.07 are acceptable to the State of New Jersey as indicated by their letter of March 25, 1963.

- .10 A suitable legend outlining the accuracy of the MHWL using the overlays as a guide shall be prepared and shown on the manuscript.
- .11 The manuscript shall be scribed with all names and marginal data by stick-up methods. Pass points and photo centers shall not be delineated on the scribed copy.
- .12 A field edit has not been planned and will not be accomplished unless experience during compilation indicates this is necessary.
- .13 Ratio prints of photography outlined in paragraph 3.01 will not be furnished and shall be requested as necessary.

9. Costs

All costs shall be charged to 20,000-845.

10. Schedule

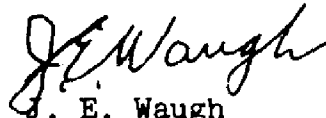
Bridging shall be complete with all data turned over to the compilation section by April 30, 1963.

Compilation shall be completed by July 30, 1963.

All completed data shall be routed to Chief, Cartographic Branch. After review two cronaflex copies and 25 double weight ozalid prints shall be ordered from the Reproduction Division.

11. Modification

If changes in procedures or methods seem advisable, please make appropriate recommendations to this office.



J. E. Waugh
Chief, Photogrammetry Division

cc:
6300B, 6310, 6314,
6320A, (L) 6324

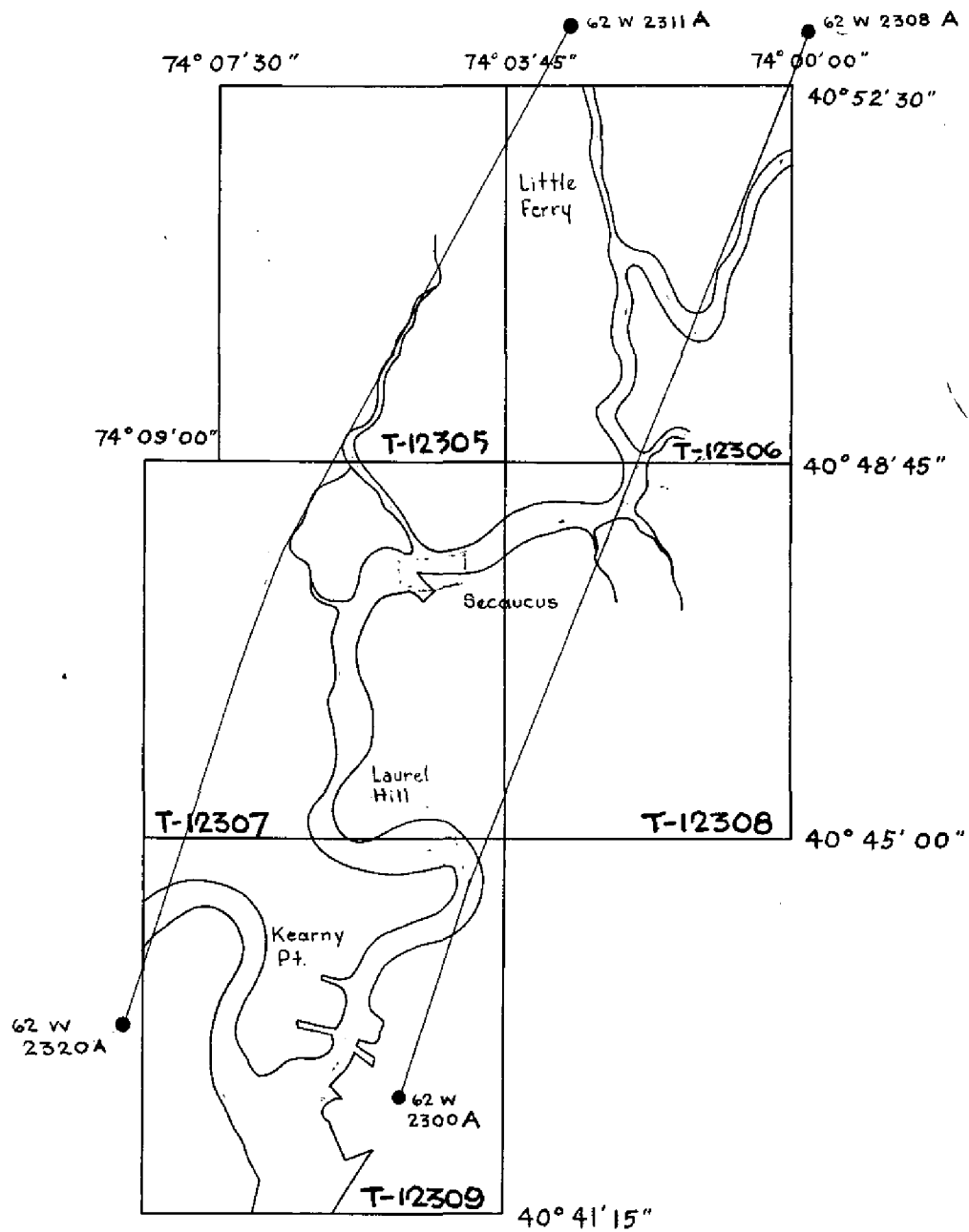
HACKENSACK RIVER, N. J.

PROJECT 20,000-845

SCALE 1:9,600

1963

JUNE - AUG.



AEROTRIANGULATION REPORT
Hackensack River, New Jersey

21. Area Covered

This report covers T sheets 12305 thru 12309 along the Hackensack River, New Jersey.

22. Method

Two horizontal bridges were run on the C-8 to provide control for graphic compilation. Photographs 62W 2300 thru 2320 were used in bridging. Holes were drilled in the diapositives with the PUG to provide tie and pass points for bridging. This process eliminated pin pricking and sketching on the photographs. The adjustment on the IBM-650 utilized 5 control stations for Strip #1 with 3 field and 9 office identified control stations used as checks. The IBM-650 utilized 5 control stations in the adjustment of Strip #2 with 4 field and 5 office identified control stations used as checks.

23. Adequacy of Control

Horizontal control accuracy meets the standards for delineating shoreline sheets at 9,600, except for Newark Meadow, Newark Bay (chimney pumping sta.). Probable reason of error is due to poor image point. All other control held well within the accuracy required by the National Standards.

Common points were hit between strips #1 and #2 to augment datum tie. Closures to control are shown on the appended sketches. All tie points were averaged between the two strips.

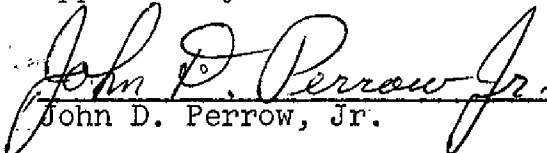
25. Photography

Adequate as to coverage, overlay, and definition.

Submitted by:


Robert B. Kelly

Approved by:

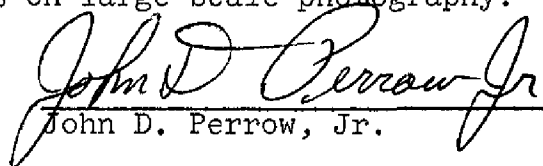

John D. Perrow, Jr.

Aerotriangulation Report
PH 20,000-845
Hackensack River, N. J.

PART II

22. Method

A supplemental, straight line adjustment was performed on on all pass points as well as, all common points of the overlapping area, of the two strips. This adjustment was necessary to provide detail points for compilation, at National Map Accuracy Standards on large scale photography.


John D. Perrow, Jr.

Preliminary Compilation Report
Hackensack, N.J.
August 1963
T-12305 thru T-12309
Project 20,000-845
Scale 1:9600

This project consists of five shoreline surveys covering the Hackensack River from Kearny Pt. upriver to approximately Little Ferry. It is a reimbursable project to compile the MHWL along the river and the adjoining marsh areas for the State of New Jersey. This report covers the first phase in the compilation of these surveys.

In November 1962, a limited field examination was made to determine with what accuracy the MHWL could be located in the marsh areas bordering the Hackensack River. Utilizing the infrared photography flown under tide-controlled conditions, the inspected shoreline was defined according to the accuracy of location.

This positioning was interpreted and compiled onto the manuscripts. The shoreline was compiled with varied line weights and/or dashes to indicate the probable accuracy of location. Each manuscript was delineated with an accompanying legend defining this symbolization and the accuracies obtained. Major roads and railroads traversing the area were delineated along with buildings bordering the river. Compilation was extended to the back limits of marsh and these limits are to be checked during field edit.

Extensive grass-in-water exists in the area of T-12307. The limits of the grass-in-water were shown with a light dash line and shaded in green to clarify the grass areas for the scribe.

The project is scheduled for field edit and on completion of the field edit revisions, a final compilation report will be written.

During compilation numerous marsh areas and shoreline areas were in the process of being filled. These areas undoubtedly have changed in size and shape since the photography taken in November. New photography or additional field work would be needed to bring these areas up-to-date.

Submitted by

Jeter P. Battley, Jr.
Jeter P. Battley, Jr.

Approved by

K. N. Maki
K. N. Maki

Chief, Compilation Section

FIELD INSPECTION REPORT
Project 20,000-845
Hackensack River, New Jersey

This field inspection and edit was started on September 16, and completed October 18, 1963, in accordance with instructions dated September 12, 1963.

Tentative sites for 12 tide stations to determine the tide datum in the sloughs and creeks connected to the Hackensack River were selected in the Washington Office by the Marine Data Division. A subsequent field examination of these sites by Mr. Orlowski resulted in the elimination of three of the stations which were found to be located on streams which were controlled by tide gates. These gates which are located near the junction with the main river allow the water in these creeks to flow only into the Hackensack River. Consequently, the areas controlled by these gates are not subject to tide action. Tide stations were constructed at the remaining nine sites. Portable gauges were run at these stations simultaneously with gauges installed at previously established tide stations, SECAUCUS and LITTLE FERRY on the Hackensack River proper. After each of these gauges were allowed to run for a minimum of 72 hours they were forwarded to the Washington Office for processing. The MHW values at each of these staffs were immediately returned to the field as the work progressed, thus enabling the field inspection parties to continue without interruption.

Levels were run from the staffs to three temporary tidal bench marks at each station. The staff was checked against the tidal bench marks upon completion of the 72-hour series.

The field inspection along the Hackensack River proper was begun as soon as the existing tide staffs at SECAUCUS and LITTLE FERRY were verified with the tidal bench marks and was completed at about the same time that the values for the first of the new staffs were received from Washington. The inspection then progressed into the sloughs and creeks for which the tide data became available.

All inspection of the MHW line was done between tide readings of .5 ft. below and .5 ft. above MHW. One man remained near the tide staff with a radio calling off the readings every ^{ten} ~~two~~ minutes or less to one or more field inspectors in the skiffs. A detailed inspection was made of all creeks, sloughs, and ditches which were accessible by boat. The skiff was beached at regular intervals along the banks and ground elevations were determined above or below the water level and adjusted to MHW.

Where the MHWL was found to be inside of the vegetation, measurements were made to the outer limits of the marsh grass which were visible on the photo. A solid line was drawn on the photo to indicate this MHWL. The area between the MHWL and the outer limits of the marsh was then considered "grass in water". When the hand level elevations indicated that the ground was at or below high water, the shoreline was indicated as indefinite and no line was drawn on the photo.

The precise point at which the MHWL left the creek banks and meandered through the marsh could not, in most cases, be delineated. Any slight depression in the creek banks would allow the tide water to flow back through the marshes. Consequently, the inked MHWL was not turned away from the shoreline when it was changed to "indefinite". For this same reason it should be understood that, although a solid line was drawn on the photos to indicate the MHWL, there could have been small breaks in this line which were not seen by the field inspector.

A number of sloughs and ditches were blocked by levees, pipe culverts, and low bridges and consequently were not inspected. Some streams were blocked by limited clearances at high water. In these instances the skiff was brought under the bridge at low water and inspected at the next stage of MHW.

It was impractical to determine the position of the MHWL where it left the creek banks and meandered through the marsh. Most of these areas were accessible only by vehicles such as "swamp buggies".

An attempt was made to delineate the back limits of the marsh areas but this was found to be impractical. Many of these "marsh areas" were dry at all stages of tide because of levees and fills which restricted or stopped the tide action. For example, many areas which had water standing in them were actually higher in elevation than the dry areas.

A list of all the tide staffs with sketches and elevations of the tidal bench marks with reference to MHW, and a copy of the mosaics showing the staff locations were furnished to each of the following:

Mr. Harold Barker, Jr.
State Topographic Engineer
Bureau of Geology
Trenton, New Jersey

Mr. Tony Scappetuolo
Principal Engineer
Bureau of Navigation
Trenton, New Jersey

Mr. Morris Colen
U. S. Engineers
New York District Office
111 East 16th Street
New York 3, N. Y.

A representative from Mr. Barker's office visited all of the tide staffs and was shown the location of all of the temporary bench marks. The State of New Jersey intends to tie these bench marks to geodetic mean-sea level datum.

The State of New Jersey was notified of the completion of the field inspection on October 14. On October 17 Mr. Peter J. Gannin, Chief of the Navigation Bureau and Messrs. Tony Scappetuolo and Frank Kelly visited the field party and inspected some of the areas which were field inspected. They were shown the methods which were used to determine the location of the MHWL and also the reasons for classifying portions of the shoreline indefinite.


A visit was made to the New York District Office of the U.S. Engineers at which time Mr. Colen expressed his desire to receive the tide data from this project and also explained their mapping program of the Hackensack Meadows. This project consists of a series of controlled mosaics at a scale of 1:4800 with 2-foot contours above 6 feet and spot elevations at approximate 500-foot intervals in the area below 6 feet. The elevations were read on stereo instruments within an accuracy of .5 feet. Mr. Colen agreed to furnish copies of these mosaics as they were completed. Three sheets overlapping the extreme south end of our project have been received to date. The remainder of the sheets will be forwarded to the Washington Office by Mr. Colen.

The following field inspection photos were submitted:

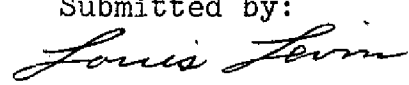
62 K 387, 388, 389 (2 prints), 390, 412, 583-585, 587,
588, 590, 604, 605, 608, 610
62 W 2302A, 2315A, 2316A.

All tide records were forwarded directly to the Marine Data Division by Mr. Orlowski.

Approved by:


Charles Theurer
Chief, Photogrammetric
Branch

Submitted by:


Louis Levin
Cartographer

Compilation Report
Project 20,000-845
Hackensack, New Jersey
December 2, 1963

The five manuscripts covering the Hackensack River were field inspected and edited in September-October, 1963. This report covers the application of the field inspected shoreline and the field edited revisions.

The field inspection for this area consisted of establishing numerous tide stations throughout the project, applying the observed MHWL to the photographs, and noting areas where the shoreline was indefinite or the MHWL could not be defined. (See field inspection report).

For the final manuscripts, the preliminary shoreline was revised and compiled to comply with the field determined MHWL location. The MHWL was shown as a red line approximately .012 in weight. Where the MHWL became indefinite, the line was turned inshore slightly, and the shoreline continued with either a light black line or a light dash line. The light line indicates areas where the MHWL could not be accurately defined or, in the case of narrow streams, was not field inspected. The dash line indicates the limits of grass-in-water.

Areas not field inspected, such as narrow streams and areas controlled by tide gates were delineated by photo-interpretation.

Tide stations established for this project were shown on the manuscripts.

Marsh limits were delineated by photo-interpretation.

Since planimetry is accurate only as of the date of photography, few changes were noted by the field editor.

Geographic names were confirmed with the Geographic Names Section.

The application of the field inspected shoreline and field corrections was completed November 20, 1963. The manuscripts were forwarded on that date for scribing.

Submitted by

Jeter P. Battley, Jr.
Jeter P. Battley, Jr.

Cartographer

Approved by

K. N. Maki

K. N. Maki
Chief, Compilation Section

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
Washington 25, D. C.

December 30, 1963

PROJECT REPORT

Mean-High Water Line Mapping
Lower Hackensack River, New Jersey

Introduction

This project was undertaken by the Coast and Geodetic Survey at the request of the State of New Jersey and will have extended over a period of nearly two years from the beginning of tide observations on the Hackensack River in the spring of 1962 to the delivery of the printed maps scheduled for early March 1964.

The primary purpose of the project was to map the Mean-High Water Line, (that is, the line of intersection of mean-high water level with the ground) of the lower Hackensack River and its tributaries.

This project was both cooperative and reimbursable. However, the State of New Jersey reimbursed the Coast and Geodetic Survey for the greater part of the total cost under two reimbursable agreements with the Photogrammetry Division, Coast and Geodetic Survey. The work was carried out by the Marine Data, Geodesy, and Photogrammetry Divisions of the Coast Survey with the assistance of personnel from the Bureau

of Navigation, State of New Jersey, that were assigned to the field party for tide observations and so on.

Operations on this project included:

1. Tide observations and establishment of tidal bench marks on the Hackensack River (spring of 1962)
2. Geodetic leveling connecting the tidal bench marks (spring of 1962)
3. Aerial photography (November 1962)
4. Field Identification of control and preliminary field inspection along the Hackensack River proper (November 1962)
5. Preparation of aerial mosaics and a preliminary report (December 1962-January 1963)
6. Aerotriangulation and compilation of manuscript maps (various periods between February 1963 and September 1963)
7. Tidal observations and establishment of temporary bench marks along the tributaries to the lower Hackensack River (September 1963)
8. Field inspection of the mean-high water line (September-October 1963)
9. Completion of map manuscripts from the September-October field inspection (November 1963)

10. Final scribing (engraving), reproduction and printing
(December 1963-February 1964)

11. Delivery of maps scheduled for early March 1964)

Records

Maps

The Coast and Geodetic Survey will retain the map manuscripts and one set of the printed maps in its permanent file. All other copies of these maps will be forwarded to the Bureau of Navigation, State of New Jersey. The Coast and Geodetic Survey does not plan to distribute copies of the printed maps; copies must be obtained from the Bureau of Navigation. The engraved negatives from which the color prints were made will be held on file in the Coast and Geodetic Survey for a limited period in case another printing is required by the State of New Jersey.

Mosaics

The negatives and copies of the mosaics made for this project will be forwarded to the Bureau of Navigation. No file will be retained on these by the Coast and Geodetic Survey.

Aerial Negatives

The aerial negatives are filed in the Coast and Geodetic Survey. Prints have been furnished to the Bureau of Navigation.

Tide and Leveling Records

The original records for the tide observations and the leveling are filed in the Coast and Geodetic Survey. Elevations of tidal bench marks and geodetic bench marks have been furnished to the Bureau of Navigation.

Plan of Operations

The Coast and Geodetic Survey suggested the use of tide-controlled infrared photography taken at exactly mean-high water by means of radio communication between the tide observers and the aircraft for mapping the mean-high water line on this project. The State of New Jersey agreed to this.

The State of New Jersey originally requested that the mapping of the mean-high water line be limited to the main stem of the Hackensack River and not include the tributaries. The State further requested that tide-controlled photography be taken as follows:

Infrared photography of the main stem of the Hackensack at the stage of mean-high water.

Infrared photography of the entire area at the highest possible tide level above mean-high water.

Infrared photography taken at mean-high water provides a very sharp definition of the mean-high water line (intersection of mean-high water level with the ground) when that line is not covered by vegetation. On this project the

infrared photography did not help very much because most of the mean-high water line is inside the edge of the marsh grass.

After examination of the photography and a preliminary field examination in November 1962, the State of New Jersey requested that we map the mean-high water line by field identification of that line on the photographs insofar as this could be done with a horizontal accuracy of ± 20 feet. The State further requested that the mean-high water line mapping include the tributaries.

The change in plan to include mapping the mean-high water line of tributaries required the establishment of additional tide stations up these tributaries as indicated in Item 7, Page 2.

Maps

The maps on this project will be at scale 1:9600 (1 inch equals 800 feet) and will be printed in three colors:

The mean-high water line (intersection of the level of mean-high water with the ground) where identified and mapped within a horizontal accuracy of ± 20 feet is shown with a heavy solid black line.

The indefinite shoreline (the outer limits of heavy marsh growth) is shown in blue for areas where the actual mean-high water line meanders back from the banks through dense marsh and could not be identified.

All marsh growth is shown by a green tint regardless of whether the marsh is flooded or whether it has been drained.

Highland areas outside the marsh are shown in white.

Cultural features are shown with black lines and symbols.

Appendices

The following diagrams and tabulations are included at the back of this report:

1. List of tide stations on the Hackensack River with the elevations of bench marks.
2. List of tide stations on the tributaries with the elevations of bench marks.
3. A diagram showing the layout of the five maps covering the project and the location of the 12 tide stations (the tide stations are also shown on the maps).
4. A diagram of the flight lines of the aerial photography.
5. A tabulation of flight lines, photograph numbers, and the stage of the tide at which the photographs were taken.
6. Summary of proposals and agreements.

2

Description of Operations1. Tide Observations and Establishment of Tidal Bench Marks on the Hackensack River

Four additional tide stations were established to provide tidal datums to control the mean high-water line mapping along the Hackensack River proper. One was established at Port Newark, one in the vicinity of N. J. Route 3 bridge (Secaucus), one in the area of U.S. Route 1 Bridge (Kearney Point), and one near the bridge on U.S. Route 46 (Little Ferry).

The tide stations were observed for a period of three months which was considered sufficient time to furnish a tidal mean high-water datum with an accuracy of about 0.1 foot.

The tide observations were made at low river stage so that the astronomic, or normal, tide would not be distorted by river flood stages of considerable duration.

Descriptions and positions of the tidal bench marks are given in Appendix 1.

2. Geodetic Leveling Connecting the Tidal Bench Marks

A line of second-order levels connecting these tidal bench marks to the main scheme was run in the spring of 1962.

3. Aerial Photography

Tide-controlled aerial photography was obtained in November 1962.

An additional tide staff at Laurel Hill was established to provide additional control when taking the aerial photography.

This staff was established by making level connections to nearby geodetic bench marks using for the elevation of mean high water the mean between the elevation of mean high water at tide stations Kearney Point and Secaucus.

The field party leveled between the tide staffs and tidal bench marks before and after aerial photography. All photography was synchronized by radio communication to observed readings on staffs at Kearney Point, Laurel Hill, Secaucus, and Little Ferry.

All operations were directed from a command post on top of Laurel Hill.

A tabulation of flight lines, photograph numbers, and the stage of the tide at which the photographs were taken are shown in appendix 5.

4. Field Identification of Control and Preliminary Field Inspection along the Hackensack River Proper

A limited field examination of the aerial photographs along the Hackensack River was made in late November 1962 soon after completion of the aerial photography. The primary purpose of this inspection was to determine with what accuracy the mean high-water line could be mapped in marsh areas. Conclusions were stated in an interim report submitted in January 1963. (See heading #3)

The inspection also included the identification of horizontal control for aerotriangulation.

Fifteen control stations were field identified on the panchromatic photography. Fourteen of these stations were natural objects. One ground station was identified using the substitute station method.

5. Preparation of Aerial Mosaics and a Preliminary Report

A Preliminary Report was submitted on January 29, 1963, outlining the work done to that date and plans for completion of the maps. The probable accuracy with which we could map the mean high-water line along the Hackensack River proper based on our preliminary field examination was graphically shown by overlays attached to the mosaics and submitted at the time of the report.

Four mosaics were also furnished at this time to provide a pictorial representation of the project area. They are semi-controlled in nature, subject to scale variations.

Mosaics numbered #1 and #2 are of the main river and were prepared at a scale of 1:9,000 (750 feet per inch) using the photography taken at mean-high water.

Mosaics numbered #3 and #4 were prepared at a scale of 1:9600 (800 feet per inch) from the photography taken at 0.9 feet to 1.0 foot above mean-high water.

6. Aerotriangulation and Compilation of Map Manuscripts

Two horizontal bridges were run in June 1963 on the Zeiss C-8 to provide for graphic compilation. Photographs 62W 2300A through 2320A were used in bridging. The points between strips

and pass points between photographs were drilled in the emulsion using the Wild P33. Adjustment of machine coordinate positions to geodetic control was accomplished on the IBM 650. The adjustment of Strip #1 (photographs 63W 2300A through 2308A, scale 1:30,000) utilized five control stations with three field identified and nine office identified stations used as checks.

The adjustment of Strip #2 (photographs 63W 2311A through 2320A, scale 1:30,000) utilized five control stations with four field and five office identified stations used as checks.

The maximum error in the adjustment of the pass points was 5 feet and the maximum error in the adjustment of geodetic control was 2 feet.

Upon completion of horizontal bridging a total of five manuscript maps at a scale of 1:9600 was compiled by graphic methods using the field inspection outlined under heading #4.

These manuscripts covered the area of the Hackensack River from Kearney Point upriver to latitude $40^{\circ}51'$.

The maps were preliminary in nature with the probably accuracy of the shoreline depicted by varied line weights subject to field edit. Major roads and railroads traversing the area were delineated along with buildings bordering the river. Compilation was extended to the back limits of marsh.

Copies of these preliminary maps were furnished to the State of New Jersey.

7. Tidal Observations and Establishment of Temporary Bench Marks Along the Tributaries to the Lower Hackensack River

To determine the tide datum in the creeks and sloughs back from the main river, nine temporary tide stations were established to cover the area.

Portable gages were run at these stations simultaneously with gages installed at previously established stations Secaucus and Little Ferry. (Refer to heading #1 and Appendix 1). Each of these portable gages was run for a minimum of 72 hours and data forwarded to the Marine Data Division of the Washington Office for analysis and determination of datum. The mean high water values for each of the temporary staffs were returned to the field party.

Levels were run from each tide staff to three temporary tidal bench marks before and after the 72-hour cycle.

A list of tide stations on the tributaries with the elevations of bench marks may be found in Appendix 2.

A diagram showing the locations of the temporary tide stations may be found in Appendix 3.

A representative of the State of New Jersey visited the field party and was shown the location of the temporary bench marks.

8. Field Inspection of the Mean-High-Water Line

A detailed field examination of the mean high-water line along the banks of the Hackensack River and the tributary creeks

was made in September and October 1963. The mean high-water line was thus positioned on field photographs or on the preliminary manuscripts where this could be done within a horizontal accuracy of ± 20 feet.

All inspection of the mean high-water line was done between tide staff readings of ± 0.5 foot of mean-high water. As the area controlled by ^athe tide staff was inspected, one man equipped with a radio called off the staff readings every 10 minutes to the field inspector occupying the skiff.

In this manner a detailed on-the-site inspection was made along the main stem of the Hackensack River and of all creeks, sloughs and ditches accessible by boat. The skiff was beached at regular intervals along the banks and ground elevations were determined above or below the water level and adjusted to mean-high water.

Where the mean high-water line was found to be along the edge of the bank it was so indicated on the manuscripts or photographs. Where the mean high-water line was found to be just inside the edge of the marsh growth measurements were made to the outer limits of the growth visible on the photographs and the mean high-water line was thus plotted on the photographs. The mean high-water line was not mapped where the hand level elevations showed that the ground at or near the banks was below mean high water and the mean high-water line meandered off into the marsh. In these latter places, the shoreline will be shown on the maps as indefinite.

Several large areas of marsh are controlled by tide gates and levees; the gates release surface water but do not permit the entry of tide water. The mean high-water datum in these areas can only be established by spirit leveling.

A number of sloughs and ditches were blocked by levees, pipe culverts, and low bridges and could not be inspected. Some streams were blocked by limited bridge clearances at high water. In these instances the skiff was brought under the bridge at low water and the area inspected at the next mean-high water stage.

It was impossible without extensive leveling to determine the position of the mean-high-water line where it left the creek banks and meandered through the marsh. The line was obscured on the photographs by tall reeds. Most of these areas are inaccessible except by vehicles such as "swamp buggies".

An attempt was made to delineate the mean-high-water line at the back limits of the marsh areas but this was found to be impractical in most cases. Many of these "marsh areas" were dry at all stages of tide because of levees and fills which restricted or stopped tide action. For example many areas in which had water standing in them were actually higher in elevation than the dry areas.

On October 17, 1963, Mr. Peter Cammin, Chief of the Bureau of Navigation and Messrs. Tony Scappetuolo and Frank Kelly visited the field party and were shown the methods which were

~~shown the methods which were used to determine the mean high-~~
water line location. They inspected some of the areas where
the shoreline was classified as indefinite.

9. Completion of Map Manuscripts from the September-October
Field Inspection

From the field inspection and edit (described under heading #8) the preliminary manuscripts were revised and compilation extended to include the mean high-water line of the tributaries back from the main river.

The mean high-water line of the main river was revised as necessary from the field edited copies.

The areas not field inspected, such as narrow streams, areas controlled by tide gates, and levees were delineated by photointerpretation.

Positions of temporary tide stations were also plotted on the manuscripts.

All geographic names were checked for accuracy by the Geographic Names Section.

For comments on the accuracy of shoreline symbolized on the manuscripts refer to pages 5 and 6 of this report.

The Corps of Engineers had a contract with the Geotechnics and Resources, Inc., to provide spot elevations every 500 feet throughout the project area on a controlled mosaic. The Coast and Geodetic Survey was to be provided with copies of these mosaics to be used in conjunction with the shoreline surveys

to determine the elevation of the marsh interior. Three of these mosaics covering the southern end of the project were received. We have been informed that the contract with the Engineers was terminated before completion.

None of this work has been shown on the maps.

10. Final Scribing (Engraving), Reproduction and Printing

All printing negatives were scribed from the reviewed compilation manuscript maps for reproduction in three colors. (Refer to pages 5 and 6 for shoreline and marsh symbolization.)

Appropriate marginal data, title block, geographic and tide station names were added by "stick-up" methods.

One hundred lithographic copies of the scribed sheets are to be delivered to the State of New Jersey in early March 1964.

/s/ A. R. Heywood

A. R. Heywood
Cartographer
December 30, 1963

Approved and Forwarded:

/s/ J. E. Waugh

J. E. Waugh, Chief
Photogrammetry Division
January 7, 1964

Approved:

/s/ B. N. Jones for

Charles Theurer, Chief
Photogrammetric Branch
December 31, 1963

12/31/62

NEW JERSEY - 6

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

TIDAL BENCH MARKS

Secaucus, Hackensack River
Lat. $40^{\circ} 07' .9$: Long. $74^{\circ} 04' .2$
4

BENCH MARK F 62 (1962) is a standard disk, stamped "F 62 1962" set in west corner of the concrete footing for the second row of piers from the southwest end of the highway bridge over the Hackensack River and about 1 foot above the level of the ground. Elevation: 6.53 feet above mean low water.

BENCH MARK M 62 (1962) is a standard disk, stamped "M 62 1962" set in southwest corner of second concrete step at south entrance to office building of Air Pilot Oil Company. It is 3 feet south of south side of the building, 1 foot above ground, 99 feet northwest of Bench Mark G 62 and about 1/10 mile southwest of State Highway Bridge over the Hackensack River. Elevation: 8.72 feet above mean low water.

BENCH MARK G 62 (1962) is a standard disk, stamped "G 62 1962" set in top of concrete fire wall around Air Pilot Oil Company tanks (nearest the river), 105 feet west of the east end of the fire wall and about 1 1/2 feet above ground. Elevation: 10.59 feet above mean low water.

Mean low water at Secaucus, Hackensack River is based on 3 months of records, July - September 1962, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Mean high water	5.10
Mean tide level	2.55
Mean low water	0.00

The estimated ^{highest} ~~lowest~~ water level to the nearest half foot is 10 1/2 feet above mean low water. The estimated lowest water level to the nearest half foot is 4 feet below mean low water.

USCOMM-CGS-DC

12/19/62

NEW JERSEY-6A

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

TIDAL BENCH MARKS

Little Ferry, Hackensack River
Lat. 40° 50'.8; Long. 74° 01'.9

BENCH MARK 1 (1962) is a standard disk stamped "NO 1 1962" set in top of 3-foot x 5-foot concrete base, flush with ground, 4 feet south of tool shed and 87 feet west of steps leading to oil dock on the property of the Sinclair Oil Company. Elevation: 9.04 feet above mean low water.

BENCH MARK A 62 (1962) is a standard disk stamped "A 62 1962" set vertically in west brick wall at southwest corner of St. Margarets Roman Catholic School. It is 176 feet north of north curb of Washington Avenue, 57 feet east of east curb of Liberty Street, 3 feet north of southwest corner of the school and $1\frac{1}{2}$ feet above ground. Elevation 10.18 feet above mean low water.

BENCH MARK F 41 (1956) is a standard disk, stamped "F 41 1956" set in top and north end of west concrete abutment of U. S. Highway 46 bridge over the Hackensack River. It is $\frac{1}{2}$ foot south of north end of the abutment and about level with the highway. Elevation: 24.45 feet above mean low water.

Mean low water at Little Ferry, Hackensack River is based on 3 months of records, July - September 1962, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Mean high water	5.30
Mean tide level	2.65
Mean low water	0.00

The estimated highest water level to the nearest half foot is 11 feet above mean low water. The estimated lowest water level to the nearest half foot is 4 feet below mean low water.

USCOMM-CGS-DC

1/9/63

NEW JERSEY - 7

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

TIDAL BENCH MARKS

Kearney Point, Hackensack River
Lat. $40^{\circ} 43'.6$; Long. $74^{\circ} 06'.1$

BENCH MARK 3 (1920) is a $1\frac{1}{2}$ -inch outline square surrounded by letters "U.S.G.S." cut in step or bench on west corner of lower part of southeast abutment of old abandoned Lincoln Highway Bridge over Passaic River. It is on south side of bridge, $\frac{1}{2}$ foot east of west corner of abutment, about 10 yards northeast of northeast edge of new bridge over the river, about 10 feet below top part of old abutment and about $\frac{1}{2}$ mile northwest along State Highway 25 from police and fire station. Elevation: 9.91 feet above mean low water.

BENCH MARK RVB (N.J.G.S.) is a monel metal rivet set in top of rock wing wall at southwest end of southeast abutment of old abandoned Lincoln Highway Bridge over the Passaic River. It is 12 feet southwest of center of metal lamp post, 4 inches north of railing on south side of bridge and about level with ground. Bench mark is 15 feet northwest of concrete retaining wall, 2 feet northeast of fence line, about 10 yards northeast of northeast edge of new bridge over the river and about $\frac{1}{2}$ mile northwest along State Highway 25 from police and fire station. Elevation: 19.37 feet above mean low water.

BENCH MARK 4 (1953) is a standard disk, stamped "NO 4 1953," set in top of 2-foot by 5-foot concrete base projecting 3 feet above ground, between concrete retaining wall and old bridge abutment on southeast side of Passaic River. It is $51\frac{1}{2}$ feet north of Bench Mark RVB (USGS), 9 feet east of abandoned bridge abutment and 13 feet west of 3-foot high concrete wall. Elevation: 21.00 feet above mean low water.

BENCH MARK W 16 (1934) is a standard disk, stamped "W 16 1934," set vertically in southwest face of pillar that is between the two southeast doors on southwest side of police and fire station and about 5 feet above level of highway. It is about $\frac{3}{10}$ mile southeast of southeast end of Highway 25 Bridge over the Passaic River. Elevation: 20.20 feet above mean low water.

(OVER)

USCOMM-CGS-DC

Based on 3 months of records, July - September 1962, reduced to mean values. The elevations of other tidal planes referred to this datum are as follows:

	<u>Feet</u>
Mean high water	5.00
Mean tide level	2.50
Mean low water	0.00

The estimated highest water level to the nearest half foot is $10\frac{1}{2}$ feet above mean low water. The estimated lowest water level to the nearest half foot is 4 feet below mean low water.

April 1953

NEW JERSEY - 8

U. S. COAST AND GEODETIC SURVEY

TIDAL BENCH MARKS

Port Newark, Newark Bay
Lat. 40° 41'.4; Long. 74° 08'.0

BENCH MARK 2 (1922) is a standard disk, stamped "2 1922", set in top of concrete sea wall along rear of old wooden dock of Newark Tidewater Terminal Inc., about 150 yards west of fence line on west side of Doremus Street, between Cargo Terminal Company and Newark Tidewater Terminal Inc., 79 feet southeast of southeast corner of most southerly building, 52 feet north of south edge of wooden dock (face line). Bench mark is at first concrete strip leading from sea wall to north edge of canal. Elevation: 10.74 feet above mean low water.

BENCH MARK 1 (1951) is a standard disk, stamped "NO 1 1951", set in top of southwest edge of concrete apron (dock) on south side of Cargo Terminal Building No. 2, 93 feet southwest of southwest corner of building, 25 feet east of west end of apron, and $1\frac{1}{2}$ feet north of edge of bulkhead. Bench mark is about 70 yards southwest of center of junction of Doremus and Gilligan Streets, 27 feet northwest of extended center line of Doremus Street, 102 feet west of west corner of building No. 2 (first building southeast of Doremus Street), $2\frac{1}{2}$ feet north of mooring bitt, and level with dock. Elevation: 10.77 feet above mean low water.

BENCH MARK 3 (1951) is a standard disk, stamped "NO 3 1951", set in top of northeast end of concrete retaining wall at east end of concrete dock at Cargo Terminal Building No. 2, 45 feet north of bulkhead, 25 feet south of south corner of building No. 2, 2 feet south of extended line of row of steel upright roof supports, about $2\frac{1}{2}$ feet above ground level, and $1\frac{1}{2}$ feet southwest of northeast end of retaining wall. Elevation: 13.24 feet above mean low water.

BENCH MARK 4 (1951) is a standard disk, stamped "NO 4 1951", set in top of concrete foundation at north corner of building No. 6 (large building with corrugated tin siding), 165 feet northeast of wooden bulkhead, 21 feet southwest of center line of Gilligan Street, 0.8 foot north of north corner of building, and about level with street. Elevation: 10.76 feet above mean low water.

(OVER)

BENCH MARK 5 (1951) is a standard disk, stamped "NO 5 1951", set in top of west corner of concrete foundation (10 feet square) at southeast end of Grady Street, at junction of Gilligan and Grady Streets, 144 feet northeast of wooden bulkhead, 75 feet northwest of west corner of building No. 36, 57 feet east of center line of Grady Street, about 1 foot above ground, and 144 feet northeast of mooring bitt on dock. Elevation: 11.49 feet above mean low water.

Mean low water at Port Newark, Newark Bay is based on 9 months of automatic gage records, January - December 1952, reduced to mean values. Elevations of other tide planes referred to this datum are as follows:

	<u>Feet</u>
Highest tide (estimated)	¹⁰ 9.5
Mean high water	5.01
Half tide level	2.51
Mean low water	0.00
Lowest tide (estimated)	3.5 -4.0

July 1963

NEW JERSEY

The difference between sea-level datum of 1929 (SLD) and mean low water (MLW) for each location where the tidal bench marks and the geodetic bench marks of the precise level net have been connected by spirit levels is given below.

Bench mark elevations above sea-level datum of 1929 may be obtained by applying the tabular difference to the published elevations above mean low water; subtracting the difference when positive and adding the difference when negative.

<u>Index Map Number</u>	<u>Locality</u>	<u>SLD-MLW Feet</u>
1	Alpine, Hudson River	1.60
2	Edgewater, Hudson River	2.06
3	Bayonne, Upper Bay	2.06
4	Constable Hook, Upper Bay	1.90
5	Bergen Point, Kill Van Kull	2.11
6	Secaucus, Hackensack River	2.21
6A	Little Ferry, Hackensack River	2.37
6B	Tea Neck (New Bridge), Hackensack River.	2.13
7	Kearney Point, Hackensack River	2.06
8	Port Newark, Newark Bay.	2.12 1.90
9	Elizabethport, Arthur Kill	2.15
10	Carteret, Arthur Kill	2.24
12	South Amboy, Raritan River	2.18
17	Keyport, Raritan Bay	2.29
18	Keansburg (Belvedere Beach), Raritan Bay	2.20
19	Sandy Hook (Fort Hancock).	1.73
20	Highlands Bridge, Shrewsbury River	1.41
21	Normandie, Shrewsbury River	1.42
24	Seabright, Shrewsbury River	0.48
26	Gooseneck Bridge, Shrewsbury River	0.06
28	Long Branch.	1.96
29	Shark River Inlet (Entrance)	1.92
30	Shark River Inlet (North Channel)	1.29
31	Manasquan Inlet	1.96
32	Brielle (Railroad Bridge), Manasquan River.	1.49
36	Mantoloking, Barnegat Bay	-0.27
37	Coates Point (Highway Bridge), Toms River Entrance	-0.40
38	Toms River, Toms River	-0.25
39	Beachwood, Toms River	-0.31
40	Barnegat Pier, Barnegat Bay	-0.34
41	Waretown, Barnegat Bay	-0.19

(OVER)

<u>Index Map Number</u>	<u>Locality</u>	<u>SLD-MLW Feet</u>
42	Oyster Creek Channel (East End), Barnegat Bay	-0.15
43	Sunset Shoal, Barnegat Bay	0.06
44	Barnegat City, Barnegat Inlet: East of Lighthouse at Inlet	1.21
	At Lighthouse at Inlet	0.97
45	West of Barnegat City ($\frac{1}{2}$ mile S. W. of Barnegat Lighthouse	0.40
46	High Bar Island ($\frac{3}{4}$ mile S. W. of Barnegat Lighthouse	0.18
47	Long Beach, Barnegat Bay	-0.10
48	Manahawkin Drawbridge, Cedar Bonnet Island	0.27
49	Ship Bottom (Ocean)	1.91
50	Beach Haven, Little Egg Harbor	0.68
63	Atlantic City	1.64
70	Ocean City (Foot of 9th Street), Back Thorofare	1.78
71	Great Egg Harbor Bay Highway Bridge	1.72
78	Sea Isle City: City Pier, Outer Coast	2.14
	Bridge, Ludlam Thorofare	1.81
86	Cape May Harbor	2.24
87	Cape May (Municipal Pier)	2.27
88	Cape May Canal (West End)	2.20
93	Trenton, Delaware River	1.60

Appendix 2

Elevations of BENCH MARKS referred to the tide staff zero along the Hackensack River, New Jersey.

The letters TEM designate Temporary Bench Marks which were 2" by 6" posts driven into the ground. All other designations are permanent marks.

To refer the elevations of the bench marks to the mean-high water, subtract the value at mean-high water on the staff from the listed elevation above the zero of the staff.

LITTLE FERRY, N. J. MHW on Staff = 6.08 ft.

NO. 1 = 9.802 ft. TEM 1 = 10.236 ft. TEM 2 = 9.542 ft.

DOPE CREEK, N. J. MHW on Staff = 4.22 ft.

H.K. 38 B = 11.431 ft. TEM 1 = 13.886 ft. TEM 2 = 9.686 ft.

BELMANS CREEK, N. J. MHW on Staff = 5.34 ft.

TEM 1 = 6.064 TEM 2 = 6.730 ft. TEM 3 = 5.949 ft.

PAUMPECK CREEK, N. J. MHW on Staff = 7.66 ft.

TEM 1 = 10.021 ft. TEM 2 = 10.759 ft. TEM 3 = 11.713 ft.

CRONAKILL CREEK, N. J. MHW on Staff = 5.03 ft.

TEM 1 = 6.790 ft. TEM 2 = 6.204 ft. TEM 3 = 6.759 ft.

MILL CREEK, N. J. MHW on Staff = 5.68 ft.

TEM 1 = 10.638 ft. TEM 2 = 13.250 ft. TEM 3 = 10.968 ft.

SECAUCUS, N. J. MHW on Staff = 7.29 ft.

G - 62 = 12.758 ft. H - 62 = 10.864 ft.

LOWER BERREYS CREEK, N. J. MHW on Staff = 3.03 ft.

TEM 1 = 10.158 ft. TEM 2 = 9.663 ft. TEM 3 = 11.564 ft.

UPPER BERREYS CREEK, N.J. MHW on Staff = 5.86 ft.

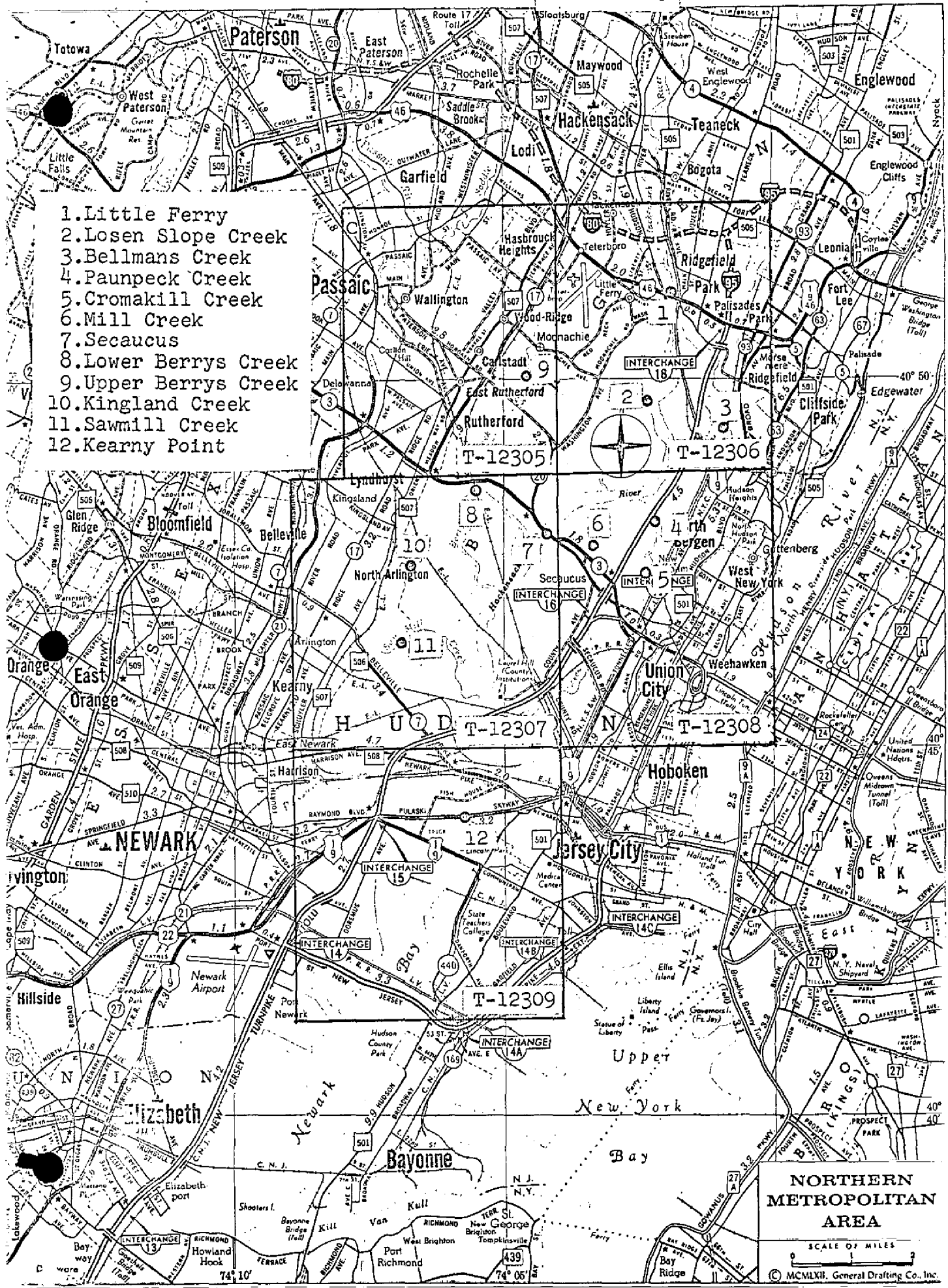
TEM 1 = 7.429 ft. TEM 2 = 8.463 ft. TEM 3 = 11.737 ft.

IRISLAND CREEK, N. J. MHW on Staff = 4.04 ft.

TEM 1 = 10.087 ft. TEM 2 = 13.774 ft. TEM 3 = 13.770 ft.

SALMILL CREEK, N. J. MHW on Staff = 2.38 ft.

TEM 1 = 6.202 ft. TEM 2 = 7.074 ft. TEM 3 = 7.042 ft.



1. Little Ferry
2. Losen Slope Creek
3. Bellmans Creek
4. Paunpeck Creek
5. Cromakill Creek
6. Mill Creek
7. Secaucus
8. Lower Berrys Creek
9. Upper Berrys Creek
10. Kingland Creek
11. Sawmill Creek
12. Kearny Point

**NORTHERN
METROPOLITAN
AREA**

SCALE OF MILES

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NEW JERSEY BUILDS

BETTER HIGHWAYS

for increased
human safety
traffic volumes
economic growth

Deadline... 1975

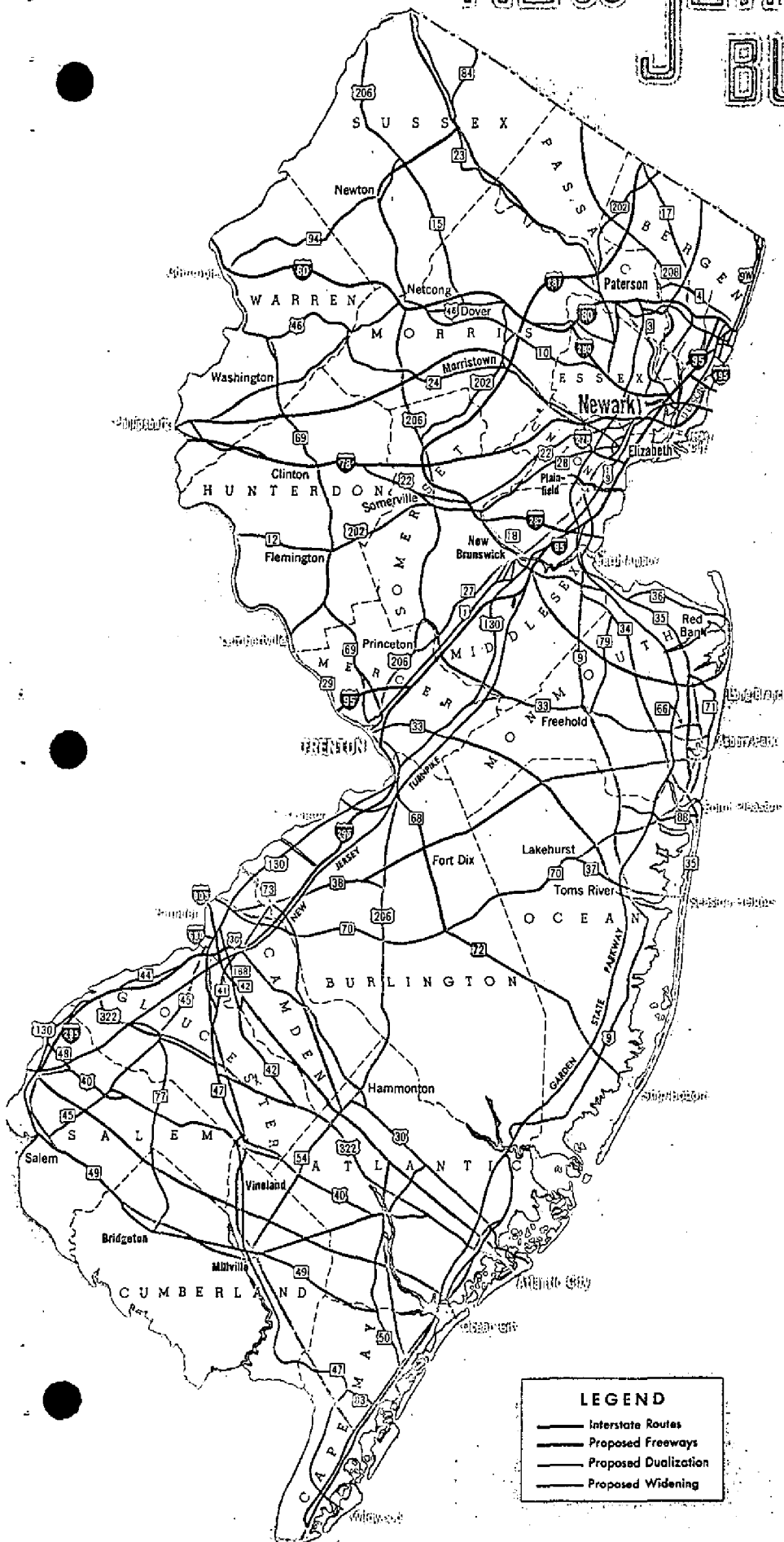
The largest state highway construction and improvement program in the history of New Jersey is well underway.

Its primary aims are to relieve congested areas and improve motorist safety, to provide good engineering design and to provide a highway system that will be able to handle the demands that will be placed upon it by 1975.

A two-year study completed by the Department in 1956 determined that it would require 821 miles of new freeways, acceleration and widening of more than 900 miles of existing state highways, plus numerous resurfacings and intersection improvements to do the job. The cost was then estimated at \$2.4 billion and the work extends into all 21 counties.

To accomplish both the primary and long range goals with maximum efficiency and at minimum cost, each construction project of each year's State Highway Department construction program is scheduled with these goals in mind.

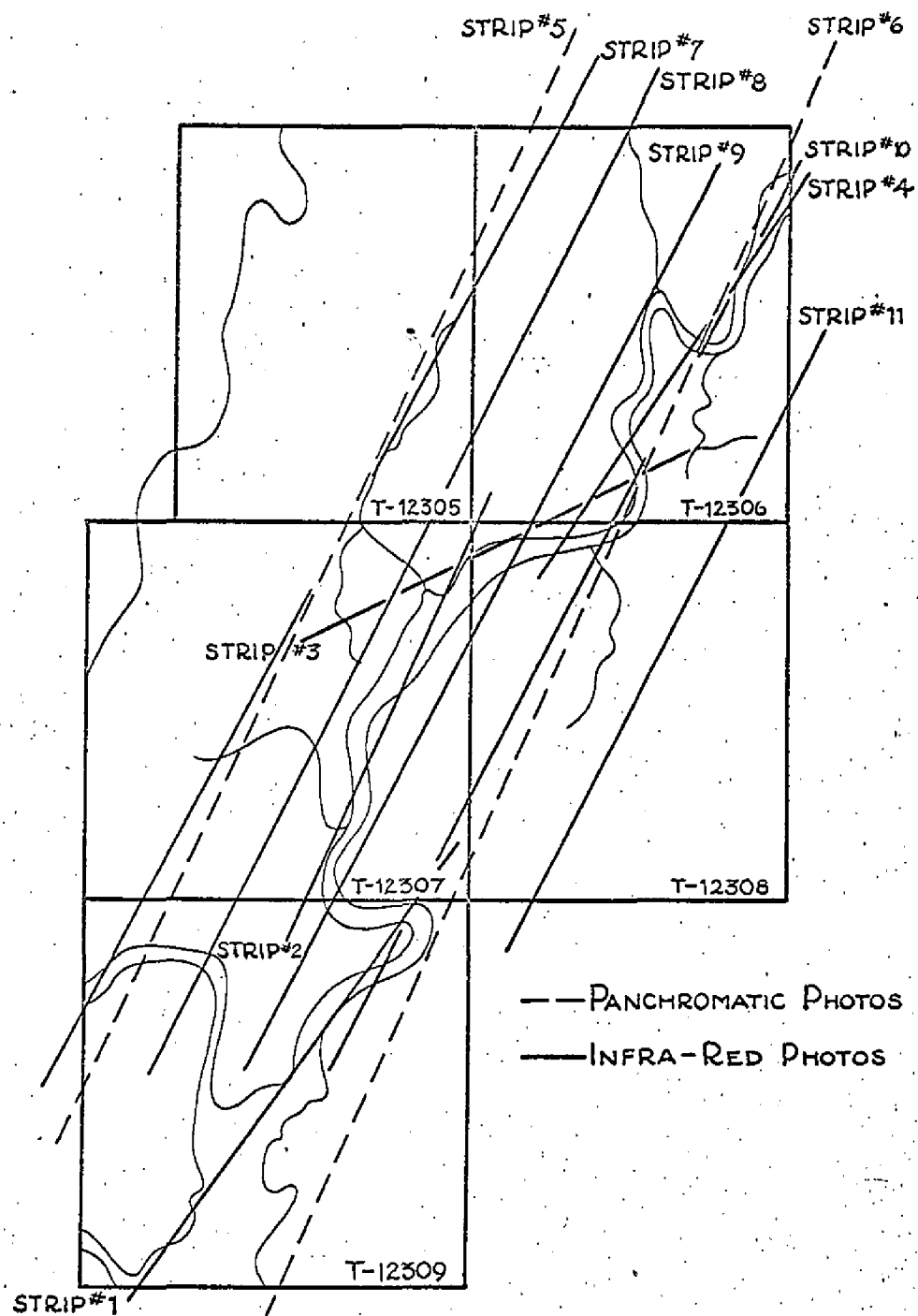
A graphic illustration of what has to be done to bring the State Highway System into line with 1975 needs is displayed in this map. It must be emphasized that this map is for general illustration only and does not indicate the exact location of proposed new alignments, their exact points of intersection with existing ones. Such details have to wait until actual construction on the individual projects can be programmed with certainty.



LEGEND

- Interstate Routes
- Proposed Freeways
- - - Proposed Dualization
- Proposed Widening

TIFFENBACH T



Appendix 5

Time and Height of Tide at Photography

Strip 1 - Kearney Pt. Tide Staff - MHW 7.22 ft., 1:10,000 scale

<u>Pass No.</u>		<u>Time</u>	<u>Tide Height</u>	<u>Ref. to MHW</u>
1	62K 351-357	0902-0904	6.9	-0.3
2	" 358-364	0915-0917	7.1	-0.1
3	" 365-371	0923-0925	7.2+	0
4	" 372-378	0930-0932	7.3+	-0.1

Strip 2 - Laurel Hill Tide Staff - MHW 6.11 ft., 1:10,000 scale

<u>Pass No.</u>		<u>Time</u>	<u>Tide Height</u>	<u>Ref. to MHW</u>
1	62K 379-385	0943-0945	6.0	-0.1
2	" 386-393	0946-0948	6.1	0
3	" 394-400	0953-0955	6.2	+0.1

Strip 3 - Secaucus Tide Staff - MHW 7.29 ft., 1:10,000 scale

<u>Pass No.</u>		<u>Time</u>	<u>Tide Height</u>	<u>Ref. to MHW</u>
1	62K 401-410	1001-1003	7.4	+0.1
2	" 583-592	1407-1409	7.3	0
3	" 593-603	1411-1413	7.2	-0.1

Strip 4 - Little Ferry Tide Staff - MHW 7.54 ft., 1:10,000 scale

<u>Pass No.</u>		<u>Time</u>	<u>Tide Height</u>	<u>Ref. to MHW</u>
1	62K 411-418	1007-1009	7.5	0
2	" 419-426	1011-1012	7.6	+0.05
3	" 427-434	1017-1020	7.7	-0.15
4	" 604-612	1417-1420	7.5	0
5	" 613-621	1422-1424	7.4	-0.15
6	" 622-630	1427-1429	7.3	-0.25

Strips 5 & 6

Panchromatic photography taken at a scale of 1:30,000, exposures 62W 2300 thru 2320 for extension of horizontal control.

Strips 7 (520-43), 8 (497-510), 9 (474-96), 10 (451-73), and 11 (435-50) - Flown 1126 to 1207.

<u>Station</u>	<u>Average Tide Height</u>	<u>Ref. to MHW</u>
Kearney Point	8.2	+1.0
Laurel Hill	7.0	+0.9
Secaucus	8.2	+0.9
Little Ferry	8.4	+0.9

Appendix 6

SUMMARY OF PROPOSALS AND REIMBURSABLE AGREEMENTS

In January 1962, the Department of Conservation and Economic Development requested the Coast and Geodetic Survey to establish additional bench marks along the Hackensack River.

The request was initiated by Mr. James Rankin, Chief Engineer.

This work was done as outlined under headings #1 and 2.

In May 1962, Mr. Rankin expressed a desire to have the Coast and Geodetic Survey undertake the mapping of the Hackensack River proper with tide-controlled photography.

An agreement to do this mapping was signed on October 8, 1962. This agreement provided for the compilation of five maps at a scale of about 1:10,000 depicting the mean-high-water line, shoreline and offshore structures, and planimetric detail.

A set of uncontrolled aerial mosaics was also to be prepared.

This work was accomplished as outlined under headings 3, 4, 5, and 6.

The original agreement was amended on July 10, 1962, to include additional work. The amended agreement included the establishment of additional tide stations back from the river proper, a detailed field inspection of the sloughs and creeks to define the mean-high water line as far as possible with an accuracy of ± 20 feet.

Work accomplished under the amended agreement is detailed under headings 7, 8, 9, and 10 of this report.

GEOGRAPHIC NAMES

BERRYS CREEK
WALDEN SWAMP
EIGHT DAY SWAMP
RUTHERFORD
NEW JERSEY AND NEW YORK
ERIE
MOONACHIE AVENUE
MOONACHIE ROAD
PATERSON PLANK ROAD
HACKENSACK RIVER
BERRYS CREEK CANAL
PENHORN CREEK
SAWMILL CREEK
KINGSLAND CREEK
ANDERSON CREEK
MARY ANN CREEK
SECAUCUS
NORTH ARLINGTON
KEARNY
LITTLE SNAKE HILL
LAUREL HILL
SCHUYLER AVENUE
BELLEVILLE TURNPIKE
NEW COUNTY ROAD
NEW JERSEY TURNPIKE
COUNTY AVENUE
DELAWARE LACKAWANNA AND WESTERN
BELLMANS CREEK
OVERPECK CREEK
BASHES CREEK
MOONACHIE CREEK
DOCTOR CREEK
LOSEN SLOPE
RIDGEFIELD PARK
LITTLE FERRY
NEW YORK CENTRAL
NEW YORK SUSQUEHANNA AND WESTERN
NEW YORK SUSQUEHANNA AND WESTERN PENNSYLVANIA
CROMAKILL CREEK
MILL CREEK
PAUNPECK CREEK
GENERAL PULASKI
JERSEY CITY
MARION
KEARNY POINT
DROYERS POINT

