

US Army Corps
of Engineers
New York District

General Design Memorandum

Streams in Westchester County, N.Y.

Flood Control Project for the Mamaroneck and Sheldrake Rivers Basin in the Village of Mamaroneck, N.Y.

Volume 6 of 6 - Appendix E - Cost Estimates,
Appendix F - Cultural Resources,
Appendix G - Environmental,
Appendix H - Economics,
Appendix I - Pertinent Correspondence, and
Appendix J - Real Estate

January 1989
Final Report

WESTCHESTER COUNTY STREAMS
MAMARONECK AND SHELDRAKE RIVERS
FLOOD CONTROL PROJECT
VILLAGE OF MAMARONECK

GENERAL DESIGN MEMORANDUM

APPENDIX E
COST ESTIMATES

JANUARY 1989

MAMARONECK AND SHELDRAKE RIVERS BASIN
VILLAGE OF MAMARONECK
WESTCHESTER COUNTY, NEW YORK
FLOOD CONTROL PROJECT

GENERAL DESIGN MEMORANDUM

APPENDIX E - COST ESTIMATES

TABLE OF CONTENTS

Paragraph No.	Description	Page
I - BASIS OF COST ESTIMATE		
E1	GENERAL	E1
E2	BASIS FOR ESTIMATES	E1
II - DESIGN DETAILS		
E3	RECOMMENDED PLAN	E1
E4	OTHER PLANS CONSIDERED	E4
E5	CHANGES IN RECOMMENDED PLAN	E5
III - COST ESTIMATES FOR THE RECOMMENDED PLAN		
E6	FIRST COSTS	E6
E7	UNIT COSTS	E7
E8	LUMP SUM ITEMS	E7
E9	TUNNEL COSTS	E7
E10	CONTINGENCIES	E10
E11	ENGINEERING AND DESIGN, SUPERVISION AND ADMINISTRATION	E10
E12	INTEREST DURING CONSTRUCTION	E10
IV - CONSTRUCTION AND FUNDING SCHEDULE		
E13	GENERAL	E10
V - ANNUAL CHARGES		
E14	PROJECT LIFE	E11
E15	INTEREST	E11
E16	AMORTIZATION	E11
E17	REPLACEMENT, OPERATION AND MAINTENANCE	E11
E18	ESTIMATES OF ANNUAL CHARGES	E12
E19	COST APPORTIONMENT	

MAMARONECK AND SHELDRAKE RIVERS BASIN
VILLAGE OF MAMARONECK
WESTCHESTER COUNTY, NEW YORK
FLOOD CONTROL PROJECT

GENERAL DESIGN MEMORANDUM

APPENDIX E - COST ESTIMATES

TABLE OF CONTENTS

LIST OF TABLES

TABLE NO.	DESCRIPTION	PAGE NO.
E1	Detailed Estimate of First Cost (Oct. 1987 Price Levels)	E13 - E22
E2	Summary of Estimated Annual Charges (Oct. 1987 Price Levels)	E23

ATTACHMENTS

COST ESTIMATE BACKUP: TUNNEL CONSTRUCTION COSTS	E24 - E37
BRIDGE DECK ANALYSIS	E38 - E40

MAMARONECK AND SHELDRAKE RIVERS BASIN
VILLAGE OF MAMARONECK
WESTCHESTER COUNTY, NEW YORK
FLOOD CONTROL PROJECT

GENERAL DESIGN MEMORANDUM

APPENDIX E - COST ESTIMATES

I. BASIS OF COST ESTIMATES

E1. GENERAL. This appendix presents the detailed cost estimate for the recommended plan of improvement for the proposed flood control project for the Mamaroneck and Sheldrake Rivers Basin in Mamaroneck, New York. Refer to Main Body Figures 2 through 24 for the plan layout.

E2. BASIS FOR ESTIMATES. Cost estimates presented herein are based on October 1987 price levels. The quantities used in the recommended plan detailed cost estimate are based on the plans and details as contained in the Main Report on Figures 3 through 75. The plan sheets were prepared from Aerial Topographic Mapping prepared in December 1980.

II - DESIGN DETAILS

E3. RECOMMENDED PLAN. The recommended plan includes channel improvement along 10,400 feet of the Mamaroneck River, and along 1400 feet of the Upper Sheldrake River and a new diversion tunnel of 3550 feet in total length which will intercept the Sheldrake River and redirect it in a tunnel under Fenimore Road to a new outlet in the Mamaroneck Harbor, West Basin. The diversion tunnel will include a new intake structure consisting of a channel section with concrete bottom slab and a concrete flume section and a new outlet structure consisting of a concrete flume section. The plan also provides for filling in 2800' of the Sheldrake River between Mamaroneck Avenue & Fenimore Road as required to form a uniform local drainage collector ditch and for clearing & snagging 900' of the Upper Sheldrake River upstream of the Rockland Avenue Bridge. The details of these improvements are as follows:

Mamaroneck River - Improvements provide for channel widening and deepening and river realignment. For the first 200 feet of the project beginning at Station 17+00 (just upstream of the Boston Post Road crossing) the existing channel width of 60 feet is maintained and riprap is used to protect the bottom. Beginning at Station 19+00 the width of channel bottom transitions to 45' as required to clear an existing structure. The 45' width is

maintained to Station 21+00 at which point it starts to transition back to 60' at Station 22+00 (100' feet downstream of Tompkins Avenue). The 60' width is maintained to a point (Station 47+45), 60' downstream of the downstream face of the Jefferson Avenue Bridge. At this point the channel bottom width increases to match the width of the opening at Jefferson Avenue Bridge. Beyond the bridge the channel transitions to a 50' width at Station 49+90. The 50' width is maintained to a point (Station 65+60) 80' downstream of the New Barry Road Bridge. At this point the channel bottom width increases to 60' at the bridge opening. Beyond the bridge the channel transitions to a 45' width at Station 68+30. The 45' width is maintained upstream for the remainder of the project (limit of work is Station 121+20) except in the vicinity of the New England Thruway, where the channel width is transitioned to match the 60' bridge opening. The channel improvements will include excavation depths of 2 to 5 feet below existing channel bottom, a uniform improved slope of 0.2%, and a trapezoidal cross section with 2.5H:1V side slopes. Where limited by the presence of existing structures the side slope is steepened to 2H:1V. The channel is lined with riprap ranging in thickness from 12" to 36" at locations where its use is deemed necessary to prevent erosion caused by high water velocities and in the vicinity of Jefferson Avenue where silty material will be exposed. Refer to Table B14 of the Hydraulic Appendix for stone sizes by locations. Significant channel realignment will be realized just upstream of the railroad bridge so that the existing sharp "S" turn can be flattened. Likewise, the channel alignment just downstream of Winfield Avenue will be modified to provide for a smoother and defined curve. Where the channel is realigned to the extent that portions of the existing streambed are abandoned, it will be filled to provide proper surface drainage. Associated features of the Mamaroneck River improvement include:

- (1) Bridge replacements at Tompkins Avenue, Ward Street, Halstead Avenue, Station Plaza and Hillside Avenue, construction of a new utility bridge at Valley Place and the demolition of the Winfield Avenue Bridge.
- (2) Construction of retaining walls at various locations interspersed along the length of the improvement. The walls are used where physical constraints prevent the use of the typical trapezoidal channel section. Refer to the "Table of Retaining Structures" contained in the Structural Design Appendix for wall locations. A total length of 6350 feet of retaining wall and an additional 790 feet of concrete faced steel sheet pile walls are required along the Mamaroneck River within the limits of the planned improvement. Retaining wall sections utilized include cantilevered "T-type" either founded on earthy, on a tremie concrete fill or on piles to rock and 'L-type' either anchored with tiebacks or with permanent steel sheeting behind to provide resistance against sliding.

- (3) Removal and/or replacement and/or relocation of minor structures such as a wooden deck, shed, garage, etc. at eleven (11) locations.
- (4) A new USGS gaging station at Station 80+62 will be constructed, and another gaging station at Winfield Avenue will be removed.
- (5) Environmental mitigation including a 9' wide, 1.5' deep low flow channel from the Sheldrake River confluence upstream and boulder fields and log dams at various locations.
- (6) Floodproofing at three (3) structures located downstream of the New Barry Road crossing.
- (7) Utility relocations at various locations where existing sanitary sewer lines are in conflict with the planned improvements. This includes construction of siphons at five locations: downstream of Halstead Avenue, at Jefferson Avenue, Howard Avenue, River Street, and 150' east of Louis Street (Station 84+80); elimination of existing river crossings at five locations: at Ward Avenue where the sewer will be reconnected to the 66" trunk sewer, at Willow Street where a lift station will be built with a discharge to the 66" trunk sewer, at Hillside Avenue where the sewer will be rerouted to connect to the 66" trunk line, at N. Barry Avenue where the existing siphon will be removed and a new line will be constructed to tie into the River Street siphon, and at Bradley Avenue where the abandoned crossing will be removed; and replacement of an existing siphon crossing at Ellis Place with a gravity line crossing and a new lift station. Also included is the reconstruction of 1258 feet of the 66" trunk line since a new alignment is required to avoid conflict with the planned channel improvements at two locations: (1) along the left bank of the Mamaroneck River from above Tompkins Avenue to Ward Avenue and (2) along the left bank north and south of Hillside Avenue (from Station 56+00 to Station 62+50). In addition existing storm drainage discharges to the Mamaroneck River will be maintained and modified and new headwalls will be constructed as required. Overland drainage to the river in areas with retaining walls will be provided for by constructing swales behind the wall which will drain to drop outlets.

Sheldrake River - The lower section of the Sheldrake River from its confluence with the Mamaroneck River to Fenimore Road will function only as a local drainage collector ditch after the diversion tunnel is completed and Sheldrake River flow is intercepted by the tunnel. From just downstream of Mamaroneck Avenue to Fenimore Road, the planned improvement entails filling

in the Shel Drake River streambed as required to form a ditch with a 10' bottom width and 3H:1V side slopes. In addition, a small concrete weir will be provided on the Lower Shel Drake River at a point 200 feet upstream of its confluence with the Mamaroneck River as required to create a small natural pool in the Station Plaza Park. Upstream of Fenimore Road the Shel Drake River will be realigned as required to divert the flow into the tunnel. From upstream of the diversion tunnel intake structure to the downstream face of the Rockland Avenue Bridge the improvements provide for channel widening to provide a 40' bottom width and realignment. Associated features of the Shel Drake River improvement include construction of 340' of retaining wall on the right bank as required to protect existing structures, environmental mitigation consisting of a low flow channel and a log dam and channel slope stabilization with riprap for 700' where a silt layer will be exposed. From upstream of Rockland Avenue to the New England Thruway crossing the existing Shel Drake River streambed will be retained and improvements will be limited to clearing & snagging of the channel. In addition, a debris deflection structure will be constructed just upstream of Rockland Avenue.

Diversion tunnel - The Shel Drake River diversion tunnel consists of an inlet structure, a cut-and-cover box culvert section, a horseshoe shaped rock tunnel section, and an outlet structure with a stilling basin. The inlet structure is approximately 260 feet long and consists of retaining wall, a flow control weir, and a flume section. The cut-and-cover box culvert section including the transition section is 1733 feet long. The culvert cross section is 16'-3" square inside dimension except for the a 108' feet long section where the cross section gradually transitions to match the rock tunnel's horseshoe shape. The rock tunnel segment is 1817 feet long and has a horseshoe shaped cross section with an inside diameter of 17'-6". The outlet structure is about 212 feet long, including a concrete transition flume, concrete-faced sheetpile wall and a stilling basin.

E4. OTHER PLANS CONSIDERED. A non-structural plan for the project area was developed in the Feasibility Report (dated October 1977) which required raising/floodproofing or relocating 220 residential, commercial, industrial and public structures and acquiring 230 residential structures with subsequent relocation of their residents. This plan included a floodwarning system and had a first cost of \$87,000,000 based on October 1987 price levels. The plan was deleted from further consideration due to its low B/C ratio (less than 0.5) and high residual damages.

A levee/floodwall alternative without channel modification was studied in the Feasibility Report and deleted from further consideration due to an unfavorable B/C ratio.

Several alternative combination levee/floodwall and channel modification plans with and without a channel diversion tunnel were also developed in the Feasibility Report with various

improved channel widths and lengths and levee/floodwall lengths and heights. One of these alternatives also included project reaches utilizing non-structural measures. The first cost of these alternative plans, based on October 1987 price levels, ranged between \$40,000,000 (without the diversion tunnel) and \$57,400,000 (with the diversion tunnel but without non-structural measures). This \$57,400,000 plan yielded the most cost effective alternative in terms of net excess benefits and was designated the recommended plan.

E5. CHANGES IN RECOMMENDED PLAN - Since the Feasibility Study, there have been several design changes incorporated into the recommended plan as follows:

I) Due to a 32% increase in design flows on the Mamaroneck River:

- a) Tompkins Avenue Bridge requires replacement for hydraulic capacity.
- b) Channel width requires an increase from 45 feet to 50 feet. for 1800' between Jefferson Avenue (Station 50) & New Barry Road (Station 68).
- c) Additional riprap requirements due to higher design velocities and additional criteria.

II) Due to a 17% increase in design flows on the Sheldrake River:

- a) The tunnel capacity requires increasing from the 15'x15' box culvert to a 16.25'x16.25' box culvert and from a 15.5' diameter circular tunnel section to an 18.5' diameter circular tunnel section. In order to implement cost savings the 18.5' diameter circular shape was developed as a 17.5' diameter horseshoe shape which resulted in an 8% reduction in cost. The 16.25'x16.25' box culvert section was also compared with the equivalent 18.5' diameter circular section for cost effectiveness and found to be 19% less costly than the circular shape.
- b) Additional riprap requirements due to higher design velocities and additional criteria.

III) The Valley Place sewer crossing over the Mamaroneck River has been changed from a siphon to a bridge structure to implement a 40% cost savings and to increase functional reliability.

IV) On the upper end of the Sheldrake River between Rockland Avenue and the New England Thruway, the following design changes have been included.

- a) Levees and associated interior drainage are deleted from the plan of improvement since they are not incrementally justified comparing its benefits to costs.
 - b) Channel deepening and widening is deleted from the plan of improvement since the resultant cost of lowering the concrete bottom Rockland Avenue Bridge foundation renders this section of channel improvement incrementally unjustified when comparing benefits to cost. Cleaning and snagging has been substituted in this reach for channel improvement.
- V) The lower Sheldrake River between Fenimore Road and its confluence with the Mamaroneck River is to be lined with topsoil and seeded fill to better provide maintenance of local drainage.
- VI) Due to model testing study results, the tunnel intake structure is widened and lengthened and the tunnel outlet structure is lengthened to provide better hydraulic conditions. In addition, the lower 370 feet of the tunnel was changed from a box culvert section to a horseshoe section of the same size as the upstream tunnel section to provide better hydraulic conditions.
- VII) The cut and cover operation for the lower end of the tunnel has been changed to a tunneling operation to reduce cost (approximately \$200,000) and preclude traffic disturbance.
- VIII) On the right bank at Station 64 of the Mamaroneck River, 150 feet of retaining wall was deleted in favor of open cut and floodproofing 3 structures as a cost reduction measure (savings of approximately \$100,000).

III COST ESTIMATES FOR THE RECOMMENDED PLAN

E6. FIRST COSTS. First costs include the charges arising from the construction of the project, including costs for contingencies, engineering, design, supervision and administration. The detailed estimate of project first costs is shown in Table E1 and includes such items as: channel improvements and modifications, retaining walls, floodproofing, removal and/or replacement and/or protection of existing structures, the construction of a diversion tunnel which will intercept the Sheldrake River upstream of Fenimore Road and consists of a reinforced concrete box culvert and constructed utilizing cut and cover methods, intake and outlet structures and the construction of a concrete lined horseshoe shaped tunnel by means of conventional drill and blast methods, reconstruction of 5 vehicular bridges and one utility bridge, relocation of roads and utilities, and lands. A cost comparison for alternative bridge deck types for the 5 vehicular bridges was accomplished to establish the most cost effective bridge deck to be utilized.

This cost comparison is presented in the Attachment to this Appendix. The project costs also include paving parking areas near Station Plaza Bridge and the replacement of a USGS gage station. The first cost of the plan of improvement is \$64,580,800 of which \$12,002,400 is for lands, easements and rights of way and for relocation of utilities, and bridges and roads. In order to construct the proposed channel improvements it will be necessary to procure permanent easements and acquisition in fee areas; temporary easements will be needed to provide for construction access. Details of real estate acquisition costs are discussed in Appendix J - REAL ESTATE.

E7. UNIT COSTS. The unit costs utilized for common fill riprap and bedding stone reflect cost savings which will be realized by obtaining qualifying materials from the excavation of the river bed. Whereas the quality of the rock which will be excavated from the tunnel is generally not considered to be adequate for its reuse as riprap, based on subsurface investigation some rock which will be excavated in the Lower Mamaroneck River channel improvement can be processed and used for riprap. The unit cost for earthwork excavation is based upon project specific characteristic such as the location of the construction area, material being excavated, availability and location of disposal sites and reuse of excavation materials that comply with project requirements.

E8. LUMP SUM ITEMS. Certain items of cost such as stream diversion and dewatering, maintenance and protection of traffic, planting, USGS gage station and utility relocation and modification are listed in Table E1- Detailed Estimate of First Cost as lump sum items. The cost of these features is presented in this manner because of the number of items and multiplicity of activities utilized to accomplish each of these work features.

E9. TUNNEL COSTS. The construction cost for the tunnel has been prepared based on an estimate of labor crew sizes and productivity rates and equipment and material expenditures. The construction of the tunnel will entail tunnel excavation by means of drilling, blasting and mucking, installation of temporary supports and placement of a permanent concrete lining. The cost estimate backup which was utilized to develop the tunnel costs is presented as an attachment at the end of this Appendix. Five different tunneling conditions have been defined from the subsurface investigations and they are as follows:

- 1) Good rock - between Stations 4+25 and 14+25
- 2) Fair rock - between Stations 3+40 and 4+25, 14+25 and 16+25, 17+50 and 18+30
- 3) Fault zone = between Stations 16+25 and 17+50
- 4) Mixed face & rock spile zone - between Stations 1+50 and 3+40 (vicinity of Boston Post Rd)
- 5) Mixed face & rock spile zone - between Stations 18+30 and 19+67 (at rock tunnel inlet portal)

The horseshoe tunnel for conditions 1, 2, and 3 will be constructed by conventional drill and blast methods. Through the fault zone as well as transitions from mixed face to fair rock spiles can be installed to stabilize the crown and the pull per round will be decreased to four feet per round instead of the standard ten foot pull. For condition 4, mixed face tunneling techniques such as grouting the soil above the crown, and pulling the rock with light charges or using rock breakers to excavate the rock for the steel liner plates and steel sets will be used to tunnel beneath Boston Post Rd. Condition 5 occurs in the vicinity of the upstream portal, where the rock thickness above the tunnel crown is questionable. Where the sound massive rock is less than five feet above the crown, the soil can be grouted to form a beam over the tunnel roof. The moderately blocky and seamy nature of the rock will necessitate the use of light steel sets for temporary supports.

To develop the construction costs for the excavation of the tunnel including installation of steel sets and liner plates an estimate of each of the component costs has been prepared. The labor costs have been determined by estimating the typical crew size and the concomitant cost for each of the rock tunneling conditions which will be encountered. Productivity rates for tunnel excavation were estimated for each of the tunneling conditions (Refer to the COST ESTIMATE BACKUP) in order to determine Total Labor Costs for Rock Excavation and Installation of Ribs & Liner Plates. The daily productivity rates assume that the Contractor will work two shifts a day. Blasting will be restricted to 10 hrs/day. The material and equipment costs which will be expended for the excavation of the rock tunnel and installation of initial supports has been estimated (Refer to the COST ESTIMATE BACKUP) and added to the labor costs to arrive at the excavation unit prices presented in the "Detailed Estimate of First Cost."

The permanent tunnel lining will be reinforced cast-in-place concrete. A telescoping metal form will be used. Based on an estimate of the cost of typical labor crews, task duration and material and equipment expenditures (Refer to the COST ESTIMATE BACKUP) unit costs for reinforcing steel, & concrete have been developed.

Additional costs have been included for stabilization of soil above the mixed face section (previously indicated), portal area preparation for bulkheading ramping, etc. at the tunnel outlet south of Boston Post Rd. and preconstruction structure survey, monitoring structures during construction and protection of structures. The tunnel excavation will generally allow the groundwater perched above bedrock to drain into the tunnel. The pressure tests performed on the I-Series borings indicate that the joints in the sound gneiss are tight with coefficient of permeability less than 2×10^{-4} cm/sec. The permeability coefficient in the upper portions of the bedrock in the decomposed zone is less than 2×10^{-3} cm/sec. As such the rock can be

classified as having "low discharge and poor drainage." To prevent minor uniform settlements of structures that would result from migration of the fine sands, and inorganic silts in the supporting soil caused by uncontrolled seepage, grouting and/or other means of controlling seepage will be utilized.

The costs for the outlet structure of the tunnel are based on the following constructability and details are shown in Figure No. 46.

Because the foundation material under the outer 150 ft. of outlet concrete flume and exit walls is poor, the outlet flume is to be supported on piles and the exit walls are to be constructed as part of a concrete faced cellular cofferdam.

In order to prepare an area for the construction of the outlet flume, a cellular cofferdam system (shown on Figures No. 24 and 46) is to be installed to seal off the Mamaroneck West Basin from the construction area. Firstly, the steel sheeting of the cellular cofferdam is to be driven building out from the land side. Once the steel sheeting for the cofferdam system is installed to preclude wave overtopping, the poor material within the cofferdam cells is to be removed to firm bottom and replaced with a sand fill.

Once the cofferdam cells are excavated and backfilled (from temporary platforms spanning the cofferdam construction), the area landward of the cofferdam is to be excavated to firm bottom and backfilled with uncompacted sand to the approximate surface of the underside of the improvement. Dewatering would then be accomplished. It is to be noted that all soft organic and mucky material (46,000 c.y.) excavated within and behind the cofferdam is proposed to be disposed offshore at an approved L.I. Sound dump site and capped with sand (160,000 c.y.).

Piles would then be driven to support the outlet flume from the outer end working landward. Piles would be driven landward to a point where rock comes within 5 ft. of the subgrade of the flume. At this point, the uncompacted sand from an earlier operation would be excavated to firm bearing and replaced with a compacted structural, well graded sand fill or crushed stone. One hundred percent compaction would be accomplished on lifts not to exceed 8 inches. Where the rock rises to within 2 ft. of the flume bottom, the rock is to be removed to provide a 2 ft. minimum cushion layer of similarly compacted material.

The bottom slab of the flume would then be constructed using the subgrade for initial support. In areas where the cofferdam overlaps the outlet flume, the flume walls will be poured against the cofferdam sheeting as a form line.

After curing of the flume and concrete exit wall facing, the temporary cofferdam cells seaward of the permanent cells will be cut to below the improvement grade subsequent to cellular fill

removal.

The riprap basin lining can then be constructed. For the small portion of riprap lining beyond the cofferdam, the Basin bottom will be overexcavated, lined with stabilizing filter fabric and surcharged slowly to obtain a stable foundation prior to riprap placement.

E10. CONTINGENCIES. A contingency factor of 15% is utilized which is applied to the cost of construction. This factor is in accordance with the allowances stipulated in Appendix C of EM1110-2-1301 (31 July 1980) "Cost Estimate, Planning and Design Stages." However, for the drill and blast (horseshoe tunnel) section, the contingency has been increased to 20% to reflect the greater degree of uncertainty of the rock location and condition.

E11. ENGINEERING AND DESIGN, SUPERVISION AND ADMINISTRATION. The total engineering and design costs (4.5%) and the total costs for supervision, administration, inspection and overhead (10.3%) has been estimated as 14.8% of total construction costs. Engineering and design includes preparation of the final report, plans and specifications and engineering during construction. It is to be noted that \$1,405,000 of E&D and S&A costs incurred prior to Oct. 1985 for pre-authorization planning and engineering studies were not included in this project cost estimate. The supervision, administration, inspection and overhead costs are those which will be incurred both prior to and during construction. These percentages are commensurate with project requirements.

E12. INTEREST DURING CONSTRUCTION. Construction of the recommended plan is estimated to be completed in 4 years as shown on Table 13 of the Main Body "Construction and Expenditure Schedule." The first phase contract will entail the construction of the lower Mamaroneck River channel improvements and will require 15 months. The second and third phases (contracts) will run simultaneously for 24 months and 33 months, respectively, and commence after the completion of the first phase. Partial project benefits (which will reduce interest during construction costs) will be realized in both the Sheldrake River and the upper Mamaroneck River once the first phase (lower Mamaroneck) is completed. The interest during construction cost has been calculated based on developing the time frames & costs of each of the three phases (contracts) of the project and comparing them with associated partial & full benefits realized. The total IDC is developed in the Economic Appendix at Oct. 88 price levels. The IDC cost at Oct. 1987 price level is added to the project first cost (Table E2) to obtain a total investment cost.

IV. CONSTRUCTION AND FUNDING SCHEDULE

E13. GENERAL. The time schedule for construction and expenditure of the plan of improvement developed herein is shown on Table 13 of the Main Body and is based on the timeliness of the reports approval and allocation of funds by Congress and the ability of

local interests to implement the necessary items of local cooperation, principally the furnishing of easements, the relocations of utilities, the replacement of bridges and the provision of a cash contribution.

V. ANNUAL CHARGES

E14. PROJECT LIFE. It is estimated that the major features of the plan of improvement such as the diversion tunnel, the retaining walls and the channel improvements will have a useful life expectancy of at least 100 years, provided a consistent program of maintenance is adhered to by the operating agency.

E15. INTEREST. The interest rate used in converting investment costs to an equivalent annual cost is the expected average long term return on risk-free investments. On this basis, the rate of interest used for the plan of improvement over the 100 year project life is 8 5/8%. The economic analysis utilizing an updated interest rate of 8 7/8% is provided in the Economic Appendix and the Main Body.

E16. AMORTIZATION. Amortization is the financial or economic process of recovering the wealth invested in a project. The amortization period is the period of time assumed or selected for economic recovery of the net investment in a project by the process of amortization. The definition of amortization is the equivalent annual amount which, with compound interest, will accumulate to provide one dollar at the end of the amortization period. The rate of amortization based on a 100 year project life and 8 5/8 percent interest rate is .000022. Amortigation has been calculated at an updated interest rate of 8-7/8% in the Economic Appendix and the Main Body.

E17. REPLACEMENT, OPERATION AND MAINTENANCE. The operation and maintenance cost for the plan of improvement was estimated to represent the average annual economic cost necessary to maintain the project at full operating efficiency throughout the project life. None of the project features will require regular operation and only periodic maintenance will be required. The annual maintenance cost is estimated to be \$150,000 and includes clearance of debris from the channel, shoal removal from the channel, cleaning of the diversion tunnel debris deflector shoal removal throughout the tunnel and specifically at the stilling basin of the outlet structure, stone lining repair, pruning of trees and shrubbery, patching of concrete structures including tunnel repairs, cleaning of new siphons, maintenance inspection of new sewage lift stations and periodic inspection of the project. An additional cost of the project is the pump replacement at 2 sewage lift stations. The life expectancy of pumps is estimated to be 30 years and therefore they will have to be replaced three times throughout a project life of 100 years.

E18. ESTIMATES OF ANNUAL CHARGES. The total annual cost for the

plan of improvement is estimated at \$6,772,100. A detailed breakdown of annual costs is presented in Table E2.

E19. COST APPORTIONMENT. The cost apportionment of project first cost based on the Water Resources Development Act of 1986 established a breakout of 75% Federal share and 25% non-Federal share for project costs. Cost apportionment of first costs is displayed in Table E2.

TABLE E1 - DETAILED ESTIMATE OF FIRST COST (OCTOBER 1987 P.L.) (\$)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
I. CHANNELS & CANALS					
A. MAMARONECK & SHELDRAKE RIVERS - CHANNEL WORK					
1.	Mobilization & Demob.	-	Job	L.S.	230,000*
2.	Stream Diversion & Dewatering	-	Job	L.S.	400,000
3.	Maint. & Prot. of Traffic	-	Job	L.S.	100,000
4.	Clearing & Grubbing	-	Job	L.S.	47,000
5.	Removals/Replacements	-	Job	L.S.	260,000
6.	Excavation, Common	255,980	C.Y.	8.50	2,175,830
7.	Excavation, Stripping	10,455	C.Y.	7.50	78,413
8.	Excavation, Rock	12,380	C.Y.	45.00	557,100
9.	Compacted Fill, Common	51,035	C.Y.	7.00	357,245
10.	Select Fill	3,500	C.Y.	15.50	54,250
11.	Previous Fill	2,334	C.Y.	20.00	46,680
12.	Riprap	18,190	C.Y.	28.00	509,320
13.	Bedding Stone	5,690	C.Y.	23.00	130,870
14.	Topsoil & Seeding	11	AC	12,000.00	132,000
15.	Concrete	14,500	C.Y.	285.00	4,132,500
16.	Tremie Concrete	1,088	C.Y.	160.00	174,080
17.	Reinforcing Steel	1,237,150	LB	0.75	927,863
18.	Timber Piles	20,820	L.F.	14.50	301,890
19.	Wall Anchors	25,500	LB	5.00	127,500
20.	Drain Pipe	4,735	L.F.	7.50	35,513
21.	Filter Cloth	9,240	S.Y.	2.50	23,100
22.	Steel Sheet Piling	35,976	S.F.	16.00	575,616
23.	Concrete Faced Steel Sheet piling	9,130	S.F.	22.00	200,860
24.	Temporary Sheet piling	33,520	S.F.	11.00	368,720
25.	Chain Link Fence	6,380	L.F.	15.00	95,700
26.	Drop Inlet Frame & Cover	18	Ea.	500.00	9,000
27.	Bituminous Ditch Paving	1,500	S.Y.	14.00	21,000
28.	Structural Underpinning	-	Job	L.S.	100,000
29.	Floodproof 3 Structures	-	Job	L.S.	20,000
30.	U.S.G.S. Gage Station	-	Job	L.S.	60,000
31.	Debris Deflector	-	Job	L.S.	20,000
32.	Rock/Log Dam	-	Job	L.S.	10,000
33.	Planting	-	Job	L.S.	300,000

Mamaroneck & Shel Drake Rivers - Channel Work Subtotal 12,582,050
 Contingency (15%) 1,887,310

Subtotal - Channel Work \$14,469,360

*Includes soil erosion control

TABLE E1 - DETAILED ESTIMATE OF FIRST COST (OCTOBER 1987 P.L.) (\$) (CONT'D)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
----------	-------------	--------------------	------	------------	------------------

B. SHELDRAKE RIVER TUNNEL

(a) INTAKE STRUCTURE

1.	Mobilization & Demob.	-	Job	L.S.	28,000
2.	Excavation, Common	6,030	C.Y.	8.50	51,255
3.	Excavation, Organic Material	45,800	C.Y.	12.00	549,600
4.	Excavation, Common	14,000	C.Y.	8.50	119,000
5.	Compacted Fill, Common	5,400	C.Y.	7.00	37,800
6.	Previous Fill	500	C.Y.	20.00	10,000
7.	Concrete	2,510	C.Y.	285.00	715,350
8.	Reinforcing Steel	374,000	LB	0.75	280,500
9.	Riprap	150	C.Y.	28.00	4,200
10.	Bedding Stone	340	C.Y.	23.00	7,820
11.	Drain Pipe	530	L.F.	7.50	3,975
12.	Chain Link Fence	0.6	AC	12,000.00	7,200
13.	Topsoil & Seeding	600	L.F.	15.00	9,000

Intake Structure Subtotal \$1,261,245
 Contingency (15%) 189,187

Subtotal Intake Structure \$1,450,432

(b) OUTLET STRUCTURE

1.	Mobilization & Demob.	-	Job	L.S.	28,000
2.	Excavation, Common	6,030	C.Y.	8.50	51,255
3.	Excavation, Organic Material	45,800	C.Y.	12.00	549,600
4.	Excavation, Backfilled Mat. in Cofferdam	9,400	C.Y.	6.00	56,400
5.	Excav., Rock	1,170	C.Y.	50.00	58,500
6.	Previous Fill	490	C.Y.	20.00	9,800
7.	Sand Backfill	49,200	C.Y.	10.00	492,000
8.	Embankment Fill	1,200	C.Y.	10.00	12,000
9.	Concrete	2,350	C.Y.	300.00	705,000
10.	Reinforcing Steel	449,000	#	0.85	381,650
11.	Cofferdam Templates				
	A) Timber piles (untreated)	10,000	L.F.	12.00	120,000
	B) Template	10	Ea.	10,000	100,000
12.	Cofferdam Steel Sheeting	116,500	S.F.	17.50	2,038,750
13.	Cut Steel Sheeting Cofferdam	2,200	L.F.	10.00	22,000
14.	Riprap	1,360	C.Y.	30.00	40,800
15.	Bedding Stone	600	C.Y.	25.00	15,000
16.	Filter Fabric	350	S.Y.	5.00	1,750
17.	Temporary Sheeting	8,800	S.F.	10.00	88,000
18.	Treated Timber Piles	2,220	L.F.	15.00	33,300

TABLE E1 - DETAILED ESTIMATE OF FIRST COST (OCTOBER 1987 P.L.) (\$) (CONT'D)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
19.	Capping Fill Transport For Offshore Disposal	160,000	C.Y.	5.00	800,000
20.	Dewatering	-	Job	L.S.	40,000
21.	Chain Link Fence	440	L.F.	15.00	6,600
22.	Pedestrian Bridge	-	Job	L.S.	20,000
23.	Topsoil & Seeding	0.3	Ac.	12,000	3,600
24.	Temporary Access Rd.	-	Job	L.S.	10,000
OUTLET STRUCTURE SUBTOTAL					\$5,684,005
CONTINGENCY (15%)					852,601
SUBTOTAL-OUTLET STRUCTURE					\$6,536,606

(c) BOX CULVERT (CUT & COVER SECTION)

1.	Mobilization & Demob.	-	Job	L.S.	170,000
2.	Excavation, Common	40,040	C.Y.	13.00	520,520
3.	Excavation, Rock	9,250	C.Y.	45.00	416,250
4.	Compacted Fill, Common	17,800	C.Y.	7.00	124,600
5.	Concrete	14,460	C.Y.	290.00*	4,193,400
6.	Reinforcing Steel	2,159,000	LB	0.75	1,619,250
7.	Bedding Stone	1,400	C.Y.	23.00	32,200
8.	Dewatering	-	Job	L.S.	572,000
9.	Temporary Sheeting				
	a. Up to 20' depth	13,000	S.F.	11.00	143,000
	b. Beyond 20' depth	67,000	S.F.	15.00	1,005,000
10.	Pavement Removal	4,820	S.Y.	5.00	24,100
11.	Maint. & Prot. of Traffic incl. Temporary Decking	-	Job	L.S.	210,000
12.	Pavement Restoration	4,820	S.Y.	50.00	241,000
13.	Curb Restoration	960	L.F.	10.00	9,600
14.	Underpinning R.R. Bridges	160	L.F.	387.00	62,000
Box Culvert Subtotal					\$9,342,920
Contingency (15%)					1,401,438
Subtotal - Box Culvert					\$10,744,358

* Includes metal formwork for inner surface

TABLE E1 - DETAILED ESTIMATE OF FIRST COST (OCTOBER 1987 P.L.) (\$) (CONT'D)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
(a) HORSESHOE TUNNEL SECTION (DRILL & BLAST SECTION)*					
1.	Earth Excavation	1,500	C.Y.	180.27	270,405
2.	Rock Excavation	24,600	C.Y.	114.40	2,814,240
3.	Spiles	18,400	#	4.00	73,600
4.	Liner Plates	64,300	#	3.50	225,050
5.	Steel Ribs	1,355,400	#	0.95	1,287,630
6.	Concrete	9,000	C.Y.	261.00	2,349,000
7.	Reinforcing Steel	1,324,000	#	1.09	1,443,160
8.	Soil Stabilization Over Mixed Face Section (Chemical Grout)	-	Job	L.S.	1,359,700
9.	Portal Area Preparation (at Boston Post Rd.)	-	Job	L.S.	70,000
10.	Preconstruction Structure Survey	-	Job	L.S.	100,000
11.	Monitoring Structures During Construction	-	Job	L.S.	200,000
12.	Protection of Exist. Struct. (Shoring etc.)	-	Job	L.S.	300,000
HORSESHOE TUNNEL SUBTOTAL					10,492,785
CONTINGENCY (20%)					2,098,557
SUBTOTAL - HORSESHOE TUNNEL					\$12,591,342
SUBTOTAL - SHELDRAKE RIVER TUNNEL					\$31,322,738
*Includes mobilization & demobilization & dewatering					
IA)	CHANNELS & CANALS - CHANNEL WORK				14,469,360
IB)	CHANNELS & CANALS - TUNNEL WORK				31,322,738
SUBTOTAL*					45,792,098
E&D					2,012,000
S&A					4,774,300
SUBTOTAL - CHANNELS & CANALS					\$52,578,398

*Include contingencies

TABLE E1 - DETAILED ESTIMATE OF FIRST COST (OCTOBER 1987 P.L.) (\$) (CONT'D)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
II. RELOCATION/BRIDGES					
A) HILLSIDE AVENUE BRIDGE 2250 196					
1.	Mobilization & Demob.	-	Job	L.S.	10,000
2.	Removal of Exist. Struct.	-	Job	L.S.	23,000
3.	Maint. & Prot. of Traffic	-	Job	L.S.	15,000
4.	Diversion & Dewatering	-	Job	L.S.	15,000
5.	Excavation, Common	275	C.Y.	8.50	2,338
6.	Excavation, Structural	875	C.Y.	20.00	17,500
7.	Approach Slab	280	S.Y.	52.00	14,560
8.	Compacted Fill, Select	800	C.Y.	15.00	12,000
9.	Previous Fill	130	C.Y.	20.00	2,600
10.	Concrete	383	C.Y.	285.00	109,155
11.	Reinforcing Steel	21,750	LB	0.75	16,313
12.	Reinforcing Steel - Epoxy Coated	9,400	LB	0.95	8,930
13.	Prestressed Concrete Beams	2,300	S.F.	40.00	92,000
14.	Temporary Steel Sheet Piling	3,600	S.F.	11.00	39,600
15.	Chain Link Fence	145	L.F.	15.00	2,175
16.	Elastomeric Bearing	22	Ea	500.00	11,000
17.	Elastomeric Expan. Jt. System	92	L.F.	110.00	10,120
18.	Drain Pipe	130	L.F.	7.50	975
19.	Utility Work	-	Job	L.S.	37,000
Hillside Ave. Subtotal					439,266
B) STATION PLAZA ROAD BRIDGE 3000 190					
1.	Mobilization & Demob.	-	Job	L.S.	10,000
2.	Removal of Exist. Struct.	-	Job	L.S.	65,000
3.	Maint. & Prot. of Traffic	-	Job	L.S.	20,000
4.	Diversion & Dewatering	-	Job	L.S.	15,000
5.	Excavation, Common	350	C.Y.	8.50	2,975
6.	Excavation Structural	1,050	C.Y.	20.00	21,000
7.	Approach Slab	310	S.Y.	52.00	16,120
8.	Compacted Fill, Select	1,100	C.Y.	15.00	16,500
9.	Previous Fill	150	C.Y.	20.00	3,000
10.	Concrete	440	C.Y.	285.00	125,400
11.	Reinforcing Steel	24,400	LB	0.75	18,300
12.	Reinforcing Steel - Epoxy Coated	12,600	LB	0.95	11,970

TABLE E1 - DETAILED ESTIMATE OF FIRST COST (OCTOBER 1987 P.L.) (\$) (CONT'D)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
13.	Prestressed Concrete Beam	2,700	S.F.	40.00	108,000
14.	Chain Link Fence	160	L.F.	15.00	2,400
15.	Elastomeric Bearing	22	Ea	500.00	11,000
16.	Elastomeric Expan., Jt.	100	L.F.	110.00	11,000
17.	Drain Pipe	150	L.F.	7.50	1,125
Station Plaza Rd. Subtotal					458,790
C) HALSTEAD AVENUE BRIDGE 3750					
1.	Mobilization & Demob.	-	Job	L.S.	12,000
2.	Removal of Exist. Struct.	-	Job	L.S.	50,000
3.	Maint. & Prot. of Traffic	-	Job	L.S.	25,000
4.	Diversion & Dewatering	-	Job	L.S.	25,000
5.	Excavation, Common	275	C.Y.	8.50	2,338
6.	Excavation, Struc.	825	C.Y.	20.00	16,500
7.	Approach Slab	375	S.Y.	52.00	19,500
8.	Compacted Fill, Select	500	C.Y.	15.00	7,500
9.	Previous Fill	112	C.Y.	20.00	2,240
10.	Concrete	800	C.Y.	335.00*	268,000
11.	Reinforcing Steel	55,800	LB	0.75	41,850
12.	Reinforcing Steel - Epoxy Coated	21,300	LB	0.95	20,235
13.	Temporary Steel Sheet Piling	6,000	S.F.	11.00	66,000
14.	Bridge Railing - 4 Rails Steel	160	L.F.	90.00	14,400
15.	Precast Prestressed Conc. Beam	512	L.F.	140.00	71,680
16.	Elastomeric Bearing	16	Ea	500.00	8,000
17.	Elastomeric Expan. Jt. System	118	L.F.	110.00	12,980
18.	Drain Pipe	195	L.F.	7.50	1,463
19.	Tie Back Anchor	23	Ea	1,500.00	34,500
20.	Cofferdam	-	Job	L.S.	20,500
21.	Utility Work	-	Job	L.S.	68,000
Halstead Ave Bridge Subtotal					787,686

*Include PPC deck forms

TABLE E1 - DETAILED ESTIMATE OF FIRST COST (OCTOBER 1987 P.L.) (\$) (CONT'D)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
D) WARD AVENUE BRIDGE 3270 770					
1.	Mobilization & Demob.	-	Job	L.S.	10,000
2.	Removal of Exist. Struct. ←	-	Job	L.S.	35,000
3.	Maint. & Prot. of Traffic	-	Job	L.S.	10,000
4.	Diversion & Dewatering	-	Job	L.S.	20,000
5.	Excavation, Common ←	450	C.Y.	8.50	3,825
6.	Excavation, Structural ←	1,350	C.Y.	20.00	27,000
7.	Excavation, Rock ←	440	C.Y.	65.00	28,600
8.	Approach Slab ←	375	S.Y.	52.00	19,500
9.	Compacted Fill, Select ←	1,300	C.Y.	15.00	19,500
10.	Previous Fill ←	83	C.Y.	20.00	1,660
11.	Concrete ←	562	C.Y.	335.00*	188,270
12.	Reinforcing Steel ←	31,000	LB	0.75	23,250
13.	Reinforcing Steel - ← Epoxy Coated ←	20,820	LB	0.95	19,779
14.	Temp. Steel Sheetpiling ←	4,500	S.F.	11.00	49,500
15.	Bridge Railing - ← 4 Rails Steel	130	L.F.	90.00	11,700
16.	Precast Prestressed ← Conc. Beam	448	L.F.	140.00	62,720
17.	Elastomeric Bearing ←	14	Ea	500.00	7,000
18.	Elastomeric Expan. Jt. ← System	108	L.F.	110.00	11,880
19.	Drain Pipe ←	150	L.F.	7.50	1,125
20.	Utility Work ←	-	Job	L.S.	22,000
Ward Ave. Bridge Subtotal					572,309

*Include PPC deck forms

E) TOMPKINS AVENUE BRIDGE 3120					
1.	Mobilization & Demob.	-	Job	L.S.	10,000
2.	Removal of Exist. Struct. ←	-	Job	L.S.	37,000
3.	Maint. of Prot. of Traffic	-	Job	L.S.	10,000
4.	Diversion & Dewatering	-	Job	L.S.	25,000
5.	Excavation, Common ←	400	C.Y.	8.50	3,400
6.	Excavation, Structural ←	1,200	C.Y.	20.00	24,000
7.	Excavation, Rock ←	150	C.Y.	80.00	12,000
8.	Approach Slab ←	360	S.Y.	52.00	18,720
9.	Compacted Fill, Select ←	900	C.Y.	15.00	13,500
10.	Previous Fill ←	118	C.Y.	20.00	2,360
11.	Concrete ←	800	C.Y.	335.00*	268,000
12.	Reinforcing Steel ←	44,190	LB	0.75	33,143
13.	Reinforcing Steel - ← Epoxy Coated ←	21,670	LB	0.95	20,587

TABLE E1 - DETAILED ESTIMATE OF FIRST COST (OCTOBER 1987 P.L.) (\$) (CONT'D)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
14.	Bridge Railings - 4 Rails Steel	200	L.F.	90.00	18,000
15.	Precast Prestressed Conc. Beam	384	L.F.	140.00	53,760
16.	Elastomeric Bearing	12	Ea	500.00	6,000
17.	Elastomeric Expan. Jt. System	104	L.F.	110.00	11,440
18.	Drain Pipe	253	L.F.	7.50	1,898
19.	Utility Work	-	Job	L.S.	19,000
Tompkins Ave. Bridge Subtotal					587,808
Relocation/Bridges Subtotal					\$2,845,859

*Includes PPC deck forms

F) RELOCATION/ROADS (Misc.)

1.	Parking Area Pavement	2,150	S.Y.	40.00	86,000
2.	Guard Rails	353	L.F.	10.00	3,530
3.	Highway Guardrail	410	L.F.	45.00	18,450
Relocation/Roads Subtotal					107,980
Subtotal Cost Relocation/Bridge & Roads					2,953,839
Contingency (15%)					443,076
Subtotal Bridges & Roads					\$3,396,915

III. RELOCATION/UTILITIES

A) VALLEY PLACE SEWER LINE

1.	Removal of Exist. Struct.	-	Job	L.S.	18,000
2.	Excavation, Rock	32	C.Y.	80.00	2,560
3.	Excavation, Common	50	C.Y.	8.50	425
4.	Excavation, Structural	200	C.Y.	20.00	4,000
5.	Compacted Fill, Select	200	C.Y.	15.00	3,000
6.	Concrete	75	C.Y.	285.00	21,375
7.	Reinforcing Steel	7,500	LB	0.75	5,625
8.	Temporary Pipe Support	-	Job	L.S.	50,000
9.	Cofferdam & Dewatering	-	Job	L.S.	40,000

TABLE E1 - DETAILED ESTIMATE OF FIRST COST (OCTOBER 1987 P.L.) (\$) (CONT'D)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
10.	Pipe Support Bearings	-	Job	L.S.	3,000
11.	Structural Steel	16,700	LB	1.50	25,050
12.	Previous Fill	25	C.Y.	20.00	500
13.	Other Utility Work	-	Job	L.S.	24,000
Valley Place Sewer Line Subtotal					197,535

B) OTHER UTILITY RELOCATIONS

1.	66" DIAM. SEWER RELOC.	1,258	L.S.	563.00	708,254
2.	HALSTEAD AVE. SIPHON RELOC.	-	Job	L.S.	104,423
3.	JEFFERSON AVE., SIPHON RELOC.	-	Job	L.S.	96,875
4.	WILLOW ST. LIFT STA.	-	Job	L.S.	60,875
5.	HOWARD AVE. SEWER & SIPHON	-	Job	L.S.	99,830
6.	NEW 6" SEWER @ STA. 58+50 (HILLSIDE AVE)	-	Job	L.S.	7,000
7.	NEW 8" SEWER BETWEEN N. BARRY AVE & RIVER ST.	-	Job	L.S.	90,700
8.	RIVER STREET, SIPHON RELOC.	-	Job	L.S.	57,445
9.	SIPHON RELOC. @ STA. 84+80	-	Job	L.S.	55,608
10.	10" DIAM. SEWER RELOC. @ STA. 100+50	-	Job	L.S.	18,660
11.	ELLIS PLACE LIFT STA.	-	Job	L.S.	84,553
12.	6" GAS MAIN RELOC. BETWEEN BRAX MART DR. & URBAN ST.	-	Job	L.S.	50,000
13.	ELECTRIC POLE RELOC. & MAINT.	-	Job	L.S.	20,000
14.	UTILITIES RELOC. @ WINFIELD AVE. BRIDGE	-	Job	L.S.	27,750
15.	UTILITY RELOCATION @ FENIMORE RD.				
	a) Remove & replace 6" gas line	1,430	L.F.	30.00	42,900
	b) Remove & replace 10" san. line	1,280	L.F.	40.00	51,200
	c) Install 8" san. line	100	L.F.	35.00	3,500
	d) Relocate storm lines	860	L.F.	60.00	51,600
	e) Install catch basins	5	Ea	1,500.00	7,500
	f) Protection of exist. utilities	-	Job	L.S.	35,000
	g) Misc. (O.H. elect., m.h., valves, etc.)	-	Job	L.S.	52,000
Subtotal - Other Utility Relocations					1,725,673
Subtotal-Relocation Utilities					1,923,208
Contingency (15%)					288,482
Subtotal-Utility Relocation Work					\$2,211,690

TABLE E1 - DETAILED ESTIMATE OF FIRST COST (OCTOBER 1987 P.L.) (\$) (CONT'D)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
II. RELOCATIONS/ROADS & BRIDGES					3,396,915
III. RELOCATIONS/UTILITIES					2,211,690
					SUBTOTAL*
					5,608,605
					E&D
					330,000
					S&A
					535,000
Subtotal - Relocations/Bridges & Roads and Relocations/Utilities					\$ 6,473,605
*Includes contingencies					
IV. LANDS & DAMAGES					
1.	Permanent Easements	11.5	Ac.	196,500	2,259,800
2.	Temporary Easements	14.7	Ac.	68,700	1,009,900
3.	Acquisition in Fee	9.5	Ac.	141,200	1,341,400
Lands & Damages Subtotal					4,611,100
Contingency (10%)					461,100
Subtotal					5,072,200
Planning & Surveys					152,200
Appraisal & Admins.					304,400
IV. Total Lands & Damages					\$ 5,528,800
Total First Cost of Project					\$ 64,580,803
say					\$ 64,580,800

TABLE E2
SUMMARY OF ESTIMATED ANNUAL CHARGES
(OCT. 1987 PRICE LEVEL) (a)

DESCRIPTION	COST (\$)
1) Federal First Cost	52,578,400
- Cash Contribution	(-) 4,142,800
Total Federal First Cost	48,435,600
2) Non-Federal First Cost	
a) Lands	5,528,800
b) Relocations	6,473,600
c) Cash Contribution	4,142,800
Total Non-Fed. First Cost	16,145,200
Total First Cost	64,580,800
3) Interest During Construction (b)	6,800,000
4) Total Investment Cost	71,380,800
5) Annualized First Cost (c)	6,158,200
6) Annual Maintenance Costs	
a) Floodwall Maintenance	10,000
b) Ditch Maintenance - Lower Shel Drake	4,500
c) Ditch Maintenance Behind Walls	4,500
d) Channel Debris Clearance, Shoal Removal and Stone Repair - Upper Shel Drake & Mamaroneck Rivers	58,000
e) Sedimentation Removal - Tunnel & Outlet Structure	20,000
f) Tunnel Repair (Patching, etc.)	52,500
g) Pump Replacements @ 2 Lift Stations	500
Subtotal, Annual Maintenance Costs	150,000
7) Total Annual Cost	6,308,200

(a) For development of annual charges at Oct. 1988 price level refer to Table 7 of the Main Body. For interest during construction charges at Oct. 1988 price level and 8-7/8% interest refer to paragraph H41 of the Economic Appendix.

(b) Based on \$9 million of construction for a 15 month period, \$16 million of construction for a 24 month period and \$39.6 million of construction for a 33 month period.

(c) Based on an interest rate of 8 5/8% for a 100 year project life.

ATTACHMENTS

COST ESTIMATE BACKUP

**TUNNEL CONSTRUCTION COSTS
AND BRIDGE DECK ANALYSIS**

BACK-UP

SUMMARY OF HORSESHOE TUNNEL CONSTRUCTION COSTS*

EXCAVATION & INITIAL SUPPORT:

ITEM	COST
LABOR	\$1,835,500
MATERIAL & SUPPLIES	\$1,525,000
EQUIPMENT & EQUIP. AND OPER.	\$ 980,200
REMOVAL OF MUCK OFFSITE (25,000 C.Y +)	\$ 328,800
<hr/>	
SUB TOTAL =	\$4,669,500

SOIL STABILIZATION FOR MIXED FACE SECTION (GROUTING) = \$1,359,700 (LUMP SUM)

REINFORCED CONCRETE LINING

ITEM	BID PRICE
LABOR	\$1,704,700
MATERIAL & SUPPLIES	\$1,943,100
EQUIPMENT & EQUIP. OPER.	\$ 145,800
<hr/>	
TOTAL =	\$3,793,600

PORTAL AREA PREPARATION (BULKHEADING, RAMPING ETC.) @BOSTON POST RD. (NOT INCL. IN BACKUP)

TOTAL = \$9,892,800

*Excludes monitoring costs

BACK-UP

EXCAVATION & INITIAL SUPPORT:

TUNNEL HEADING CREW:

LABOR DESCRIPTION	SHIFT NO. 1		SHIFT NO. 2	
	NOs.	COST (\$/day)	NOs.	COST (\$/day)
WALKING BOSS	1	273	1	323
SHIFTER	1	261	1	309
MINERS	2	510	2	600
HELPERS	2	502	2	596
POWDER MAN.	1	251	1	298
ELECTRICIAN	1	290	1	352
L.H.D. DRIVER	2	552	2	672
BULL GANG FOREMAN	1	261	-	-
BULL GANG LABORERS	2	492	-	-
TOTAL	13	\$3,392	10	\$3,150

No. OF SHIFTS = 2 , RATE/DAY = \$6,542*

BACK-UP

SUPPORT CREW AT PORTAL:

LABOR DESCRIPTION	SHIFT NO. 1		SHIFT NO. 2	
	NOs.	COST (\$/day)	NOs.	COST (\$/day)
CRANE OPERATOR	1	286	1	347
CRANE OILER	1	208	1	254
F.E.L. OPERATOR	1	286	-	-
COMPRES OPER.	1	219	1	268
PUMP MAN	1	219	1	268
POWDER WATCH	1	246	1	298
CHANGE HOUSE MAN	1	246	1	298
SIGNAL MAN	1	246	1	298
MECHANIC	1	276	1	336
TOTAL	9	\$2,232	8	\$2,367

No. OF SHIFTS = 2, RATE/DAY = \$4,599*

TOTAL HEADING + SUPPORT CREW
RATE/DAY = \$11,141. *

*Includes Fringes, FICA, etc.

BACK-UP

EXCAVATION & INITIAL SUPPORT

LABOR SUMMARY:

TYPE OF TUNNEL	STATION (+)	LNTH (LF)	NUMBER OF DAYS	RATE PER DAY	DIR. COST	TOTAL INCL OVERHEAD & PROFIT
MIXED FACE I	1+50 TO 2+70	120	15-1/2	\$11,141	\$172,700	\$240,100
RK W/SPILE	2+70 TO 3+40, 18+30 TO 18+60	100	13	\$11,141	\$144,800	\$201,300
FAIR RK	3+40 TO 4+25, 14+25 TO 16+25 17+50 TO 18+30	365	19	\$11,141	\$211,700	\$294,300
GOOD RK	4+25 TO 14+25	1000	50	\$11,141	\$557,000	\$774,400
FAULT RK	16+25 TO 17+50	125	7	\$11,141	\$ 78,000	\$108,400
MIXED FACE II	18+60 TO 19+67	107	14	\$11,141	\$156,000	\$217,000
TOTAL		1817	119		\$1,320,200	\$1,835,500

*Overhead and profit is 39% of direct cost

BACK-UP

EXCAVATION & INITIAL SUPPORT

MATERIAL AND SUPPLIES:

ITEM	DESCRIPTION	DIRECT COST	TOTAL COST INCL 39% O&P
DRL & BLAST	Includes - TOVEX explosive caps, wire, drill steel & bits @ \$12 per CY (3 lbs -TOVEX/cy)	\$287,800	\$400,100
SPILES	#9 BARS FULLY ENCAPSULATED 25 Sets (@4o.c.), 18spiles/set, 12'lg @ Rate of \$1.60/LF. COST =(25)(18)(12)(1.6) =\$8,640	\$8,640	\$ 12,000
STEEL SETS W/INVERT STRUTS	1,355,370 lbs. @ \$.45/lbs	\$609,917	\$848,000
LINER PLATES	NO.7 GAUGE 24 INCH Wide plate wt = 56.9 lbs/plate 113 courses, 10 plate/course @ \$0.50/lb cost= (56.9)(10)(113)(0.5) =\$32,149	\$32,149	\$44,700
GROUT	GROUT ANNULAR SPACE AROUND LINER PLATES 227 LF (SAY 1-1/2 X 34') USE 40 CY @ \$85/CY. COST= (40)(85)=\$3,400	\$3,400	\$4,700
MISC MATERIAL	FOOT BLOCKS, BLOCKINGS, ETC.	\$23,000	\$32,000
SUPPLIES	SMALL tools, boots, hard hats etc. 10% of Direct Labor cost of \$1,320,200	\$132,000	\$183,500
MATERIAL & SUPPLY COST =			\$1,525,000

BACK-UP

DISTRIBUTION OF EQUIPMENT CHARGES
EXCLUDING 39% FOR O&P

TYPE EQUIPMENT	TOTAL CHARGE (\$)	INITIAL SUPPORT (\$)	CONCRETE LINING (\$)
CRANE	120,000	110,000	10,000
COMPRESSORS	60,000	50,000	10,000
DRILL JUMBO	150,000	150,000	---
L-HrD's	60,000	54,000	6,000
PUMPS	10,000	7,000	3,000
SERVICE LINES	30,000	20,000	10,000
VENT FAN	5,000	5,000	---
F.E.L.	40,000	36,000	4,000
TRUCK	20,000	14,000	6,000
POWDER MAGAZINE	5,000	5,000	---
CONC. PUMP	20,000	---	20,000
GROUT SET UP	4,000	1,000	3,000
MISC. AIR TOOLS	10,000	8,000	2,000
COMMUNICATIONS	3,000	2,000	1,000
MISC. EQUIP.	8,000	6,000	2,000
TOTAL	\$545,000	\$468,000	\$77,000
EQUIPMENT OPERATION	---	\$237,200	\$27,900
TOTAL DIRECT COST		\$705,200	\$104,900
TOTAL COST INCL. 39% O&P		\$980,200	\$145,800

BACK-UP

REINFORCED CONCRETE LINING

INVERT CLEAN UP CREW:

LABOR DESCRIPTION	SHIFT NO. 1		SHIFT NO. 2	
	NOs.	COST (\$/day)	NOs.	COST (\$/day)
WALKING BOSS	1	273	1	323
SHIFTER	1	261	1	309
MINERS	2	510	1	600
HELPERS	2	502	1	596
LOADER OPERATOR	1	286	1	347
LABORERS	2	492	2	596
TRUCK DRIVER	1	246	1	298
CRANE OPER	1	286	1	347
CRANE OILER	1	208	1	254
ELECTRICIAN	1	290	1	352
UTILITY	1	219	1	268
MECHANIC	1	276	1	336
TOTAL	15	\$3849	15	\$4626

NO. OF SHIFTS = 2, RATE/DAY = \$ 8,475*

*Includes fringes, FICA, etc.

BACK-UP

CONCRETE FORM & PLACING CREW:

POUR - SHIFT No 1. (DAY), FORM - SHIFT NO.2 (NIGHT)

LABOR DESCRIPTION	SHIFT NO. 1		SHIFT NO. 2	
	NOs.	COST (\$/day)	NOs.	COST (\$/day)
WALKING BOSS	1	273	1	323
FORMAN	1	261	1	309
PUMPMAN (CONCRETE)	1	276	-	-
LABORERS (TOP SIDE)	1	246	1	298
VIBRATOR MAN (CONC.)	3	765	-	-
LABORERS (TUNNEL)	-	-	2	596
CRANE OPERATOR	-	-	1	347
CRANE OILER	-	-	1	254
COMP./PUMP OPER.	1	219	1	268
MECHANIC	1	276	1	336
ELECTRICIAN	1	290	1	352
FOREMAN	-	-	4	1200
TOTAL	10	\$2606	14	\$4283

NO. OF SHIFTS = 2, RATE/DAY = \$6,889*

*Includes fringes, FICA, etc.

BACK-UP

CONTACT GROUT CREW:

LABOR DESCRIPTION	SHIFT NO. 1		SHIFT NO. 2	
	NOs.	COST (\$/day)	NOs.	COST (\$/day)
WALKING BOSS	1	273	1	323
FOREMAN	1	261	1	309
MIXER MAN	1	276	1	336
MINERS	4	1020	4	1200
HELPERS	2	492	2	596
TOTAL	9	\$2322	9	\$2764

No. OF SHIFTS = 2, RATE/DAY = \$ 5086*

BACK-UP

FINAL CLEAN UP CREW:

LABOR DESCRIPTION	SHIFT NO. 1		SHIFT NO. 2	
	NOS.	COST (\$/day)	NOS.	COST (\$/day)
WALKING BOSS	1	273	1	323
SHIFTER	1	261	1	309
MINERS (FINISHERS)	6	1530	6	1800
ELECTIRCIAN	1	290	1	352
MECHANIC	1	276	1	336
TRUCK DRIVER	1	246	1	293
TOTAL	11	\$2876	11	\$3418

No. OF SHIFTS = 2, RATE/DAY = \$6,294*

*Includes fringes, FICA, etc.

BACK-UP

REINF. STEEL CREW:

ASSUME A PROGRESS OF 3 TONS/DAY

LABOR DESCRIPTION	SHIFT NO. 1		SHIFT NO. 2	
	NOs.	COST (\$/day)	NOs.	COST (\$/day)
FORMAN	1	261	-	-
MINERS (PLACING STEEL)	8	2040	-	-
HELPERS	2	492	-	-
TOTAL	11	2793	-	-

ASSUME MATERIAL & ACCESSORIES = \$36/3 TONS.
 No. OF SHIFT =1, RATE/DAY= 2793+36
 = \$2829 *

*Includes fringes, FICA, etc.

BACK-UP

REINFORCED CONCRETE LINING

LABOR SUMMARY:

ITEM DESCRIPTION	SHIFT #1 MEN RATE (\$/day)	SHIFT #2 MEN RATE (\$/day)	RATE/ DAY (\$)	PROG. FT/ DAY	# OF DAYS	DIRECT COST	TOTAL COST INCL 39% O&P
INVERT CLEANUP	15 3849	15 4626	8475	400	5	\$ 42,400	\$ 58,900
CONCRETE FORM & PLACING	14 2606 (PLACE)	11 4283 (FORM)	6889	50	73	\$502,900	\$ 699,200
CONTACT GROUT	9 2322	9 2764	5086	300	6	\$ 30,500	\$ 42,400
FINAL CLEAN UP	11 2876	11 3418	6294	500	4	\$ 25,200	\$ 35,000
REINF. STEEL	11 2829		2829	3 TONS PER DAY	221	\$625,200	\$ 869,200
TOTAL						\$1,226,200	\$1,704,700

(a) 1817 FT OF TUNNEL @ RATE OF 50 FT/DAY = 36 DAYS INVERT
 36 DAYS ARCH
 1 DAY SET UP

 TOTAL = 73 DAYS

(b) 1817 FT OF TUNNEL @ RATE OF 300 FT/DAY = 6 DAYS
 (c) 1817 FT OF TUNNEL @ RATE OF 500 FT/DAY = 4 DAYS
 (d) 662 TONS OF REINF. @ RATE OF 3 TON/DAY =221 DAYS

BACK-UP

REINFORCED CONCRETE LINING
MATERIAL AND SUPPLIES:

ITEM	DESCRIPTION	DIRECT COST	TOTAL COST INCL 39% O&P
CONCRETE	9000 CY @ \$87/CY	\$783,000	\$1,088,600
FORMS	INVERT \$30,000	\$100,000	\$ 139,000
	ARCH \$64,000		
	MANUAL CARRIER \$15,000		
	BULK HEAD \$ 6,000		
	<u>\$115,000</u>		
	SAY SALVAGE(-) <u>\$15,000</u>		
	USE \$100,000		
CONTACT GROUT	300 CY @ \$90/CY = \$27,000	\$27,000	\$ 37,500
FINAL CLEAN UP	ALLOW \$1,000	\$1,000	\$ 1,400
RESTEEL	662 TONS @ \$550/TON (WITH ACCESSORIES) = \$364,100	\$364,100	\$ 506,200
SUPPLIES	10% OF DIRECT LABOR = 1,225,500 X 0.1	\$122,550	\$ 170,400
MATERIAL & SUPPLY COST =			\$1,943,100

COMPARATIVE BRIDGE DECK ANALYSIS

INTRODUCTION. The following paragraphs and tables summarize the economic analysis for the comparative bridge deck alternatives and the rationale for selection. The selected bridge decks are shown on Figures 52, 56, 60, 64 and 66 of the Main Body.

BRIDGE DECK ANALYSIS. Two bridge deck types were investigated for each of the 5 bridge construction locations to determine the most cost effective deck type to be utilized. The two deck types selected for investigation were based on the deck types economically and structurally pertinent to the required bridge spans for the project, i.e. 50 ft. span at Hillside Ave. and 60 ft. span at Tompkins Ave., Ward Ave., Halstead Ave. and Station Plaza Rd.

The two alternative deck types investigated were steel girder-concrete composite deck and prestressed concrete deck (I beam or box beam). Table 1 shows the economic comparison between the steel girder/composite deck and the prestressed concrete deck for the 50 ft. span Hillside Ave Bridge. Table 2 shows the economic comparison between the steel girder/composite deck and the prestressed concrete deck for the representative 60 ft. span Station Plaza Rd. Bridge. It is to be noted that the prestressed concrete deck can be composed of box beams (Station Plaza Rd. and Hillside Ave.) or comparable I beams (Ward Ave., Tompkins Ave. and Halstead Ave.) at comparable cost.

DECK SELECTION. Based on this cost analysis and because a steel girder/composite deck requires higher average maintenance costs, the prestressed concrete deck was selected as the deck type to be utilized for both the 50 ft. and 60 ft. spans.

BACK-UP

TABLE 1
COMPARISON OF DECK COSTS FOR HILLSIDE AVE. BRIDGE
(50 FT. SPAN - 2,250 S.F. CLEAR SPAN DECK)

Prestressed Concrete Deck

1) Deck concrete	93 c.y. @ \$330/c.y. = \$30,690
2) Reinforcing steel - epoxy coated.....	9,400 # @ \$0.95/# = \$8,930
3) Prestressed concrete beams - (11 - 48"x21" beams).....	2,300 s.f. @ \$40/ s.f. = \$92,000
4) Chain link fence.....	145 l.f. @ \$15/l.f. = \$2,175
5) Elastomeric bearings.....	22 ea. @ \$500/ea. = \$11,000
6) Elastomeric expansion joint system.....	92 l.f. @ \$110/l.f. = \$10,120

	Total \$154,915

Thus, deck cost = \$154,915/2,250 s.f. = \$68.90/s.f.

Steel Girder/Composite Deck

1) Deck concrete.....	113 c.y. @ \$330/c.y. = \$37,290
2) Deck forms.....	2,400 s.f. @ \$10/s.f. = \$24,000
3) Slab reinforcement - epoxy coated.....	22,400 # @ \$0.95/# = \$21,280
4) Stud shear connectors.....	1,100 ea. @ \$0.80/ea. = \$880
5) Structural steel (11 W18x119* beams w/cover pl. & diaphragms)	98,000 # @ \$1.50/# = \$147,000
6) Expansion bearings.....	11 ea. @ \$950/ea. = \$10,450
7) Fixed bearings.....	11 ea. @ \$570/ea. = \$6,270
8) Elastomeric expansion joint system.....	92 l.f. @ \$110/l.f. = \$10,120
9) Chain link fence.....	145 l.f. @ \$15/l.f. = \$2,175

	Total \$259,465

Thus, deck cost = \$259,465/2,250s.f. = \$115.30/s.f.

* An 18" wide flange beam is req'd. for hydraulic clearance

BACK-UP

TABLE 2
 COMPARISON OF DECK COSTS FOR STATION PLAZA BRIDGE
 (60 FT. SPAN = 2,880 S.F. CLEAR SPAN DECK)

Prestressed Concrete Deck

1) Deck concrete	115 c.y. @ \$330/c.y.	= \$37,950
2) Reinforcing steel- epoxy coated	12,600 # @ \$0.95/#	= \$11,970
3) Prestressed concrete beams - (11 - 48"x27" beams).....	2,700 s.f. @ \$40/ s.f.	= \$108,000
4) Chain link fence.....	160 l.f. @ \$15/l.f.	= \$2,400
5) Elastomeric bearings.....	22 ea. @ \$500/ea.	= \$11,000
6) Elastomeric expansion joint system.....	100 l.f. @ \$110/l.f.	= \$11,000

	Total	\$182,320

Thus, deck cost = \$182,320/2,880 s.f. = \$63.30/s.f.

Steel Girder/Composite Deck

1) Deck concrete.....	135 c.y. @ \$330/c.y.	= \$44,550
2) Deck forms.....	3,000 s.f. @ \$10/s.f.	= \$30,000
3) Slab reinforcement - epoxy coated.....	27,500 # @ \$0.95/#	= \$26,125
4) Stud shear connectors.....	900 ea. @ \$0.80/ea.	= \$720
5) Structural steel (7 W36x150 beams w/cover pl. & diaphragms)	96,000 # @ \$1.50/#	= \$144,000
6) Expansion bearings.....	7 ea. @ \$950/ea.	= \$6,650
7) Fixed bearings.....	7 ea. @ \$570/ea.	= \$3,990
8) Elastomeric expansion joint system.....	100 l.f. @ \$110/l.f.	= \$11,000
9) Chain link fence.....	160 l.f. @ \$15/l.f.	= \$2,400

	Total	\$269,435

Thus, deck cost = \$269,435/2,880s.f. = \$93.55/s.f.

**WESTCHESTER COUNTY STREAMS
MAMARONECK AND SHELDRAKE RIVERS
FLOOD CONTROL PROJECT
VILLAGE OF MAMARONECK**

GENERAL DESIGN MEMORANDUM

**APPENDIX F
CULTURAL RESOURCES**

JANUARY 1989

APPENDIX F
TABLE OF CONTENTS

ITEM

Page

A. Cultural Resources Section

F-1	Introduction	F-1
F-2	Reconnaissance Report	F-1
F-3	Scope of Study	F-1
F-4	Current Findings	F-1

Cultural Appendix - Final GDM

Cultural Resources

F-1. A cultural resources survey report was prepared in January 1977 for the New York District, Corps of Engineers entitled, "Reconnaissance Level Survey of Cultural Resources Mamaroneck and Sheldrake River Basin and Byram River Basin Flood control Projects." Conclusions reached by that report indicated that there were no cultural resources present in the project area which would be eligible for listing on the National Register of Historic Places and would be negatively affected by proposed project actions. Two standing structures, the "Delancy House" (currently known as the Fenimore Inn) and the Mamaroneck Waterworks No. 1 Building and Pump House were identified by the report as potentially eligible properties in need of protection and avoidance should blasting and/or excavation occur in their vicinities during the construction phase of the project. The report recommended that no blasting be undertaken in either area without first consulting the New York State Historic Preservation Officer. The Mamaroneck Waterworks building is located upstream of the Winfield Avenue Bridge. The Delancy House, located off Fenimore Road on Boston Post Road, is presently a Town of Mamaroneck Landmark.

F-2. The 1977 reconnaissance-level survey report was reviewed by State and Federal agencies who concurred in a determination of no effect of project actions on cultural resources within the project area. It was recommended, however, that the New York State Historic Preservation Officer be contacted should cultural artifacts be located during construction activities along the upper Mamaroneck River area, where potential resources may be present and that the Corps implement the reconnaissance report's recommendations concerning the protection of historic properties during the blasting program..

F-3. The Byram River Basin, located in Connecticut, which was originally combined with the Mamaroneck and Sheldrake project areas in the 1977 report, no longer forms part of the project actions and is not treated here.

F-4. A recent in-house review of properties listed on or eligible for listing on the National Register of Historic Places (as of 3 May 1988) has determined that no currently identified historical or archaeological properties are known to exist within the project area which would be adversely affected by project actions. Following an in-house review of a minor modification to project plans, the Corps forwarded documentation and a determination of no effect to the New York State Historic Preservation Officer (SHPO) on 31 October 1988. The SHPO concurred with this determination on 23 November 1988. Any new impacts associated with the proposed design changes will be coordinated with the SHPO, as required under Section 106 of the National Historic Preservation Act.

WESTCHESTER COUNTY STREAMS
MAMARONECK AND SHELDRAKE RIVERS
FLOOD CONTROL PROJECT
VILLAGE OF MAMARONECK

GENERAL DESIGN MEMORANDUM

APPENDIX G
ENVIRONMENTAL

JANUARY 1989

APPENDIX G
TABLE OF CONTENTS

<u>Item</u>	<u>Page(s)</u>
<u>A. Environmental Conditions Section</u>	
G1. Introduction.	G-1
G2. Zoning and Land Use.	G-1
G3. Coastal Zone Management.	G-1
G4. Water Quality.	G-1
G5. Mamaroneck Harbor.	G-2
G6. Water Quality Data.	G-2
G7. New York District Water Column and Sediment Sampling.	G-2
G8. Sediment Data.	G-6
G9. Soil Explorations for the Mamaroneck and Sheldrake Rivers Basin.	G-6
G10. Justification for Mitigation (Sill Construction and Pond Formation) at Columbus Park.	G-6
G11. Pond Formation) at Columbus Park.	G-7
<u>B. Evaluation and Analysis Section</u>	
G12. Sediments (Grain-size).	G-8
G13.- Water Quality and Bottom Sediment	
G14. Data Results.	G-8
G15. Coordination	G-15
 <u>Tables</u>	
	<u>Page(s)</u>
Table 1 - New York District Testing in the Sheldrake and Mamaroneck Rivers, and Harbor (March 1985, Sept. 1984 and June 1984) - Grain-Size Analysis.	G-3
Table 2 - Highest Concentrations Reported for the Bottom Grab and/or Core Samples in the Sheldrake River.	G-9
Table 3 - Highest Concentrations Reported for the bottom and/ or Core Samples in the Mamaroneck River.	G-10
Table A - Data Collected by Westchester County Department of Health, Mamaroneck River, Bottom Sediment and Elutriate Tests.	G-11
Table B - Data Collected by Westchester County Department of Health, Sheldrake River, Bottom Sediment and Elutriate Tests.	G-12
Table 4 - Highest Concentrations Reported for the Bottom Grab and/or Core Samples in the Mamaroneck Harbor.	G-13
Table C - Existing and Improved Flow Conditions in the Mama- roneck and Sheldrake Rivers for the Recommended Plan.	G-14
Figure 1 - (River Sample Sites).	G-4
Figure 2 - (Harbor Sample Sites).	G-5
Attachment - Section 404 (b) (1) Evaluation Report & Public Notice & Coordination Letters Received.	G-A1 to G-A36

APPENDIX G
Final Environmental and
Water Quality Appendix

A. ENVIRONMENTAL CONDITIONS SECTION

G1. Introduction. Since the preparation of the Final Environmental Impact Statement (FEIS), dated January 1979, and the receipt of the US Fish and Wildlife Service's most recent planning aid reports (i.e. March 26, 1982, and February 9, 1984) there have been no major changes to existing environmental resources in the study area. Overall, the habitat resources, the existing levels of water quality, and land-use classification have remained the same for the Mamaroneck - Sheldrake Rivers study area. The purpose of this appendix for the final GDM is to present a discussion and review of recent water quality testing conducted within or near this study area. This review was utilized to identify possible water quality concerns or problems prior to the circulation of a 404(b) (1) public notice (and evaluation report findings). Recently, the Public Notice (PN) No. 13468 was issued (dated October 13, 1988), thus coordination has been initiated with the interested public and the appropriate governmental agencies with respect to the Clean Water Act and the Coastal Zone Management Act. Summary paragraphs of other environmental concerns are also provided below.

G2. Zoning and Land Use. The study area's zoning and land use has generally remained the same. The great majority of land use zoning in the Village is residential. There are few remaining vacant parcels of land and the majority of the zones allow only single family dwellings. In general, parks and recreational facilities are concentrated south of the Boston Post Road near Long Island Sound. The main commercial zones are restricted to Boston Post Road, the Village Center, Mamaroneck Avenue, Halstead Avenue, and Old White Plains Road. A marine commercial zone exists where the Village center meets Mamaroneck Harbor, and other areas front the Long Island Sound. There is also an industrial zone located to the east and west of Fenimore Road.

G3. Coastal Zone Management. With the exception of the proposed structural works within or adjacent to the West Basin, the project works are not located within a New York State coastal zone area. As part of the Section 404 (b) (1) [Clean Water Act] PN No. 13468 process, coordination has been effected with the New York State Department of State, Division of Coastal Resources and Waterfront Revitalization and the Connecticut Department of Environmental Protection. A copy of the public notice is attached, below (along with the letters received to date). In addition, it should be noted that the material to be dredged from the West Basin of Mamaroneck Harbor will be disposed of at an approved ocean site. For this material, the Central Long Island Sound (CLIS) site is the preferred alternative.

G4. Water Quality. Historically, the Mamaroneck and Sheldrake Rivers were classified as "D" streams by the State of New York Department of Environmental Conservation (NYSDEC) within the project areas and are considered significantly degraded. The lower tidal portion of the Mamaroneck River is Class "I" while the East and West Basins of Mamaroneck Harbor are classified as "SB" waters, closed to shellfishing (copies of the applicable State water quality standards were presented in the FEIS). The upstream reservoirs (Larchmont Reservoirs and Mamaroneck Reservoir) remain classified as "A" (drinking water). However, the main stems of the Mamaroneck and Sheldrake Rivers have been proposed for upgrading to Class "C" and the water quality

in some areas appears to be improving. Local hearings were held September 1987, and were required prior to any official changes (personal communication with Mr. P. Bologna, NYSDEC, Albany). In addition, the NYSDEC has not yet established criteria and standards for pollutants in the sediment material. Recommendations and possible standards for certain parameters continue to be reviewed and studied (personal communication with Mr. Colby Tucker, NYDEC, Albany).

G5. Mamaroneck Harbor. The study area boat basins remain classified as "SB". However, as work on the Mamaroneck Sewage Treatment Plant progresses some improvement in the local water quality may be anticipated. The report was issued for the Step II 201 Facilities Plan. Construction of the force mains and pump stations is complete (sewer system rehabilitation and upgrading). The design phase of the Mamaroneck plant upgrading to secondary treatment is complete. June 1, 1993 is the projected start-up date of operation of the 20.6 MGD secondary activated sludge plant. The Town of Mamaroneck is operating under a State of New York "Consent Order" to attain secondary treatment. Specific dates for the municipal compliance plan are being revised. The upgraded plant will consist of preliminary, primary, and secondary treatment facilities and a new outfall pipeline (Interstate Sanitation Commission, 1987 Annual Report).

G6. Water Quality Data. The final EIS (Jan. 1979) reported that only limited water quality data had been collected for the river basin. Data collected by the United States Department of the Interior, and the U.S. Environmental Protection Agency (water quality - STORET System) indicates that water quality in the basin generally conforms to the standards for the class C and D waters. Data have been collected on the Mamaroneck River at the stream gaging station located just below the confluence of the Mamaroneck and Sheldrake Rivers. Dissolved nitrates, solids, and sulfates were low (reported at 4.5 mg/l, 36.0 mg/l and 92.0 mg/l, respectively). The pH ranged from a high value of 8.2 to a low of 6.9, and dissolved chlorides were less than 100 mg/l. According to the report on water quality management for the region, (Westchester County 208) published by the New York State Department of Environmental Conservation, the basin is a prime contributor of high bacteria counts in Mamaroneck Harbor. The region's public beaches continue to be closed often during the summer months due to adverse water quality conditions for bathing. High coliform and fecal coliform counts have been recorded at the mouth of the Mamaroneck River and at the upstream Mamaroneck Reservoir (refer to pages 24-28, including Tables 8 & 9, of the FEIS).

G7. New York District Water Column and Sediment Sampling. To supplement the existing data base, and to gain a better understanding of the existing conditions, and thus identify possible problems with the disposal of the project's dredged material, additional sampling was undertaken within the project area. Within the two freshwater rivers a total of seven (7) sediment samples and three (3) water column samples were collected. In addition, composite site water was used for the elutriate phase of testing. For the Harbor area, three (3) bottom samples were collected (2 samples in the West Boat Basin and 1 in the East Basin) along with one (1) water column sample and composite site water for the elutriate phase. The location of the samples collected by the Corps are presented in the attached Figures 1 and 2.

TABLE 1
 New York District Testing in the Sheldrake,
 and Mamaroneck Rivers, and Harbor (March 1984,
 June 1984 and Sept.1984) - Grain Size Analysis.

<u>River/ Harbor</u>	<u>% Gravel (4.76mm)</u>	<u>% Sand (0.074-4.76mm)</u>	<u>% Silt (0.0039-0.074)</u>	<u>% Clay (0.0039mm)</u>
1 SR	1.96	96.10	1.11	0.83
2 SR	6.71	91.60	1.34	0.35
3 SR	16.76	79.25	0.79	3.20
1 MR	18.15	76.35	3.95	1.55
2 MR	16.43	80.10	2.28	1.19
3 MR	38.70	57.06	2.43	1.81
4 MR	17.46	80.10	0.62	1.82
1 WB	3.40	13.7	42.5	40.4
2 WB	2.10	10.8	42.3	44.8
3 EB	2.30	59.3	27.4	11.0

\geq = Greater than or equal to .

\leq = Less than or equal to .

*NOTE: From New York Testing Laboratories, Inc. report numbers 84-72006,
 84-73938, and 84-73122, respectively.

- LEGEND**
- RETAINING WALL
 - CUT SLOPE
 - FILLED AREA
 - REGRAVING

SCALE IN FEET

TOWN OF MAMARONECK

TOWN OF HARRISON

MAMARONECK AND SHELDRAKE RIVERS BASIN
MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT
GENERAL PLAN

MAMARONECK NEW YORK
PLATE C1

SEDIMENT AND COMPOSITE SITE WATER SAMPLES COLLECTED FROM THE MAMARONECK RIVER ON SEPT. 14, 1984 AND SAMPLES COLLECTED FROM THE SHELDRAKE RIVER ON MARCH 16, 1984 BY THE NEW YORK DISTRICT CORPS OF ENGINEERS.

C1-4

FIGURE 1

G-4

G8. Sediment Data. In addition to the surface water quality data discussed in the above paragraphs, bottom sediment data are available from a United States Department of the Interior, Water Resources Division study of selected streams and lakes in Westchester County. Additional data are also available from a New York District Corps of Engineers sampling program for the ~~Mamaroneck and Byram Rivers Federal Navigation projects~~ (refer to the Final EIS pages 11, and 25-28, dated Jan. 1979), as well as from the more recent local permit to dredge in Mamaroneck Harbor by the Mamaroneck Beach & Yacht Club (NAN Public Notice No. 11591-83-070-YW, dated October 21, 1983) which contained sediment data, as well as bioassays and bioaccumulation data. The sediment data (grain size) presented in Table 1 above were collected specifically for the subject flood control study. A discussion of the relative importance of this information, as well as, the New York District's water quality data (Tables A & B and Tables 2 - 4) are provided in the analysis section of this Appendix).

G9. Soil Explorations for the Mamaroneck and Sheldrake Rivers Basin. During the summer of 1945, June of 1976, and October 1986, foundations conditions along the stream were investigated.* The subsurface explorations consisted of drill holes, auger holes and test pits. The soil profile along the Mamaroneck River consists, in general of a small varying layer of topsoil, followed by layers of coarse to fine sand mixed with varying amounts of silt and gravel. In the test drilling, bedrock was encountered at depths ranging from about 12 to 22 feet below the surface. Soil profiles for the Mamaroneck and Sheldrake indicate bedrock is exposed at several areas along the streambed and banks though the proposed channel alignment. These rock outcroppings are particularly visible along the Sheldrake River upstream of Landsowne Road in the Town of Mamaroneck (which is outside this project's upstream limit). To summarize, the study area materials to be excavated will generally be sand, gravel and rock with relatively small amounts of fine sands. Occasional layers of clay or silt are found inter-bedded with the sandy soils (for additional information please refer to Appendix C, Geological and Soils Investigations, of this GDM report).

G10. Justification for Mitigation (Sill Construction and Pond Formation) at Columbus Park. Adverse impacts associated with the implementation of the project works, such as; the removal of bankside vegetation, the disturbance of the channel bottom by widening and deepening, the placement of fill, increased turbidity, and increased water temperatures would all tend to severely stress the aquatic habitat. Relatively major modifications to the existing channels would occur in all of the project area river reaches. However, the aquatic habitat located below (downstream of) the Fenimore Road Bridge (a section of the Sheldrake of about 2,900 feet) would be further adversely effected with the severe reduction of riverine flows. Comparing the existing flows with the improved flows indicates that the reduction levels would be one order of magnitude or more. Further, during the low-flow summer or early fall season the flow rate for the by-passed section of the Sheldrake River is expected to be one cubic foot per second (cfs) or less. Because of these anticipated changes additional mitigation was considered and developed (see also environmental considerations paragraphs in the main report section of this GDM).

*Note: Additional foundation and soils testing have been performed along the Sheldrake River diversion tunnel route.

G11. While there is no economic or monetary data available for the recreational use of the stream, the construction of the sill in Columbus Park is considered a justified mitigation measure. The study area is reported to support a warmwater recreational fishery particularly for common suckers and sunfish. The Sheldrake River and the upper reaches of the Mamaroneck River is primarily characterized by freshwater species which include: redbreast sunfish, pumpkinseed sunfish, and minnows. Recent coordination with New York Department of Environmental Conservation has indicated that water quality conditions are expected to improve, such that increasing the stream standards to Class "C" would be justified. Given the authorized project's design elements, there is no way to replace the damages and the loss in productivity to the Sheldrake's riverine habitat other than lessening the overall magnitude of the adverse effects. The main mitigation measures recommended for the "by-passed" section is to provide a minimal flow within the regraded streambanks and the preservation (throughout the life of the project) of at least some of the existing aquatic habitat. The small pond to be formed upstream of the concrete sill would minimize lost aquatic habitat areas within the Sheldrake River by preserving approximately 7% to 14% of the total surface area involved. This ponding area would allow the recreational fishery to continue for that section of the lower Sheldrake River and it would also serve as a waterfowl resting area. The construction of the sill and the creation of the ponding area would not result in the loss of any additional trees within Columbus Park.

B. EVALUATION AND ANALYSIS SECTION

G12. Sediments (Grain-size). According to the information presented in Table 1 and referenced in the paragraphs above, the project area sediments may be characterized as fairly dense materials (mostly sand and gravel). With respect to water quality or other environmental concerns, this fact also leads to at least two (2) main implications: (a) the material is not likely to accumulate high concentrations of persistent pollutants (see the pesticides & PCB concentrations reported for the sediment material in the Shelldrake and Mamaroneck Rivers) and secondly, (b) that the excavated material generated by project implementation should not result in major disposal problems, since it may be described as relatively "clean." The materials may be suitable for use as construction material. In addition, it has recently been confirmed by a consultant's report, Sediment Transport Analysis, (September 1986 by Lawler, Matusky & Skelly Engineers) that there have not been any significant changes in sedimentation patterns within the Shelldrake and Mamaroneck Rivers (within recent years). The report also concludes that no significant changes in sediment deposition are expected within the project area streams after the project is constructed. It may be further concluded then, that significant transportation of the pollutants within the sediment is not anticipated (refer also to the attached 404 (b) (1) Evaluation Report, below).

G13. Water Quality and Bottom Sediment Data Results. The water quality and sediment data presented in Tables 2, 3 and 4, all report the highest concentrations for the parameters tested. Tables 2 through 4 report the results for sediment and water samples that were collected from locations within the project area (see Figures I & II). Tables A and B report data obtained by the Westchester County Department of Health (WCDH). The WCDH data collection sites are within the flood control area river reaches. It should be noted, that the "Human Health (Drinking Water) Standard" column heading is provided only as a comparison guide. The Mamaroneck Reservoir and the Larchmont No.1 & No.2 Reservoirs are only "back-up" water supply facilities. These facilities are not currently in use and are all located upstream of the construction sites.

G14. A review of the data presented in the tables cited above indicates that the bulk sediments are free of any high concentrations of pesticides and PCB's. These results are generally consistent with the nature of the materials to be excavated, since heavier-size materials do not concentrate potential pollutants very well. The only relatively high concentration appeared for PCB's in one of the Harbor samples. However, this was the "highest" reported (only 4.0 PPM) from among all samples collected and the elutriate and the site water results reported no concentrations above the detection limits. Relatively high concentrations of heavy metals were clearly detected (in the bulk sediments) for the following: iron, copper, lead, chromium, and zinc. However, the elutriate and water column tests again reported low concentrations. In general, the results suggest that the New York State standards for class C or D streams would not be exceeded during construction. While there is a potential for a temporary contravention of the standards (during dredging or excavation activities) for some of the heavy metals (particularly iron and copper), this is not expected to be a matter for serious concern, since the effects should be temporary and high concentrations of these elements, already occur naturally in sediments of the project riverbeds and other streambeds in Westchester County.

Table 2
 Highest Concentrations Reported for the Bottom Grab and/or Core
 Samples in the Shel Drake River* (Taken by N.Y. District)
 (March 16, 1984)

<u>Parameters</u>	<u>(Bulk) Sediment</u>	<u>Elutriate</u>	<u>Site Water</u>	<u>Human Health (Drinking Water) Standard</u>	<u>Standard Fresh Water Aquatic Life**</u>
CN	< 0.02	0.20	0.02	.005	.052
TOC	13205	12	5	-	-
PCB'S	0.100	0.0001	0.0001	.001	.0062
As	12.20	0.003	0.002	.050	.130 PPM
Cd	0.27	0.0002	0.0001	.010	.0015 - .0063
Cr	14.76	0.026	0.018	.050	.110 PPM
Cu	732.0	0.30	0.060	1.0	0.12 - .043
Fe	12238	0.041	0.026	.050	1.0 (1976 Red Book)
Pb	116.60	0.0006	0.0001	.050	.074-.400
Mn	163.34	0.036	0.022	.050	-
Zn	314.98	0.026	0.141	5.00	0.01
Hg	1.19	0.0011	0.0001	.002	0.0032-.0088
Chlordane	<0.001	<0.0001	<0.0001	-	0.36 PPB
DDT	<0.001	<0.0001	<0.0001	-	0.41 PPB
DDD	<0.001	<0.0001	<0.0001	-	-
DDE	<0.001	<0.0001	<0.0001	-	1.05 PPM
Dieldrin	<0.001	<0.0001	<0.0001	-	1.2 PPB
Oil & (IR)					
Grease	25400	0.05	0.05	-	0.01

*NOTE: The unit concentrations are in mg/kg, mg/l or parts per million (PPM) unless otherwise indicated.

**NOTE: (Not to exceed given concentrations) Part V U.S Environmental Protection Agency Water Quality Criteria Documents Availability, Federal Register, Friday November 28, 1980. (The amounts noted are for maximum concentrations in order to protect aquatic life).

PCB'S -Federal regulation 40 CFR 761 promulgated under the Toxic Substance Control Act states that dredged material containing 50-500 PPM of PCB must be placed in a chemical waste land-fill. Similarly, the NY State Department of Environmental Conservation has ruled that dredged material exceeding 50 PPM must be placed in a secured land burial facility as specified in NYCRR, Part 360 Solid Waste Management Facilities.

Table 3
 Highest Concentrations Reported for the Bottom Grab and/or Core
 Samples in the Mamaroneck River * (Taken by N.Y. District)
 (September 14, 1984)

<u>Parameters</u>	<u>(Bulk) Sediment</u>	<u>Elutriate</u>	<u>Site Water</u>	<u>Human Health (Drinking Water) Standard</u>	<u>Standard Fresh Water Aquatic Life**</u>
CN	<0.02	<0.02	See WCDH Data	.005	.052
TOC	7235	8	"	-	-
PCB'S	0.019	<0.0005	"	.001	.0062
As	4.32	<0.0001	"	.050	.130
Cd	0.51	<0.0001	"	.010	.0015-.0063
Cr	9.54	0.0001	"	.050	.110PPM
Cu	24.36	0.0001	"	1.0	.012-.043
Fe	7832.6	<0.0001	"	.050	1.0(1976 Red Book)
Pb	56.77	0.135	"	.050	.074-.400
Mn	197.00	0.016	"	.050	-
Hg	<0.005	<0.0001	"	.002	0.0032-.0088
Zn	55.08	0.039	"	5.00	0.01
DDT	<0.001	<0.0005	"	-	0.41PPB
DDE	<0.001	<0.0005	"	-	1.05PPM
Dieldrin	<0.001	<0.0005	"	-	1.2PPB
Chlordane	<0.001	<0.0005	"	-	0.36PPB
DDD	<0.001	<0.0005	"	-	-
Grease (IR)	894.5	0.05	"	-	0.01
TKN	305.70	1.01	"	-	-
Total Ammonia	0.02	0.04	(Table A)	-	-

*NOTE: The unit concentrations are in mg/kg, mg/l or parts per million (PPM), unless otherwise indicated.

**NOTE: (Not to exceed given concentrations) - See Table 2, above.

Table A
 DATA COLLECTED BY WESTCHESTER COUNTY
 DEPARTMENT OF HEALTH (WCDH)
 (October 21, 1980)
 Mamaroneck River
 Bottom Sediment and Elutriate Tests*

A. Location - Village of Mamaroneck at Jefferson Avenue
 (WCDH #1).

<u>Parameters</u>	<u>Sediment</u>	<u>Elutriate</u>	<u>Site Water**</u>
As	0.900	-	0.020
Cd	< 0.20	0.002	< 0.002
Cr	4.900	0.070	< 0.010
Cu	110.00	0.340	< 0.020
Pb	42.00	0.500	< 0.010
Mn	160.00	3.900	< 0.200
Zn	38.00	0.320	< 0.050
PCB	< 0.012	< 0.001	< 0.001
Chlordane	< 0.060	< 0.001	< 0.0001
DDT	< 0.030	< 0.001	< 0.0005
DDD	< 0.010	< 0.001	< 0.0005
DDE	< 0.010	< 0.001	< 0.0005
Hg	< 0.010	< 0.0004	< 0.0004

*Concentrations are in mg/kg, mg/l or part per million (PPM).

**Sample taken at given location during high flow on March 17, 1982.

< = Less than

Note: The above indicated data are raw data obtained from the WCDH (presently unpublished).

Table B
 DATA COLLECTED BY WESTCHESTER COUNTY
 DEPARTMENT OF HEALTH (WCDH)
 Sheldrake River
 Bottom Sediment and Elutriate Tests*
 (September 30, 1980)

A. Location- Waverly Avenue
 (WCDH #5)

B. Location- Mamaroneck Ave.
 (WCDH #6)

<u>Parameters</u>	(Bulk)		(● A)	(Bulk)		(● B)
	<u>Sediment</u>	<u>Elutriate</u>	<u>Site Water</u>	<u>Sediment</u>	<u>Elutriate**</u>	<u>Site Water</u>
As	1.800	<0.020	<0.020	0.400	<0.020	<0.020
Hg	-	-	-	-	-	-
Cd	-	-	-	-	-	-
Cr	-	-	-	-	-	-
Cu	17.00	0.030	<0.020	110.0	0.400	<0.020
Pb	110.0	0.280	<0.020	78.00	0.220	<0.030
Mn	-	-	-	-	-	-
Zn	90.00	0.250	<0.050	77.00	0.260	<0.050
PCB	0.310	0.001	<0.001	<0.001	0.001	<0.001
Chlordane	0.360	0.0009	<0.0001	0.0150	0.0008	<0.0001
DDT	0.75	<0.0005	<0.0005	0.033	<0.0005	<0.0005
DDD	0.081	<0.0005	<0.0005	0.016	<0.0005	<0.0005
DDE	0.027	<0.0005	<0.0005	0.014	<0.0005	<0.0005
Dieldrin	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Heptach. Epoxide	<0.0001	-	<0.0001	<0.0001	-	<0.0001

*Concentrations are in mg/kg, mg/l or parts per million (PPM).

Note: The above indicated data are raw data obtained from the WCDH (presently unpublished).

Table 4
 Highest Concentrations Reported for the Bottom Grab and/or
 samples in the Mamaroneck Harbor* (Taken by N.Y. District)
 (June 26, 1984)

<u>Parameters</u>	<u>(Bulk)</u> <u>Sediment</u>	<u>Elutriate</u>	<u>Site</u> <u>Water</u>	<u>Human Health</u> <u>(Drinking Water</u> <u>Standard</u>	<u>Standard-Salt</u> <u>Water Aquatic</u> <u>Life**</u>
CN	<0.02	<0.02	<0.02	NA	.030
TOC	37198	4	5	"	-
PCB'S	4.000	<0.0001	<0.0001	"	-
As	8.05	<0.010	0.070	"	.508
Cd	1.50	<0.001	<0.001	"	.059
Cr	49.12	0.031	0.032	"	1.260
Cu	151.18	0.038	0.052	"	-
Fe	28228.0	0.126	0.187	"	-
Pb	301.00	0.083	0.124	"	-
Mn	453.11	0.012	0.016	"	-
Hg	1.09	0.0003	0.0002	"	.037
Zn	311.39	0.058	0.110	"	-
DDT	<0.001	<0.0001	<0.0001	"	-
DDD	<0.001	<0.0001	<0.0001	"	-
DDE	<0.001	<0.0001	<0.0001	"	-
Dieldrin	<0.001	<0.0001	<0.0001	"	-
Chlordane	<0.001	<0.0001	<0.0001	"	0.01
Oil & Grease	11421	<0.05	<0.05	N.A.	-
TKN	6070	1.12	2.24	-	-
Total Ammonia	<0.1	<0.04	<0.04	-	-

*NOTE: The unit concentrations are in mg/kg, mg/l or parts per million (PPM), unless otherwise indicated.

**NOTE: (Not to exceed given concentrations) - See Table 2, above.

TABLE C
Existing and Improved Flow Conditions* in the Mamaroneck
and Sheldrake Rivers for the Recommended Plan.

<u>LOCATION</u>	<u>10 YEAR STORM</u>		<u>2 YEAR STORM</u>		<u>1 YR STORM</u>		<u>LOW FLOW (AUGUST)**</u>		
	EXT	IMP	EXT	IMP	EXT	IMP	EXT	IMP	EXT
1. Mamar. R (@ mouth)	3070	2880	1700	1250	-	-	-	-	-
2. Mamar. R (@ Jeff. Ave)	2080	2200	1180	1210	-	-	-	-	-
3. Sheld. R. (@ mouth)	1080	140	740	90	550	72	4	1	9***
4. Sheld. R. (Below Tn)	1060	70	730	40	530	32	4	1	9***
5. Sheld. R. (@ Fenimore Rd.- above tunnel)	1160	1210	740	750	-	-	-	-	-

*Note: These discharges - in cubic feet per second (cfs) - are based on the results from HEC-1 runs made by Corps of Engineers technical staff.

**Note: These are the typical average daily flows for the month of August and may be used to indicate the low flow conditions for the lower section of the Sheldrake River located below Fenimore Rd. (Data submitted by Mr. T. Smyth - NANPL).

***Note: This quantity is the average daily flow for the given stream (under existing conditions) over the course of a calendar year. Under the proposed improved conditions the average daily flow would be approximately 1.0 cfs.

EXT = Existing
IMP = Improved

G15. Coordination. As indicated in paragraph G3, coordination has been initiated and will continue with the public, and the various federal, state, and local governmental agencies. Additional environmental documentation, such as another public notice, will be needed due primarily to the recently proposed design changes for the tunnel outfall area at the West Boat Basin of Mamaroneck Harbor. Presented below, is a listing of all the coordination letters that have been received (to date).

Federal Offices

Letter Dated

Department of Commerce National Marine Fisheries Service	(awaiting letter)
Environmental Protection Agency Region I Region II	Dec. 22, 1988 (awaiting letter)
Department of the Interior Fish and Wildlife Service	Jan. 4, 1989

State of Connecticut

Dept. of Environmental Protection Coastal Resources Management Div.	Dec. 30, 1988
--	---------------

State of New York

Dept. of Environmental Conservation Region 3	Nov. 9, 1988
Dept. of Transportation	Nov. 10, 1988
Parks, Recreation, Hist. Presv.	Nov. 23, 1988
Dept. of State	Dec. 6, 1988

Westchester County

Dept. of Environmental Facilities	Nov. 14, 1988
-----------------------------------	---------------

Town of Mamaroneck

Conservation Advisory Commission	Nov. 7, 1988
----------------------------------	--------------

SECTION 404 (b) (1)
EVALUATION REPORT
Mamaroneck and Sheldrake Rivers Basin
Flood Control Project
Village and Town of Mamaroneck, N.Y.

I. PROJECT DESCRIPTION

a. Location: Mamaroneck and Sheldrake Rivers basin, Village and Town of Mamaroneck, Westchester County, New York.

b. General Description: The recommended flood protection plan, located within the Mamaroneck and Sheldrake Rivers basin, includes the following features: channel work, some new retaining walls, sheet piling, channel realignment, removing existing fencing, underpinning of embankments, relocation of existing utilities (sewer lines, light boxes, etc.), the replacement or the removal of several bridges, and the placement of fill or riprap in the rivers and harbor. Tunnel work is also proposed. The proposed tunnel involves the redirection of the lower Sheldrake River (downstream of Fenimore Road bridge) into a diversion tunnel which will transfer the flows into the West Basin of Mamaroneck Harbor.

Mamaroneck River. The proposed channel work for the Mamaroneck River extends from 200 feet upstream of (east) Boston Post Road for 10,000 feet upstream (northeast) in the vicinity of Winfield Avenue. The existing bottom channel width is about thirty (30) feet throughout the project area. The area from the mouth of Mamaroneck Harbor upstream to Jefferson Avenue will be widened to an average bottom width of sixty (60) feet, while to the north of this point and throughout the rest of the modified Mamaroneck River the average bottom width of the modified channels will be forty-five (45) feet. The average channel cut will be 3.4 feet. Upstream of the New York Thruway (3,200 feet) the modified channels will be trapezoidal. From the mouth of the river to the Thruway (7,000 feet) half will be trapezoidal and half will be semitrapezoidal or V-shaped.

Sheldrake River-Tunnel. The proposed tunnel work will be constructed so that the flow of the Sheldrake River at Fenimore Road will be diverted into the 3,800-foot-long tunnel. The diverted waters will discharge into the West Basin of the Mamaroneck Harbor. The tunnel will follow the east side of Fenimore Road and will consist of two parts: (a) a 16.25-foot-square 'cut and cover' and a box culvert section, and (b) a 17.5 foot diameter horseshoe-shaped rock tunnel. The box culvert section will run approximately 1,700 linear feet downstream from the intake structure near its beginning on Fenimore Road. After a relatively short (100-foot) transition section near Stanley Avenue, the horseshoe shaped tunnel runs for about 1,800 linear feet to just south of U.S.1 (Boston Post Road). The proposed outlet structure includes a 45-foot-wide, 137-foot-long energy dissipating stilling basin. Some realignment of the moorings and floating docks within the boat basin is anticipated.

Sheldrake River. Some channel work is also designed for the lower Sheldrake River. The existing channels between Fenimore Road and the confluence area (at Columbus Park) will be modified and maintained in order to handle local drainage (a total length of about 2,900 feet). The existing channels would be filled an average depth of one (1) foot as well as re-graded for improved drainage. Upstream of Fenimore Road, the existing channels would be deepened with an average two-foot cut (not including the 1.5 feet deep low-flow pilot channel). For the river sections located

upstream of Fenimore Road, the existing channels would be modified to a bottom width of forty (40) feet (from the existing 25-30 foot width). The upstream limit of the project for the Sheldrake River (northwest) is located at the Rockland Avenue bridge (a total length of 1,650 feet).

c. Authority: The cited flood control project was recently authorized by Title IV, Section 401 of the Water Resources Development Act of 1986, PL 99-662 (H.R.6).

d. General Description of Dredged or Fill Material

(1) Characteristics of Material:

The excavated material would consist primarily of native soils and sand, as well as various clay, silt, sand and gravel mixtures. Approximately 60 to 80 percent is considered sand or gravel type mixtures (for the upper layers of the modified channel areas).

(2) Quantity of Material:

- (a) Compacted fill and concrete: about 140,000 cubic yards.
- (b) Excavated material: (river channels) about 290,000 cubic yards. (c) Excavated material: (tunnel) about 100,000 cubic yards.
- (d) Dredged material: (Harbor) about 3,000 to 5,000 cubic yards.
- (e) Riprap: about 20,000 cubic yards.
- (f) Crushed stone and bedding: about 7,000 to 10,000 cubic yards.
- (g) Riprap, crushed stone and bedding: about 15,000 cubic yards (within the water surface, below the annual high water levels).
- (h) Total Material: about 130,000 cubic yards (total new material to be placed in-stream, between steambanks below the 1 yr. high water levels, or mean high water at the harbor).

(3) Source of Materials:

Suitable excavated materials from the project or from commercial sources would be utilized.

e. Description of the Proposed Discharge Site

(1) Location: Project area as described in Ib, above.

(2) Size:

The riprap and crushed stone (fill material) would be placed along the stream bottoms and side slopes for a distance of approximately 4,700 linear feet within the streams. The Sheldrake River would be regraded and filled for a length of 2,900 feet. In addition, the modified Mamaroneck river would contain a 100-foot-long concrete bottom at a transition section and riprap, crushed stone and cement for the Sheldrake River diversion tunnel outlet structure at the boat basin. Also, during dredging a temporary turbidity plume may form. This is likely to happen particularly if a barge is used to transport dredged material, since overflow would occur during construction operations at boat basin.

(3) Type of Sites/Habitat:

The surface water classifications in the vicinity of the study area are class A at the upstream portions of the basin (eg. Larchmont No.1 & 2 reservoirs, and the Mamaroneck reservoir), class C at the freshwater sections located below the reservoirs and class I at the tidal section of the Mamaroneck River. The Mamaroneck Harbor area is class SB waters as designated by the State of New York Department of Environmental Conservation (NYDEC) (previously the freshwater sections of both rivers were classified as "D" streams except for the upstream reservoirs).

(4) Time and Duration of Disposal:

The construction works would be completed within an estimated 3 to 4 year period. The disposal date is unknown, but would likely proceed throughout the period of construction.

f. Description of Disposal Methods:

The proposed construction works would require the utilization of various types of equipment and may require draglines, backhoes, bulldozers, and trucks or similar equipment, depending upon the construction methods selected by the contractor(s). Dredging within the harbor would be by clamshell or dragline equipment, depending upon the construction methods selected by the contractor(s). Excess or unsuitable excavated materials would be disposed at approved upland sites not subject to Section 404 of the Clean Water Act. It should be noted that the small amount of material to be dredged from the West Boat Basin may be disposed within an approved Long Island Sound site (refer to PN No. 13468).

II FACTUAL DETERMINATIONS

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope:

Elevation varies. Slope is gradual.

(2) Sediment Type:

While the fill material would be crushed stone, riprap, concrete, etc., onto a sand/gravel/silt bottom habitat, approximately one-fourth to one-half of the stream channels have been altered by past channel modifications or wall construction (primarily N.Y. Thruway construction).

(3) Dredged/Fill Material Movement:

No significant effect (minor short-term movement).

(4) Physical Effects on Benthos:

Some benthic forms will be smothered by burial. Long-term effects are not anticipated.

(5) Other Effects:

Where needed and utilized, riprap and crushed stone would minimize erosion and scouring within the streams.

(6) Actions Taken to Minimize Impacts:

Riprap and concrete would prevent erosion or scouring at the tunnel outfall area (boat basin).

b. Water Circulation, Fluctuation and Salinity Determinations

(1) Water. Consider effects on:

(a) Salinity - At the streams, not applicable (N/A). At the harbor, minimal effects are anticipated.

(b) Water Chemistry (pH, etc.) - No significant effects. (c) Clarity - Temporary increases in turbidity during excavation/dredging. Also, potentially, temporary increases due

- to barge - filling (overflow).
- (d) Color - Possible minor short-term change.
 - (e) Odor - Not measurable (with insufficient flows, some problems may occur at the lower diverted sections of the Shelldrake River).
 - (f) Taste - Not measurable.
 - (g) Dissolved Gas Levels - potential short-term variations due to turbulence caused by excavations/dredging activities.
 - (h) Nutrients - Potential short-term increase.
 - (i) Eutrophication - N/A.
 - (j) Others as Appropriate - N/A.

(2) Current Pattern and Circulation:

- (a) Current Pattern and Flow - Channel improvements will make current more uniform in those regions where improvements are located. An analysis performed by the Waterways Experiment Station (West Basin, Mamaroneck Harbor Sedimentation Study 1986) indicated that there will be no significant shoaling or scouring problems, due to project actions, in the West Basin.
- (b) Velocity - No significant effects (due to discharge). The average rate of flow at the tunnel exit is 8.3 cubic feet per second (cfs).
- (c) Stratification - N/A.
- (d) Hydrologic Regime - No significant effects due to fill placement.

(3) Normal Water Level Fluctuations:

Streambanks would be modified. The project area would experience flood damage reductions up to the design level.

(4) Salinity Gradients:

Minor impacts at the harbor. No impacts for the upstream project sections.

(5) Actions that will be Taken to Minimize Impacts:

N/A.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site:

Temporary increases in turbidity due to barge overflow (if barges are utilized for disposal) and excavation/dredging activities. Temporary increases in turbidity due to runoff from exposed streambanks and fill placement.

(2) Effects on Chemical and Physical Properties of the Water Water Column:

- (a) Light Penetration - Within the streams, due to the shallowness of the water and the short duration of the discharge, there will be no significant reduction in light penetration. Within the harbor area, where limited dredging will occur, minor impacts are anticipated.
- (b) Dissolved Oxygen - No adverse effects.
- (c) Toxic Metals and Organics - No adverse effects.
- (d) Pathogens - N/A.
- (e) Aesthetics - Temporary increase in turbidity.
- (f) Others as Appropriate - N/A.

(3) Effects on Biota:

- (a) Primary Production, Photosynthesis - No significant effects.
- (b) Suspension/Filter Feeders - No significant effects.
- (c) Sight Feeders - Fishes and motile invertebrates generally can avoid or leave areas of degraded water quality; therefore, there will be no significant effects. Fill placement and the straightening of some channel sections will reduce the net aquatic habitat.

(4) Actions taken to Minimize Impacts:

Contractors will be required to utilize accepted turbidity-minimizing technology, such as hay bales and silt screens, should turbidity levels increase significantly during construction operations.

d. Contaminant Determinations

The fill material is not considered contaminated. If ocean disposal is needed for the about 3,000 to 5,000 cubic yards of dredged material to be removed from the harbor, then bioassay/bioaccumulation testing of the sediments to determine suitability for unrestricted ocean disposal would be conducted. At this time, no further testing would be needed, if the Long Island Sound Central Site were to be utilized - with "capping".

e. Aquatic Ecosystem and Organism Determinations:

- (1) Effects on Plankton/Nekton - There may be some blockage of gills among the nekton. Significant aquatic resources are not reported for the study area.
- (2) Effects on Benthos - Some benthic forms and the eggs and/or juveniles of nektonic species may be buried by silt and/or by fill placement.
- (3) Effects on Aquatic Food Web - A portion of the project area has been previously disturbed. Significant long-term adverse effects are not anticipated, since the project area resources, including stream cover, are limited.
- (4) Effects on Special Aquatic Sites:

- (a) Sanctuaries and Refuges - N/A.

- (b) Wetlands - Marginal habitat in study area. Minor impacts.
- (c) Mud Flats - Minor impacts.
- (d) Vegetated Shallows - N/A.
- (e) Coral Reefs - N/A.
- (f) Riffle and Pool Complexes - Minor impacts.

(5) Threatened and Endangered Species:

No Federal or State endangered or threatened species will be impacted.

(6) Other Wildlife: No significant effects.

(7) Actions to Minimize Impacts:

Depending upon the various locations mitigative in-stream structures include: a low flow pilot channel, boulder field, log dams, rock dams, and a pool formation (at the mouth of the Shelldrake).

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination: Because of the short-term duration of the effects, the vertical mixing zone is negligible. The extent of the horizontal mixing would depend on factors such as volume (discharge), and water flow and bottom topography.

(2) Determination of Compliance with Applicable Water Quality Standards: The NY State Department of Environmental Conservation classifies this study area as "C" for riverine sections, and "SB" for the harbor. State water quality standards should not be exceeded by the proposed action.

(3) Potential Effects on Human Use Characteristic:

- (a) Municipal and Private Water Supply - N/A (these potential resources are located upstream of the project).
- (b) Recreational and Commercial Fisheries - No commercial fishery. Minimal adverse impacts to sports fishery.
- (c) Water Related Recreation - No significant effects.
- (d) Aesthetics - Natural setting of river and bay sections has been altered by man's past activities, as has the existing water quality.
- (e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves - No adverse effects.

g. Determination of Cumulative Effects on the Aquatic Ecosystem:

None anticipated. In general, the structural works would be constructed in an urbanized floodplain habitat. Most of the channel work would be done in degraded aquatic habitat areas. The fill materials generally would consist of riprap, crushed stone, native soils, or cement, other project effects would be temporary.

h. Determination of Secondary Effects on the Aquatic Ecosystem:

Significant effects are not anticipated.

III. FINDING OF COMPLIANCE OR NONCOMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. Several alternatives for the alleviation of the flooding problems in the study area were considered. There are no practicable alternatives under the jurisdiction of section 404 (b)(1) guidelines (see FEIS Section 6).

c. The proposed action does not appear to violate applicable State water quality standards or effluent standards.

d. The proposed dredged material placement will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

e. The proposal will have no adverse impact on endangered species or their critical habitats (Endangered Species Act of 1973).

f. The proposal will have no impact on marine sanctuaries designated by the Marine Protection, Research, and Sanctuaries Act of 1972.

g. The proposed discharge of dredged material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values will not occur.

h. Appropriate steps to minimize potential adverse impacts of the discharge on aquatic systems include good engineering practices and use of clean fill material.

i. On the basis of the guidelines, the proposed discharge site for dredged or fill material is specified as complying with the requirements of these guidelines.



**US Army Corps
of Engineers**
New York District
26 Federal Plaza
New York, N.Y. 10278
ATTN:

Public Notice

In replying refer to:

Public Notice No. 13468

Published: 13 OCT 88 Expires: 14 NOV 88

TO WHOM IT MAY CONCERN:

Pursuant to Section 313 (33 U.S.C. 1323) and 404 (33 U.S.C. 1344) of the Clean Water Act (86 Stat. 816, P.L. 92-500), as appropriate, notice is hereby given that the U.S. Army Engineer District, New York, proposes to excavate and place fill in the Mamaroneck and Sheldrake Rivers and dispose of the excavated material on the upland for the Mamaroneck and Sheldrake Flood Control Project, Mamaroneck, New York.

In addition a minor amount of material will be dredged from the West Basin of Mamaroneck Harbor and may be disposed at an approved ocean site. For this material, the Central Long Island Sound disposal site is the preferred alternative.

AUTHORIZATION

The study along the Mamaroneck and Sheldrake Rivers in the Village of Mamaroneck, New York was authorized under resolutions adopted 14 September 1955 and 14 November 1955 by the United States Senate Committee on Public Works, and resolution adopted 13 June 1956 by the United States House of Representatives Committee on Public Works. The project recommended by the Corps as a result of studies under these resolutions was authorized for construction by Section 401(a) of the Water Resources Development Act of 1986 (Public Law 99-662, 99th Congress, 2nd Session), adopted 17 November 1986.

DESCRIPTION OF AUTHORIZED PROJECT

The plan of protection recommended in the Feasibility Report and authorized by the WRDA of 1986 is described in the Report of the Chief of Engineers, dated 4 April 1979.

This plan provides for modifying approximately 10,000 feet of river channel, constructing about 3,700 feet of retaining walls, replacing four bridges, and building interior drainage works on the Mamaroneck River. On the Sheldrake River, modifications include a diversion tunnel about 3,000 feet in length from its inlet at Fenimore Road to the west basin of Mamaroneck Harbor, channel modification along approximately 2,700 feet, a retaining wall for about 1,700 feet, and a levee about 1,000 feet long.

The recommended plan was designed to protect against a 200-year flood event along the Mamaroneck River from Tompkins Avenue upstream to the New England Thruway, and against a 100 year flood upstream of the

New England Thruway to the Westchester County Joint Waterworks Dam. The protection along the Sheldrake River is designed to protect against a 200-year flood event, and extends from the New England Thruway downstream of the waterways confluence with the Mamaroneck River in Columbus Park.

DESCRIPTION OF POST-AUTHORIZATION CHANGE

In general some design refinements and enhancements have been incorporated into the plan of improvement to provide a better engineered plan and cost efficiencies, but these are minor and will not alter the scope of the project.

Due to further refined investigations which have identified increased with-project design flows on both the Mamaroneck and Sheldrake Rivers, the following design refinements were incorporated:

(1) Mamaroneck River:

- (a) The Tompkins Avenue Bridge will be replaced.
- (b) The channel width increases from 45 feet to 50 feet between Jefferson Avenue (Stat. 50+00) and New Barry Avenue (Stat. 68+00).
- (c) Additional riprap in selected locations for bank protection.
- (d) The existing Valley Place sewer bridge will be replaced.

(2) Lower Sheldrake River:

- (a) The tunnel size increased from the 15' x 15' box culvert to a 16.25' x 16.25' box culvert, and from a 15.5' diameter circular tunnel section to a 17.5' diameter horseshoe shape.
- (b) Additional riprap for bank protection.
- (c) The lower Sheldrake River between Fenimore Road and its confluence with the Mamaroneck River is to be regraded for drainage and lined with topsoil and seeded fill and a small concrete weir would be placed in Columbus Park to better provide maintenance of local drainage and to maintain aquatic resources.

(3) Upper Sheldrake River between Rockland Avenue and the New England Thruway:

- (a) Levees and associated interior drainage are deleted from the plan of improvement since they are no longer necessary to provide a high degree of protection.
- (b) Due to the identification of a concrete bridge bottom

widening is deleted from the plan of improvement to reduce excessively high costs. Clearing and snagging has been substituted in this reach extending to the Larchmont Gardens Dam for an additional length of 700 feet.

DESCRIPTION OF CURRENT PROJECT

The recommended flood protection plan, located within the Mamaroneck and Sheldrake Rivers basin, includes the following features: channel work, retaining walls, sheet piling, channel realignment, removing existing fencing and walls, relocation of existing utilities (sewer lines, light boxes, etc.), the replacement or the removal of several bridges, and the placement of fill or riprap in the rivers and harbor. A diversion tunnel is proposed to redirect the lower Sheldrake River (downstream of Fenimore Road bridge) which will transfer the flows into the West Basin of Mamaroneck Harbor.

Mamaroneck River. The proposed channel work for the Mamaroneck River extends from 200 feet upstream of (east) Boston Post Road for 10,000 feet upstream (northeast) in the vicinity of Winfield Avenue. The existing bottom channel width is about thirty (30) feet throughout the project area. The area from the mouth of Mamaroneck Harbor upstream to Jefferson Avenue will be widened to an average bottom width of sixty (60) feet, while to the north of this point and throughout the rest of the modified Mamaroneck River the bottom width of the modified channels will be fifty (50) feet to New Barry Road and forty-five (45) feet to project limits in the vicinity of Winfield Avenue. The average channel cut will be 3.4 feet. Upstream of the New York Thruway (3,200 feet) the modified channels will be trapezoidal. From the lower limit of the project to the Thruway (7,000 feet) half will be trapezoidal and half will be semitrapezoidal or rectangular. Five bridges and a utility crossing will be replaced and the Winfield Avenue Bridge will be removed.

Sheldrake River-Tunnel. The proposed tunnel work will be constructed so that the flow of the Sheldrake River at Fenimore Road will be diverted into the 3,600-foot-long tunnel. The diverted waters will discharge into the West Basin of the Mamaroneck Harbor. The tunnel will follow the east side of Fenimore Road and will consist of two parts: (a) a 16.25-foot-square box culvert section, and (b) a 17.5 foot diameter U.S.B.R. horseshoe-shaped rock tunnel. The box culvert section of the tunnel will run approximately 1625 linear feet in length from the 160-foot long intake structure near its beginning at Fenimore Road. After a relatively short (108-foot) tunnel transition section near Stanley Avenue, the tunnel continues with a horseshoe shape and runs for 1,817 linear feet to just south of U.S.1 (Boston Post Road). The proposed outlet structure ranges from 17.5 to 45 feet in width and provides for a 212-foot-long energy dissipating stilling basin which extends 100 feet into the West Basin Mamaroneck Harbor. Some realignment of the moorings and floating docks within the boat basin is anticipated.

Sheldrake River-Channel Modification. Some channel work is also designed for the lower Sheldrake River and 1300 feet between the tunnel intake structure and Rockland Avenue. The existing channels between Fenimore Road and the confluence area (at Columbus Park) will be regraded and maintained in order to handle local drainage (a total length of about 2,900 feet). The existing channels would be filled an average depth of one (1) foot as well as regraded for improved drainage. Upstream of Fenimore Road, the existing channels will be deepened with an average two-foot cut (not including the 1.5 feet deep low-flow pilot channel) and the existing channel bottom will be modified and widened to forty (40) feet (from the existing 25-30 foot width). The upstream limit of the channel cut for the Sheldrake River (northwest) is located at the Rockland Avenue Bridge. Clearing and snagging will be done from Rockland Avenue to the Larchmont Gardens Lake.

General Description of Dredged or Fill Material

(1) Characteristics of Material:

The excavated material will consist primarily of native soils: sand, as well as various clay, silt, sand and gravel mixtures and rock. Approximately 60 to 80 percent is considered sand or gravel type mixtures (for the upper layers of the modified channel areas).

(2) Quantity of Material:

- (a) Compacted fill and concrete: about 140,000 cubic yards.
- (b) Excavated material: (river channels) about 290,000 cubic yards.
- (c) Excavated material: (tunnel) about 100,000 cubic yards.
- (d) Dredged material: (Harbor) about 3,000 to 5,000 cubic yards.
- (e) Riprap: about 20,000 cubic yards.
- (f) Crushed stone and bedding: about 7,000 cubic yards.
- (g) Riprap, crushed stone and bedding: about 15,000 cubic yards (within the water surface, below the annual high water levels).
- (h) Total Material: about 130,000 cubic yards (total new material to be placed in-stream, between streambanks below the 1 yr. high water levels, or mean high water at the harbor).

(3) Source of Materials:

Suitable excavated materials from the project or from commercial sources will be utilized.

Description of the Proposed Discharge Site

(1) Location: Project area as described in "DESCRIPTION OF AUTHORIZED PROJECT" above.

(2) Size:

The riprap and crushed stone will be placed along the stream bottom and side slopes for a distance of approximately 4,700 linear feet along the Mamaroneck & Sheldrake Rivers. The Sheldrake River will be regraded and filled for a length of 2,900 feet. The modified Mamaroneck River will be also lined with a concrete bottom in the vicinity of Halstead Avenue. The Sheldrake River diversion tunnel outlet structure at the boat basin will also be lined with riprap.

During dredging in the West Basin (3,000 - 5,000 c.y.) a minor temporary turbidity plume may form due to disruption of bottom sediments. This is likely to happen particularly if a barge is used to transport dredged material, since some overflow might occur during construction operations in the West Basin.

(3) Type of Sites/Habitat:

The surface water classifications in the vicinity of the study area are class A at the upstream portions of the basin (eg. Larchmont No. 1 & 2 reservoirs, and the Mamaroneck reservoir), class C at the freshwater sections located below the reservoirs and class I at the tidal section of the Mamaroneck River. The Mamaroneck Harbor area is class SB waters as designated by the State of New York Department of Environmental Conservation (NYDEC) (previously the freshwater sections of both rivers were classified as "D" streams except for the upstream reservoirs).

(4) Time and Duration of Disposal:

The construction works will be completed within an estimated 3 to 4 year period. The disposal date is unknown, but is likely to proceed throughout the period of construction.

Description of Disposal Methods

The proposed construction works would require the utilization of various types of equipment and may require draglines, backhoes, bulldozers, and trucks or similar equipment, depending upon the construction methods selected by the contractor(s). Dredging within the harbor would be by clamshell or dragline equipment, depending upon the construction methods selected by the contractor(s). All excess or unsuitable excavated materials is proposed to be disposed at approved upland sites not subject to Section 404 of the Clean Water Act.

PRELIMINARY SECTION 404(B) (1) EVALUATION

An analysis and evaluation of the impacts of the proposed action with respect to the environment and with respect to Section 404 activities was performed. A draft Section 404 (b) (1) Evaluation Report was prepared in accordance with criteria in ER 1105-2-2, 1105-2-50, 40 CFR 230, and other applicable Corps of Engineers regulations which provide guidance on planning and evaluating Corps' projects. The Final Environmental Impact Statement was filed with the U.S. EPA on 3 April 1981. On the basis of the subject 404 (b) (1) evaluation, it was concluded that the proposed project changes would not result in significant adverse long-term effects on the environment. In general, the relatively high development of the study area, along with the relatively limited environmental resources known to exist within the confines of the project from both a water quality and fish and wildlife viewpoint, were the major factors in the determination of no significant impact. In addition, it should be noted that by letters dated August 6, 1979 and May 4, 1983 the New York State Department of Environmental Conservation has waived water quality certification, pursuant to Section 401(a) of the Clean Water Act.

DISPOSAL SITE:

The dredged material (from the harbor) will be transported by dump scows to either CLIS or the Mud Dump site and deposited using the bottom dumping process (if no new feasible upland sites are identified prior to project construction).

The CLIS disposal site is an area of approximately 2.0 square nautical miles with existing depths varying from 49 to 75 feet below mean low water, and having center coordinates located at:

<u>LATITUDE</u>	<u>LONGITUDE</u>
41° 08.95'N	72° 52.85'W

This site has been used for disposal of dredged material since the mid 1960's and it is estimated that approximately 20,146,000 cubic yards of material have been dumped at the site. The Corps of Engineers, New England Division conducts surveillance of the disposal activities at this Central Long Island Sound disposal site (See Figure 6).

The Mud Dump Site in the Atlantic Ocean as designated by the U.S. Environmental Protection Agency (USEPA), is shown on Figure 7. The Mud Dump Site has an area of 2 square miles and an average depth of 66 ft., having its corner points located at:

<u>LATITUDE</u>	<u>LONGITUDE</u>
40° 23' 48" North	73° 51' 28" West
40° 21' 48" North	73° 50' 00" West
40° 21' 48" North	73° 51' 28" West
40° 23' 48" North	73° 50' 00" West

This site has been used for the disposal of dredged material since 1914 and has disposal depths within the site ranging from 50 to 100 ft. below mean low water. The U.S. Coast Guard conducts surveillance of ocean dumping at the Mud Dump Site. It is estimated that since 1960 approximately 7.9 million cubic yards of material was dumped annually at the present disposal site. The disposal of dredged material has created a mound of sediment at the site which, between 1936 and 1973, has resulted in an accumulation of about 44 ft. of material.

ALTERNATIVES TO THE PROPOSED DISPOSAL ACTION:

a. Dredging - The only alternative to dredging is the no dredge alternative. Dredging is one of the structural features necessary for the construction of this authorized flood control project and can not be avoided.

b. Ocean Disposal - As stated in the Criteria (40 CFR 227.16(b)) "...alternative methods of disposal are practicable when they are available at reasonable incremental cost and energy expenditures which need not be competitive with the costs of ocean dumping, taking into account the environmental benefits derived from such activity, including the relative adverse environmental impacts associated with

the use of alternatives to ocean dumping..." The New York District has evaluated the practicability of potential disposal alternatives in a report entitled "Dredged Material Disposal within the New York District." The alternatives considered include land disposal, use as sanitary land fill cover, disposal in subaqueous borrow pits (and possible capping with clean material), creation of islands and/or wetlands, disposal on beaches or wetland transport and placement in deep mines, and incineration. Of these, only land disposal is considered a potential viable alternative at the present time for the particular material proposed for disposal. However, no suitable local sites have been identified for the 3,000 to 5,000 cubic yards of material from the West Basin.

The New York District contacted the State of Connecticut, the State of New York and also the Army Corps of Engineers, New England Division, with the intention of using the CLIS for disposal of the dredged material, as the preferred alternative.

COORDINATION

This public notice is being coordinated with Federal, State, and local agencies which include the following:

Federal Agencies

- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- U.S. Coast Guard
- U.S. Department of Commerce
- National Marine Fisheries Service

State of New York Agencies

Department of Environmental Conservation

State of Connecticut

Department of Environmental Protection

Local Agencies

- | | |
|--------------------------------|----------------------|
| County of Westchester | Village of Larchmont |
| Village of Mamaroneck | Town of Harrison |
| Town of Mamaroneck | Town of Rye |
| New Haven Railroad | Town of Scarsdale |
| Westchester County Water Works | City of New Rochelle |
| | City of Rye |

Pursuant to Section 7 of the Endangered Species Act (16 U. S. C. 1531) and based upon review of the latest published version of the threatened and endangered species listing, a preliminary determination is that the activity under consideration will not affect those species listed or their critical habitat.

Based upon a review of the latest published version of the National Register of Historic Places, there are no known sites eligible for or included in the Register within the surrounding area. Presently unknown archaeological, scientific, prehistorical or historical data may be lost by work accomplished under the required dredging.

The evaluation of the impact of the activity will include application of the guidelines promulgated by the Administrator, U.S. Environmental Protection Agency, under authority of Section 404(b) of the Clean Water Act.

A Water Quality Certificate of waiver has been obtained from the New York State Department of Environmental Conservation in accordance with Section 401 of the Clean Water Act. A Water Quality Certificate of waiver will be obtained from the Connecticut Department of Environmental Protection prior to the beginning of the proposed disposal action.

Since this activity is located within the coastal zone of the States of New York and Connecticut which have a federally approved coastal zone management program, New York District has requested the State of New York Department of State and Connecticut Department of Environmental Protection for certification that the proposed action will be conducted in a manner that is consistent with the approved state coastal zone management program. Reference is made to Section 307(c) of the Coastal Zone Management Act of 1972 as amended (16 U.S.C. 1456(c)). By this public notice, we are requesting the States' concurrence with, objection to, or waiver of this certification.

Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearing shall state, with particularity, the reasons for holding a public hearing.

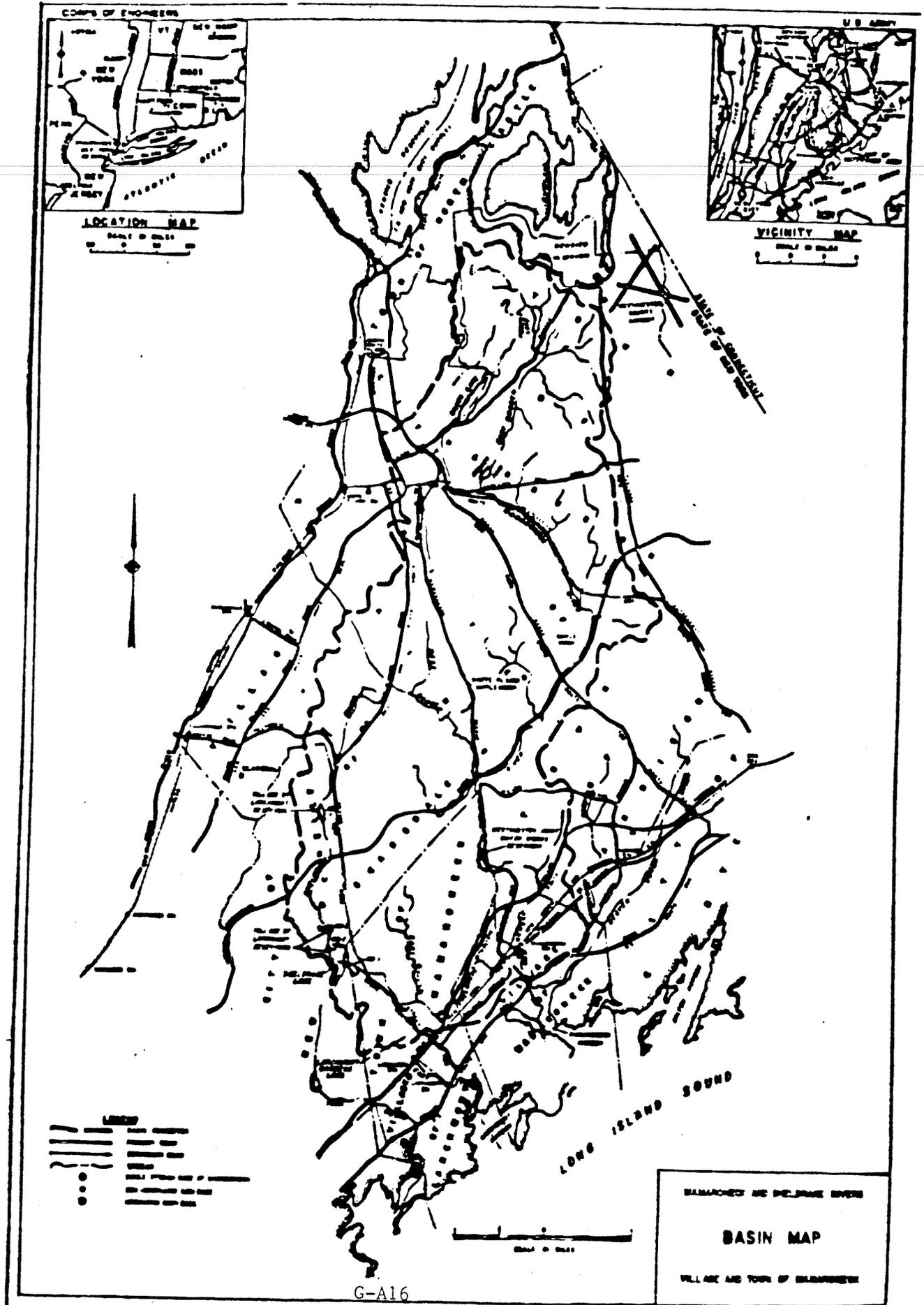
Any criticisms or protests regarding the proposed work should be PREPARED IN WRITING AND MAILED TO REACH THIS OFFICE prior to November 14, 1988 otherwise it will be presumed that there are no objections.

It is requested that you communicate the foregoing information concerning the proposed work to any persons known by you to be interested and who did not receive a copy of this notice.

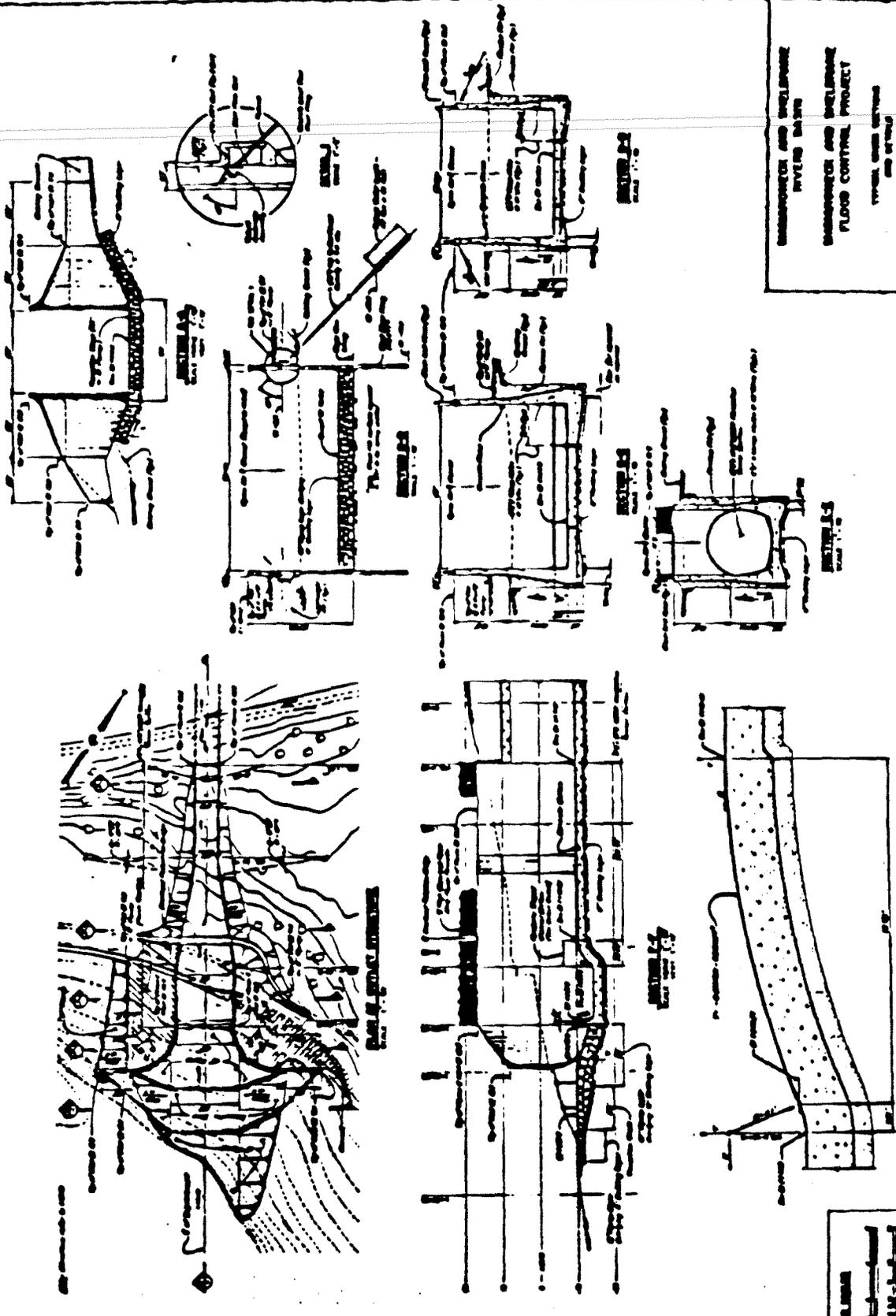
If you have any questions concerning this proposal, please contact Mr. Peter Doukas of this office, Telephone No. (212) 264-1275.

Marion L. Caldwell
Colonel, Corps of Engineers
District Engineer

Enclosure



G-A16
Figure 1 of 8

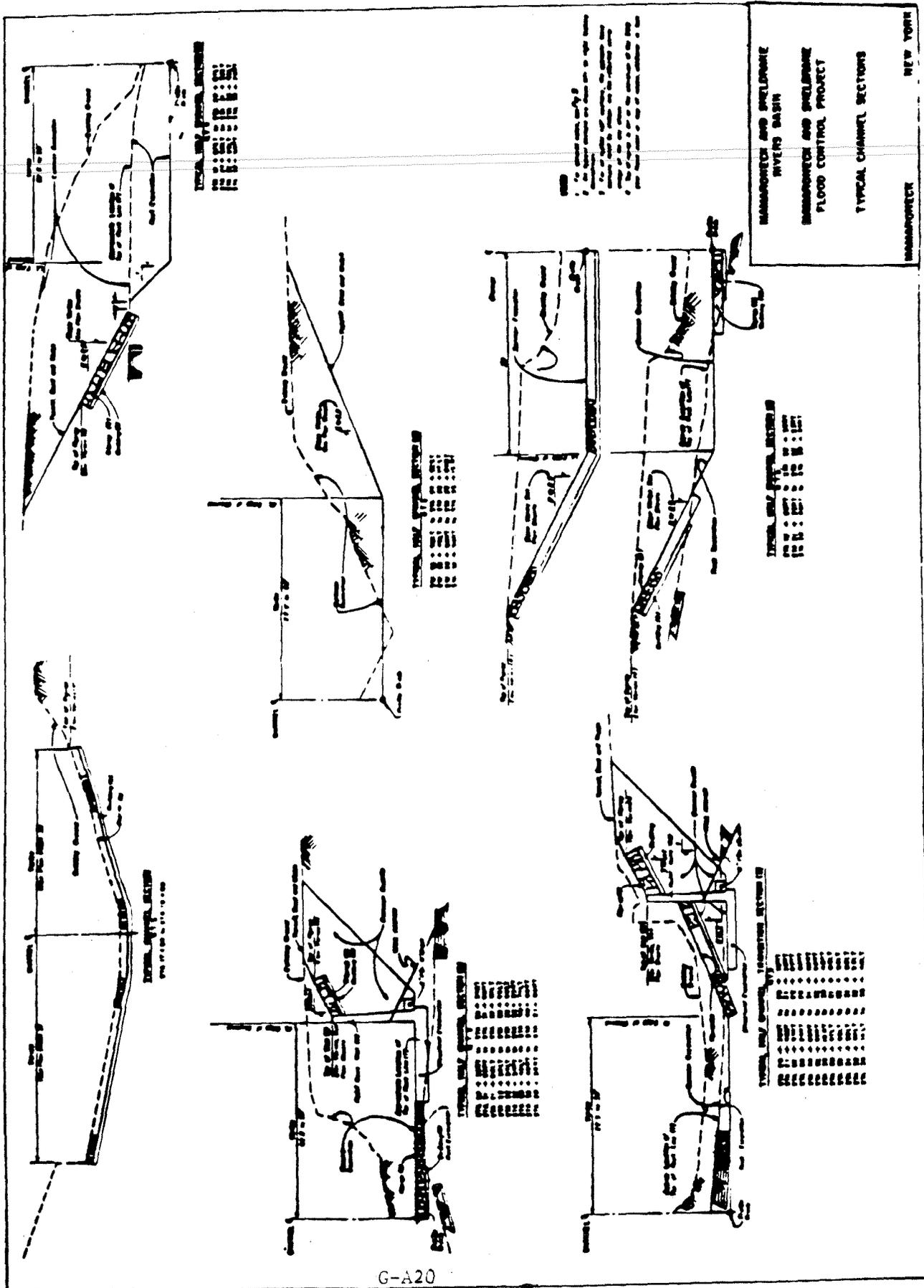


SECTION 1-1
 SECTION 2-2
 SECTION 3-3
 SECTION 4-4
 SECTION 5-5
 SECTION 6-6
 SECTION 7-7
 SECTION 8-8

SECTION 1-1
 SECTION 2-2
 SECTION 3-3
 SECTION 4-4
 SECTION 5-5
 SECTION 6-6
 SECTION 7-7
 SECTION 8-8

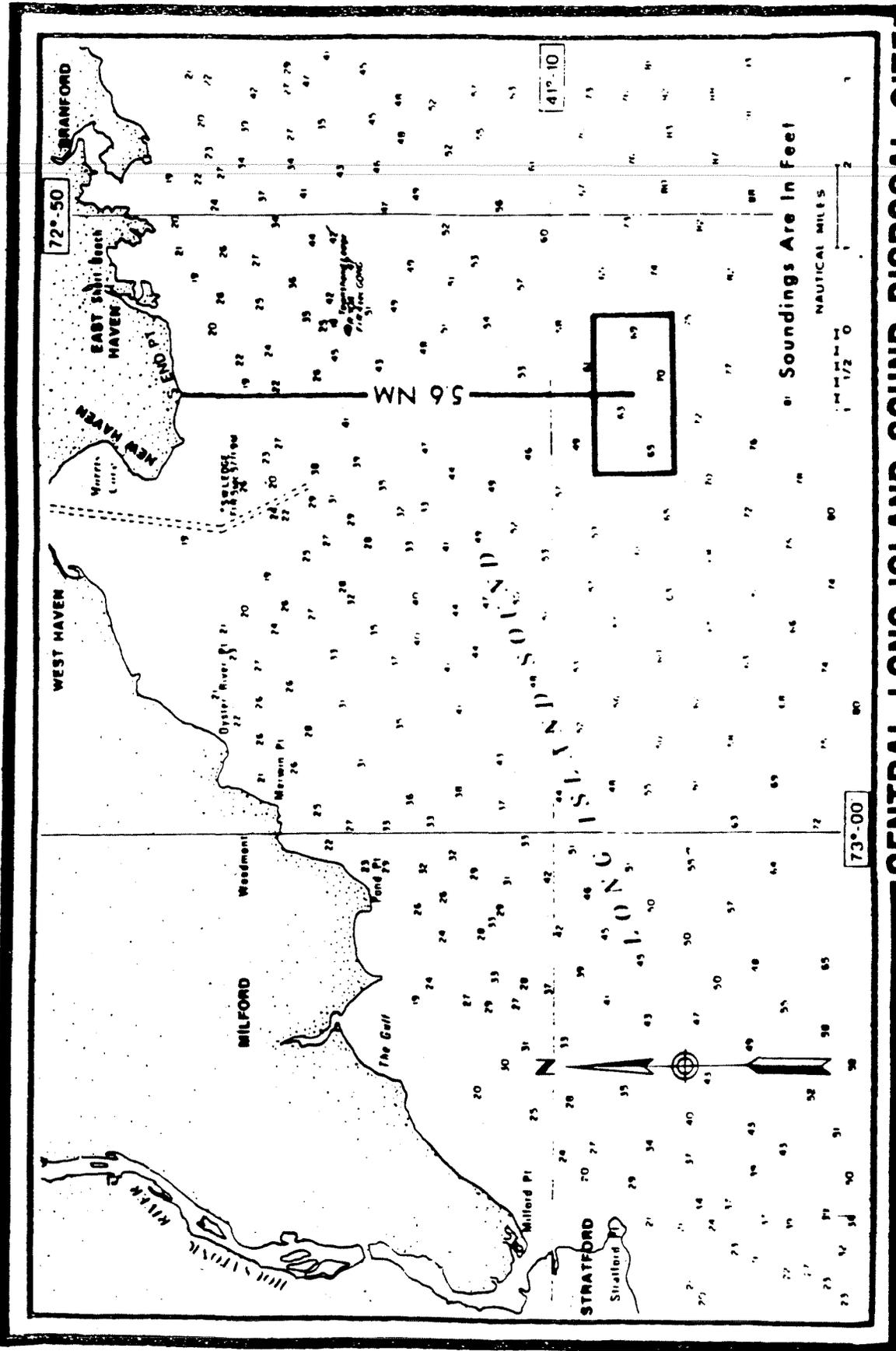
G-A19

Figure 4 of 8



G-A20

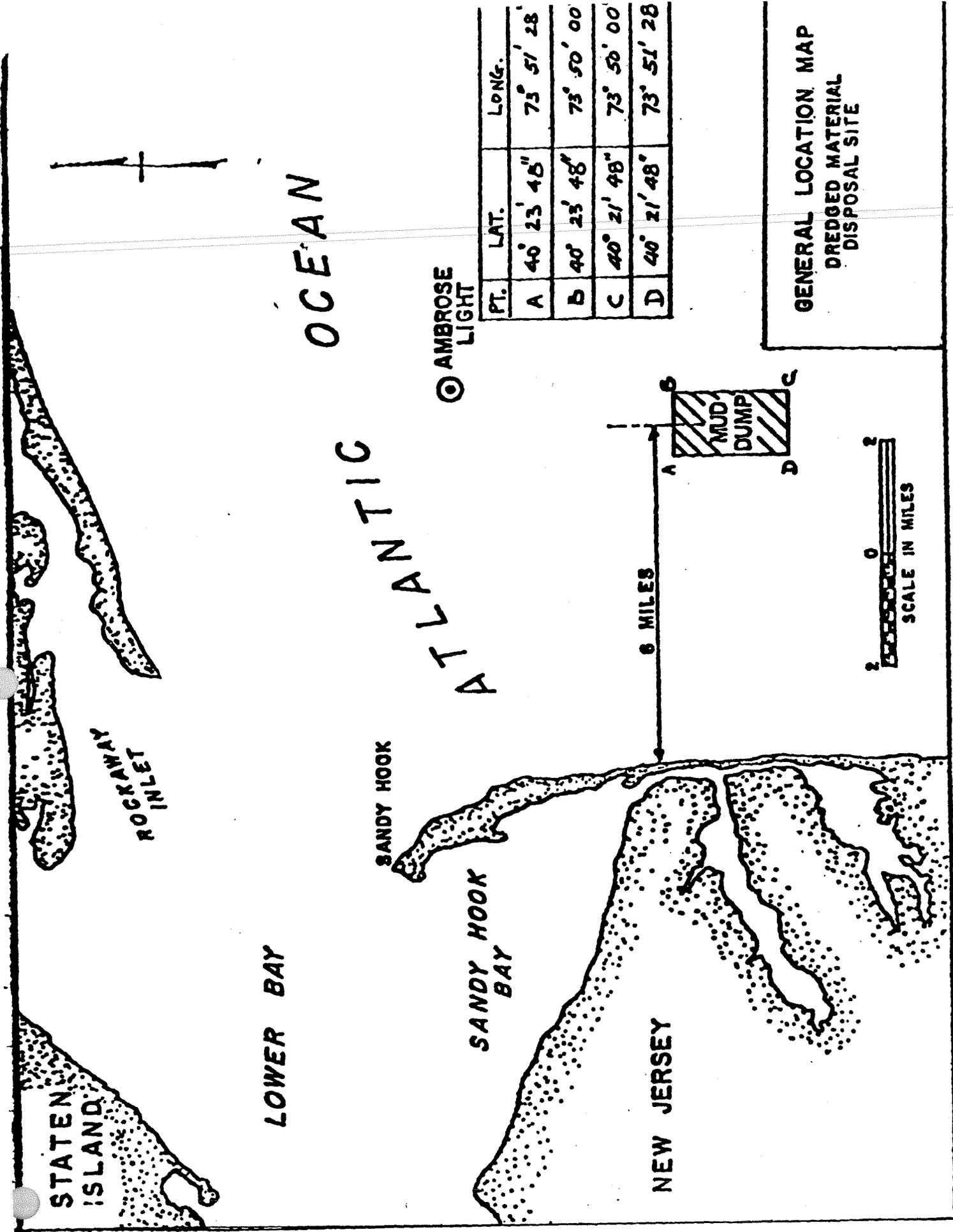
Figure 5 of 8



CENTRAL LONG ISLAND SOUND DISPOSAL SITE

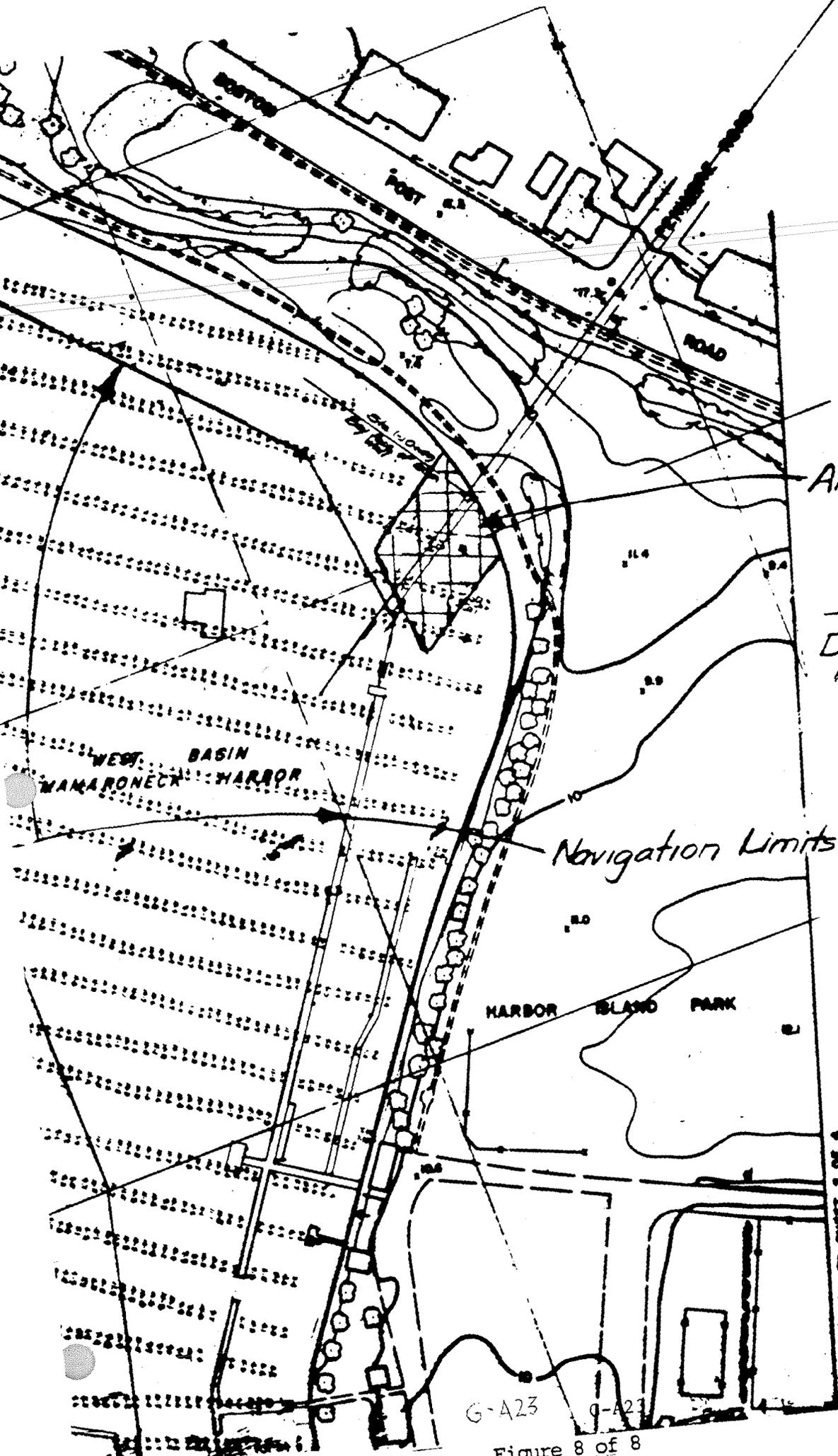
Description. This site is 2 nautical miles long by 1 nautical mile wide with the major axis running true east-west and center at 41° 08 95' N latitude and 72° 52.85' W longitude. From the center, Southwest Ledge Light bears true 345° at 10,750 yards and Townshend Ledge Lighted Gong Buoy No. "10-A" bears true 13° at 7,400 yards. This site is approximately 5.6 nautical miles off South End Point, East Haven. Depth Range: 49-75 feet MLW. The authorized disposal point (within the overall disposal area) is specified for each dredging project in other project documents.

NOTE: The map depicts the disposal site's location in relation to landmarks. It is not intended for use in navigation.



G-A22

Figure 7 of 8



Area to be Dredged

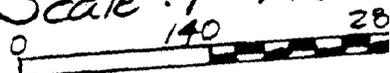
LEGEND

Dredge Area 

Navigation Limits

Note: elevation refer to NGVD datum

Scale: 1" = 140'



G-A23 Q-A23

Figure 8 of 8

29 NOV 1988

Planning Division

SUBJECT: Public Notice No. 13468 - Mamaroneck and
Sheldrake Rivers Flood Control Project.

Mr. Mario Del Vicario, Chief
Marine and Wetlands Protection Branch
U.S. Environmental Protection Agency, Region II
26 Federal Plaza
New York, New York 10278

Dear Mr. Del Vicario:

The New York District, Corps of Engineers is presently planning a flood control project, which entails dredging approximately 5,000 cubic yards of material with disposal at the Central Long Island Sound (CLIS) Dump Site. A copy of Public Notice No. 13468, dated October 13, 1988, is enclosed for your information.

Your comments to the dredging aspect of the project are requested within thirty days. Since CLIS is located within the boundaries of USEPA Region I, their comments are being solicited for the disposal aspect of the project.

You may contact Mr. Peter Doukas of my staff at 212-264-1275 if you have any questions regarding this request.

Sincerely,

Richard Maraldo, P. E.
Acting Chief, Planning Division

Enclosure



United States Department of the Interior

FISH AND WILDLIFE SERVICE

P.O. Box 534
705 White Horse Pike
Absecon, New Jersey 08201
(609) 646-9310

January 4, 1989

Colonel Marion L. Caldwell, Jr.
District Engineer, New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

Dear Colonel Caldwell:

The U.S. Fish and Wildlife Service (Service) has reviewed Public Notice 13468, dated October 13, 1988. This notice advertises plans by the New York District, Corps of Engineers to excavate and place fill in the Mamaroneck and Sheldrake Rivers and dispose of the excavated material on an upland area for the Mamaroneck and Sheldrake Rivers Flood Control Project at the Town of Mamaroneck, Westchester County, New York. In addition, the project involves the dredging of approximately 5,000 cubic yards of material from the wet basin of Mamaroneck Harbor with disposal of dredged material at the Central Long Island Sound Disposal Site, as indicated in Mr. Maraldo's letter of November 29, 1988.

This constitutes the report of the Service in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401 as amended; 16 U.S.C. 661-667e) and is to be used in your determination of Section 404(b)(1) Guidelines compliance (40 CFR 230), and in your public interest review (33 CFR 320.4) in regard to the protection of fish and wildlife resources.

Long Island Sound is an ecologically important estuary located between the heavily populated areas of Long Island, New York City and Connecticut. The ecosystem of the Sound supports a variety of organisms. Recreational fishing is a major activity, seeking species such as bluefish (Pomatomus saltatrix), summer flounder (Paralichthys dentatus), and winter flounder (Pseudopleuronectes americanus). The Sound plays a vital function in the life history of these and many other organisms by providing spawning, nursery and feeding habitat. The American lobster (Homarus americanus) is a commercially important shellfish common in this estuary. This species also relies on the waters of the Sound to propagate young in a habitat suitable for continued survival. All of these finfish and shellfish produce young which are vulnerable to adverse environmental impacts associated with suspended sediments.

Long Island Sound provides high value estuarine habitat that is becoming scarce because of various man-induced perturbations and pollution inputs. Our goal for this habitat, in accordance with the Service's Mitigation Policy (Federal Register, Vol. 46, No. 15, January 13, 1981) is no net loss of in-kind habitat value.

G-A25

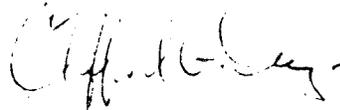
"TAKE PRIDE IN AMERICA"

Eggs and juvenile life stages of the aforementioned organisms are sensitive to increases in suspended sediments which can result in both sublethal and lethal impacts to species population levels. Potential impacts are avoidable by timing work outside the period when early life stage organisms are absent from the area. Therefore, to avoid potential adverse impacts on the aquatic organisms of Long Island Sound, the Service recommends that no dredging or disposal of dredged material be permitted from June 1 to September 30.

The New York District and the Service have been coordinating activities associated with this flood control project since 1978. Since that time, we have provided several reports on this project in accordance with Section 2(b) of the Fish and Wildlife Coordination Act. These reports have detailed measures to avoid/minimize impacts to fish and wildlife and their habitats. However, we note with considerable interest that recommended mitigation measures are not presented in the subject public notice. The Service continues to support the implementation of all mitigation measures previously recommended for this proposal.

Should you consider not incorporating these recommendations into the proposed actions, please contact Tom Sperry of my Long Island staff at 516-224-2683.

Sincerely,



Clifford G. Day
Supervisor



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

December 22, 1988

Marion L. Caldwell, Jr., Colonel
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, NY 10278

ATTN: Planning Division, PN No. 13468
Mamaroneck and Shelldrake Rivers Flood Control Project

Dear Colonel Caldwell;

We have reviewed your Public Notice (No. 13468) concerning the proposed Mararoneck and Sheldrake Rivers Flood Control Project. Approximately 5,000 cubic yards of material is proposed to be dredged from the West Basin of Mamaroneck Harbor with disposal at the Central Long Island Sound (CLIS) Dump Site.

As this project involves dredging in New York waters with disposal proposed to occur at the CLIS disposal sites which is in Connecticut waters, EPA Region 1 comments on the disposal portion of the project, while EPA Region 2 comments on the dredging and any associated development.

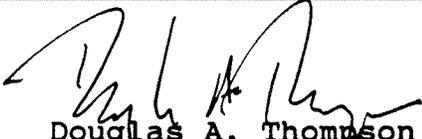
Based on our review of the bulk sediment chemistry, we conclude that the sediments are not acceptable for unconfined open water disposal at the CLIS disposal site. The concentration of PCB's (maximum concentration 4.0 ppm) and lead (maximum concentration 301 ppm) indicate the potential for adverse impacts to aquatic organisms at the disposal site. The Corps must further consider upland disposal alternatives for the dredged material.

If no upland disposal sites are available or practicable, the sediments would need to be capped at the CLIS disposal site to isolate the pollutants from biological availability. A specific capping plan would need to be coordinated with the New England Division of the Corps.

As usual a time of year restriction on the dredging and disposal from June 1 to September 30 of any year applies in order to avoid excessive adult and larval mortality of important commercial and recreational species due to increased turbidity.

If additional coordination is needed, please call Edward Reiner
of my staff at 617-565-4434 (FTS 835-4434).

Sincerely,



Douglas A. Thompson, Chief
Wetland Protection Section

cc: Steve Congdon, NEDACE, Waltham, MA
Janice Rollwagen, EPA, Region II, NY
Michael Ludwig, NMFS, Milford, CT
Ken Carr, USFWS, Concord, NH
Rick Huntley, CT DEP, Hartford, CT



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, NEW YORK 10278

JAN 26 1989

Richard Maraldo, P.E.
Acting Chief, Planning Division
New York District Corps of Engineers
26 Federal Plaza
New York, NY 10278

Dear Mr. Maraldo:

This is in response to your letter of December 1, 1988, with attached Public Notice for the Mamaroneck and Sheldrake Rivers Flood Control Project. Your letter requested our comments regarding the dredging aspects of the project. EPA Region 1 has provided comment regarding the dredged material disposal aspect of the project since disposal was proposed for the Central Long Island Sound (CLIS) dump site, which is in Region 1's jurisdiction.

Region 1 EPA has responded by letter of 22 December, 1988, that the Corps must further consider upland disposal alternatives or investigate capping at the CLIS site because of unacceptably high concentrations of PCB's and lead as shown in the bulk sediment chemistry tests. We requested from your office and received a copy of the laboratory testing results. After reviewing the test results, and as discussed with Mr. Peter Doukas of your staff, we recommend that barge overflow not be implemented as part of the dredging operations to minimize bioavailability of water-borne contaminated fine particles to fisheries and estuarine resources.

Should you have any questions regarding the above, please contact either me at 264-5170, or Mr. Alex Lechich of my staff at 264-5718.

Sincerely,

Mario Del Vicario, Chief
Marine & Wetlands Protection Branch

cc: D. Thompson, Chief, Wetlands Protection Section,
EPA Region 1
M. Ludwig, NMFS, Milford CT
K. Carr, USFWS, Concord, NH

G-A28(A)



STATE OF NEW YORK
DEPARTMENT OF STATE
ALBANY, N.Y. 12231-0001

GAIL S. SHAFFER
SECRETARY OF STATE

January 19, 1989

Mr. Richard J. Marald, P.E.
Acting Chief, Planning Division
New York District
U.S. Army Corps of Engineers
Jacob K. Javits Federal Office Building
New York, NY 10278-0090

Re: F-88-807
COE/NY - Dredging of West Basin
Anchorage Area/Mamaroneck Harbor

Dear Mr. Marald:

The Department of State has completed its review of the U.S. Army Corps of Engineers consistency determination with respect to the New York State Coastal Management Program, together with supporting documentation, for the above referenced project.

Based upon the project information submitted, the Department of State agrees with the U.S. Army Corps of Engineers consistency determination for this project.

Thank you for your cooperation in this matter.

Sincerely,

George R. Stafford

George R. Stafford
Director
Division of Coastal Resources
& Waterfront Revitalization

GRS:FMB:d1b

G-A28 (B)



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



COASTAL RESOURCES MANAGEMENT DIVISION

December 30, 1988

Mr. Richard J. Maraldo, P. E.
Acting Chief, Planning Division
New York District, Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

Re: Public Notice No. 13468 - Mamaroneck and Sheldrake Rivers
Flood Control Project

Dear Mr. Maraldo:

The Coastal Resources Management Division has reviewed your request for water quality certification and a consistency concurrence with Connecticut's approved coastal management program for the above referenced project. The proposed activities include the disposal at the Central Long Island Sound Disposal Site of 3,000-5,000 cubic yards of material to be dredged from the West Basin anchorage area of Mamaroneck Harbor, New York.

Our review indicates that all of the sediment associated with this project is contaminated with PCB's at levels exceeding the 1 ppm standard established in the Interim Plan for the Disposal of Dredged Material from Long Island Sound. As the environmental hazards associated with this organic compound are well documented, an analysis of feasible disposal alternatives to in-water disposal must be provided before we can process your request for certification. The information that should be contained in an analysis of alternatives for the PCB contaminated sediment is as follows:

1. On-site upland disposal - an analysis of upland disposal opportunities at the project site. If upland disposal is not possible at this site due to space constraints, provide the specific data that shows upland disposal is not feasible.
2. Off-site upland disposal - an analysis of off-site disposal opportunities in the vicinity of the project. This analysis may require contacting area towns to determine if there is any vacant land or development projects that could accommodate the dredged material.
3. Landfill disposal - an analysis of the availability of disposal opportunities at area landfills.

Because it is unlikely that you can provide the necessary data within the time limits imposed by regulations on the consistency certification process, and because we cannot concur with your certification without such data, we are considering

Phone: G-A29

165 Capitol Avenue Hartford, Connecticut 06106

An Equal Opportunity Employer

December 30, 1988

your certification withdrawn pending resubmission with the required data.

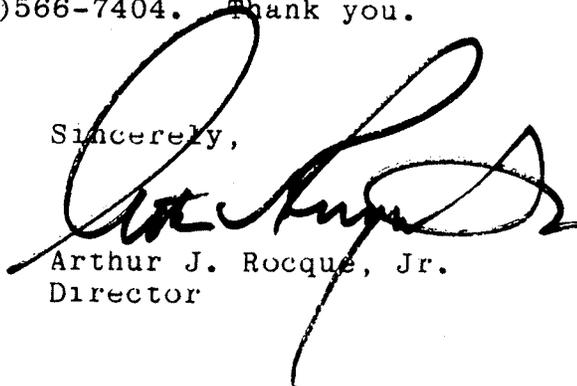
On a related matter, if your analysis indicates that open water disposal is the only feasible alternative and if this Division concurs with your analysis, then disposal at the Central Long Island Sound Disposal Site will require a cap of clean material to cover the PCB-contaminated sediment. Before disposal may occur, your agency must submit a capping plan to this Division. This plan will contain the following information:

1. The source of the clean cap material. In cases where the cap material will be derived from other permitted projects, provide signed concurrences of these permittees.
2. A schedule for capping. Generally, capping will begin within two weeks of the disposal of the contaminated sediment and will be completed within four weeks of commencement.

Note, that the capping to base sediment ratio ranges from 3:1 to 5:1 depending upon the degree of sediment contamination. It is our understanding that the New England Division of the Corps of Engineers has recommended a capping ratio of 3:1. However, Connecticut has not yet determined the appropriate cap ratio, as caps as large as 5:1 have been required for the disposal of PCB contaminated sediment at Central Long Island Sound. On or before the time that you have submitted the analysis of alternatives to open water disposal, the Division will notify you with regard to the volume of cap required.

If you have any questions in this regard, please contact Tom Ouellette of my staff at (203)566-7404. Thank you.

Sincerely,



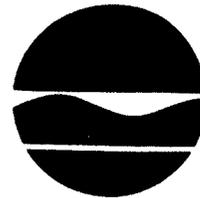
Arthur J. Rocque, Jr.
Director

AJR/RR/rr

cc: Steve Congdon, Corps Of Engineers, New England Division
Mike Ludwig, National Marine Fisheries Service

New York State Department of Environmental Conservation

21 South Putt Corners Road, New Paltz, NY 12561
914-255-5453



Thomas C. Jorling
Commissioner

November 9, 1988

Peter Doukas
U.S. Army Corps. of Engineers
New York District
26 Federal Plaza
New York, NY 10278

Dear Mr. Doukas:

After speaking to you on November 7 I have decided to write down some of my concerns relative to Public Notice No. 13468 which deals with the proposed Mamaroneck and Sheldrake Rivers flood control project. These concerns are as follows:

1. In reading the notice I saw no discussion of mitigation to address the damage which will be done to fish and wildlife habitat. Since concerns were expressed by the U.S. Fish and Wildlife (after consultation with NYS DEC) in 1984, mitigation measures being incorporated in this large project should be clearly spelled out.
2. On page 4 of the Notice, a statement appears that "The modified Manaroneck River will be also lined with a concrete bottom in the vicinity of Halstead Avenue." For what distance will the bottom be lined with concrete? If, as you indicated during our phone conversation, none of the bottom will be lined with concrete the Notice should be amended.
3. Figures 1-5 which are included in the Notice have unfortunately been reduced to the point that they are unintelligible. These figures show the location, scope and detail of the project. The notice should be amended and redistributed with a set of clear figures.

Given these concerns I believe that Public Notice 13468 should be amended and reissued, and that the November 14, 1988 deadline for public comment should be extended.

Thank you for this opportunity to comment on this project.

Sincerely,

Ronald Pierce
Senior Aquatic Biologist
Region 3

RP:sw

cc: K. Wich, NYS DEC, Albany, NY
L. Corin, USFWS, Cortland, NY
T. Sperry, USFWS, Islip, NY
C. Day, USFWS, Absecon, NY

G-A31



STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
ALBANY, N.Y. 12232

FRANKLIN E. WHITE
COMMISSIONER

November 10, 1988

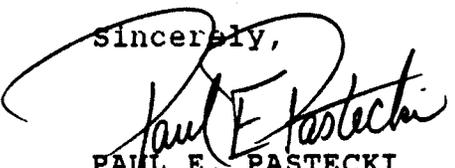
Mr. Peter Doukas
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, NY 10278

RE: PUBLIC NOTICE NO. 13468

Dear Mr. Doukas:

We have reviewed the Subject Public Notice No. 13468 for excavation and placement of fill in the Mamaroneck and Sheldrake Rivers and the disposal of excavated material for use with the Mamaroneck and Sheldrake flood control project in Mamaroneck, New York, and have no comment.

Sincerely,


PAUL E. PASTECKI
Commercial Transport Division

Attachment



New York State Office of Parks, Recreation and Historic Preservation

The Governor Nelson A. Rockefeller Empire State Plaza
Agency Building 1, Albany, New York 12238-0001

November 23, 1988

Mr. Richard J. Maraldo, P.E.
Acting Chief, Planning Division
Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
New York, New York 10278-0090

Dear Mr. Maraldo:

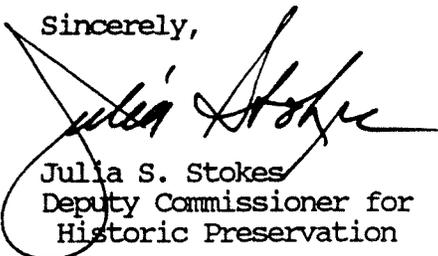
Re: ARMY
Flood Control on Sheldrake River
Mamaroneck, Westchester County

The State Historic Preservation Officer (SHPO) has reviewed the above project in accordance with Section 106 of the National Historic Preservation Act of 1966 and the Advisory Council on Historic Preservation's Regulations, 36 CFR 800/801.

Based upon this review, it is the opinion of the SHPO that this project will have no effect upon archeological resources included in or eligible for inclusion in the National Register of Historic Places.

If you have any questions, please contact the Project Review staff at (518) 474-3176.

Sincerely,



Julia S. Stokes
Deputy Commissioner for
Historic Preservation

JSS/VJD:tr
#15 (1/87)

G-A33



STATE OF NEW YORK
DEPARTMENT OF STATE
ALBANY, N.Y. 12231-0001

GAIL S. SHAFFER
SECRETARY OF STATE

December 6, 1988

Richard J. Marald, P.E.
Acting Chief, Planning Division
New York District
U.S. Army Corps of Engineers
Jacob K. Javits FOB
New York, New York 10278-0090

Re: F-88-807
Dredging of a portion of the West
Basin anchorage area in Mamaroneck
Harbor

Acknowledgement of Federal Consistency
Determination

Dear Mr. Marald:

This will acknowledge receipt on December 5, 1988 of the consistency determination with respect to the New York State Coastal Management Program, together with supporting documentation, for the above-referenced project. Pursuant to 15 CFR 930.41, the State's 45-day review period commenced as of that date.

The Department of State anticipates being able to advise you of the State's agreement or disagreement with the consistency determination on or before January 19, 1989.

Please call Larry Encoh (518) 474-3642 if you have any questions.

Sincerely,

A handwritten signature in cursive script, appearing to read "F.M. Bennett".

F.M. Bennett
Consistency Coordinator
Coastal Management Program

FMB:ng
cc: L. Enoch

G-A34



ANDREW P. O'ROURKE
County Executive

WILLIAM G. BORGHARD, P.E.
Commissioner
Department of Environmental Facilities

November 14, 1988

Department of the Army
New York District Corp of Engineers
26 Federal Plaza
New York, New York 10273
Attn: Peter Doukas

RE: Mamaroneck Sanitary Sewer District
Sheldrake Main Line Trunk Sewer
Valley Place 48" CIP Pipe Bridge
Mamaroneck/Sheldrake Flood Control Project
Public Notice No. 13468

Gentlemen:

The above captioned Public Notice alludes to the replacement of a utility crossing of the Mamaroneck River. We believe that this is the County of Westchester's Valley Place Pipe Bridge carrying the above captioned trunk sewer.

As you know, over the years this office has been reviewing and commenting on the proposals concerning the final disposition of this structure. To this end we have corresponded with both your office and that of your Consultants.

Our latest contact on the subject was a telephone conversation between the writer and Richard Gajcek, COE Project Engr., on January 15, 1988. Our understanding from that instance was that the "Siphon" scheme had been abandoned as we requested and that the Pipe Bridge was to be rebuilt in place so as not to disturb our facilities.

It would be reassuring if we could receive written confirmation that this is the case and that we will be given the opportunity to review your plans before they become final.

We thank you in advance for your cooperation.

Very Truly Yours,
Thomas J. Monahan
Thomas J. Monahan
Program Administrator

CC: Vito Sinopoli, Jr., P.E., Chief Engineer

G-A35



Town of Mamaroneck
Conservation Advisory Commission

740 West Boston Post Road
Mamaroneck, N. Y. 10543

November 7, 1988

Area Code 914

381-6133

U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, N.Y. 10278

RE: Mamaroneck-Sheldrake Flood Control Project

Dear Sirs :

The tri-municipal Conservation Advisory Commission (CAC) would like to express its deep concern over the proposed diversion tunnel of the Sheldrake River. We feel that it is not the optimal method to deal with the flooding problems and request that you consider other alternatives.

With our open space dwindling and Long Island Sound becoming more stressed, we question whether artificially enclosing a waterway would preserve the viability of the water. As you know, natural vegetation and organisms living in or near the water help to purify the water and improve its life-sustaining qualities. The abiotic factors of light and air are just as important in maintaining an ecologically healthy stream. Not only would fish and wildlife habitat be removed with the implementation of this proposal, but also the aesthetic benefits of a stream or river would be deleted.

We understand the seriousness of the flooding concerns and that some type of mitigation measure needs to be employed. The CAC would like to advocate the use of an overflow provision rather than an arbitrary diversion for the Sheldrake River; that is, we feel a system which provides a bypass route to handle excess water during times of storm would be more of an optimal method because it would allow for the preservation of the open stream as well as provide for the alleviation of flooding. We would also like to note that other related projects that are either in the works or being planned should be considered, such as automation of the valve at the Larchmont Reservoir and dredging of Gardens Lake. Together, these improvements may eliminate the need for drastic alterations.

We hope you give serious consideration to these comments. Thank you for your attention.

Very truly yours,

Robert I. Komitor
Robert I. Komitor
Chairman

G-A36

cc: Paul Noto, Mayor, Village of Mamaroneck
Paul Ryan, Village of Mamaroneck Coastal Zone Management Commission
Dolores Battalia, Supervisor, Town of Mamaroneck

**WESTCHESTER COUNTY STREAMS
MAMARONECK AND SHELDRAKE RIVERS
FLOOD CONTROL PROJECT
VILLAGE OF MAMARONECK**

GENERAL DESIGN MEMORANDUM

**APPENDIX H
ECONOMICS**

JANUARY 1989

STREAMS IN WESTCHESTER COUNTY, NEW YORK
GENERAL DESIGN MEMORANDUM FOR FLOOD CONTROL
MAMARONECK AND SHELDRAKE RIVERS BASINS, NEW YORK

APPENDIX H - FLOOD DAMAGES AND BENEFITS (ECONOMICS)

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
	I - INTRODUCTION	
H1	GENERAL	H1
H2	SCOPE	H1
H3	FLOOD DAMAGE SURVEYS	H1
H4	CLASSIFICATION OF FLOOD DAMAGES	H1
H5	INTANGIBLE FLOOD DAMAGES	H2
H6	ADJUSTMENT OF PRICE LEVEL	H2
H7	INCREASED DEVELOPMENT	H2
H8	LOSS OF LIFE	H2
	II - BASIN DESCRIPTION	
H9	GENERAL	H2
	III - FLOOD OF RECORD	
H10	GENERAL	H3
H11	MAMARONECK AND SHELDRAKE RIVERS BASIN	H3
H13	TOWN OF HARRISON, NEW YORK	H4
	IV - FLOOD PROBLEM AREAS	
H14	GENERAL	H5
H15	INVESTIGATIONS	H5
H16	MAMARONECK AND SHELDRAKE RIVERS BASIN (Mamaroneck)	H6
H18	REACHES 1 & 2, TOMPKINS TO FIRST STREET	H6
H19	REACH 3, FIRST STREET TO N.Y.S. THRUWAY	H6
H20	REACH 4, N.Y.S. THRUWAY TO WESTCHESTER WATERWORKS DAM	H6
H21	REACHES 5, 6, & 7 MAMARONECK AVE. TO N.Y.S. THRUWAY (Sheldrake)	H7
	V - AVERAGE ANNUAL FLOOD DAMAGES	
H23	GENERAL	H7

TABLE OF CONTENTS, continued

<u>PARAGRAPH</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
H25	ANNUAL FLOOD DAMAGES	H8
	VI - FUTURE FLOOD DAMAGES	
H27	AFFLUENCE FACTOR	H8
	VII - ESTIMATES OF BENEFITS	
H28	GENERAL	H9
H29	FLOOD DAMAGE REDUCTION BENEFITS	H9
H32	ADVANCE REPLACEMENT OF BRIDGES	H10
H33	LESS FREQUENT PAVEMENT MAINTENANCE	H10
H34	TRAFFIC DELAY	H10
H35	TIME DELAY	H13
H36	FIA COST	H15
H37	RED CROSS DISASTER RELIEF	H15
H38	ADVANCED ACCRUAL OF BENEFITS	H16
H39	LOCATION BENEFITS	H16
H40	SUMMARY	H16
H41	INTEREST DURING CONSTRUCTION	H16
H42	JUSTIFICATION	H17
H43	RISK AND UNCERTAINTY	H19

LIST OF TABLES

<u>NUMBER</u>	<u>DESCRIPTION</u>
H1	SUMMARY OF ESTIMATED FLOOD DAMAGES
H2	ANALYSIS OF GROWTH IN STRUCTURAL VALUES
H3	UPDATING PROCEDURE FOR THE MAMARONECK & SHELDRAKE AREA
H4	FUTURE RESIDENTIAL AVERAGE ANNUAL DAMAGES
H5	PER CAPITA MONEY INCOME NEW YORK STANDARD METROPOLITAN STATISTICAL AREA
H6	RESIDENTIAL STRUCTURE AND CONTENT VALUES
H7A	POPULATION DATA FOR NEW YORK STANDARD METROPOLITAN AREA
H7B	POPULATION PERSONAL INCOME AND EARNINGS BY INDUSTRY, HISTORICAL, AND PROTECTED SELECTED YEARS, 1969-2035
H7C	LABOR FORCE - EMPLOYMENT AND UMEMPLOYMENT

LIST OF TABLES
(CONT.)

H8	SUMMARY CALCULATION OF AVERAGE ANNUAL BENEFITS EXISTING CONDITIONS
H9	SUMMARY CALCULATION OF AVERAGE ANNUAL BENEFITS FUTURE CONDITIONS
H10	AVERAGE ANNUAL BENEFITS FROM ADVANCED REPLACEMENT OF BRIDGES
H10A-10F	COMPUTATION OF BENEFITS DERIVED FROM ADVANCED REPLACEMENT OF BRIDGES
H11	COMPUTATION OF BENEFITS DERIVED FROM LESS FREQUENT PAVEMENT MAINTENANCE
H12	SUMMARY OF ANNUAL COSTS FOR RECOMMENDED PLAN
H13	SUMMARY OF BENEFITS
H14	SENSITIVITY OF ECONOMIC JUSTIFICATION FOR THE SELECTED PLAN OF IMPROVEMENT

FIGURE

H1	DAMAGE REACHES
----	----------------

STREAMS IN WESTCHESTER COUNTY, NEW YORK
GENERAL DESIGN MEMORANDUM REPORT FOR FLOOD CONTROL
MAMARONECK AND SHELDRAKE RIVERS BASIN, NEW YORK

APPENDIX H - FLOOD DAMAGES AND BENEFITS

I - INTRODUCTION

H1. GENERAL. Flood damages in the Mamaroneck and Sheldrake Rivers Basin affect a wide range of land use, which varies from open undeveloped lands to highly urbanized communities. Flood damage is incurred because of physical damage to property; loss of commercial, industrial, and public activity; and impaired vehicular traffic. In addition, damages affect the economy and general well-being of the flood areas.

H2. SCOPE. This appendix contains details regarding the extent of damages sustained in the Mamaroneck and Sheldrake Rivers Basin due to fluvial and tidal inundation, and the benefits which accrue from the alleviation of the flooding along reaches of the Mamaroneck River in the Village of Mamaroneck and Town of Harrison, New York, and the Sheldrake River in the Village of Mamaroneck.

H3. FLOOD DAMAGE SURVEYS. Estimates of flood damages are based on flood damage surveys made by the Corps of Engineers in connection with previous flood control reports, a survey made in 1956 to determine flood damages from the flood of October 1955, and more recent surveys made in 1964, 1965, 1971, 1972, 1975, and 1976. Information also was furnished by local interests. The flood damage potential was affirmed in 1983 and again in 1986. All damage estimates have been converted to October 1988 price levels, and include both physical and non-physical losses. A detailed date of flood, type of damages, and estimated value of damage, is contained in Table H1. A description of the damages that occurred is contained in paragraphs H9 to H14.

H4. CLASSIFICATION OF FLOOD DAMAGES. The damages included in this study are presented in accordance with Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, March 10, 1983. The damages consist of primary tangible damages, including (1) physical damages to property, such as damages to buildings and other structures, loss of contents, including furnishing, equipment, decorations and stock, damage to grounds and cleanup; (2) emergency costs, such as additional expenses due to evacuation and reoccupation, flood fighting, and extra costs due to alternative traffic routes, advanced replacement of bridges, less frequent pavement maintenance, Federal Insurance Administration costs, and Red Cross disaster relief.

TABLE H1
 SUMMARY OF ESTIMATED RECURRING FLOOD DAMAGES
 MAMARONECK AND SHELDRAKE RIVERS BASINS, N.Y.
 (OCTOBER 1988 PRICE LEVEL)

		DAMAGE CLASSIFICATION							TOTAL
		FLOOD	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	PUBLIC	RAILROAD	UTILITIES	
Village of Mamaroneck	June 72		\$2,496,000	\$1,314,000	\$2,138,000	\$720,000	\$0	\$105,000	\$6,773,000
	Sept 75		\$10,348,000	\$5,802,000	\$20,694,000	\$2,071,000	\$0	\$620,000	\$39,535,000
Town of Harrison	June 72		\$45,600	\$0	\$0	\$6,100			\$51,700
	Sept 75		\$136,800	\$0	\$0	\$8,200			\$145,000

H5. INTANGIBLE FLOOD DAMAGES. Intangible damages have not been evaluated, as they cannot be equated in monetary values. The principal intangible damages consist of inconvenience to the public by suspension of normal utility services due to flooding.

H6. ADJUSTMENT OF PRICE LEVEL. The damage estimates presented in this analysis are based on October 1988 price levels. Damage estimates collected in previous years were adjusted to this level by the following updating technique. Table H2 presents a comparison of structural values for 1972 and 1976 of similar houses located in the general area of the proposed plan of improvement. From survey data and pictures of the Mamaroneck and Sheldrake area, it appears that the majority of the houses are 2 floors with basement. Comparing the average structural value of the houses surveyed in 1976 (\$54,200), with the structural value of the houses surveyed in 1972, (38,700) produces an increase of 40 percent or an annual compound growth rate of 8.8. For the same time period (April 1976 to March 1972) the average growth rate for the Consumer Price Index is 7.9. The percent increase between the annual growth rate for the survey data and the annual growth rate for the Consumer Price Index represents the actual increased structural value from years 1972 to 1976 in the Mamaroneck & Sheldrake area. The 11.4 percent increase $(8.8 \setminus 7.9)$ can then be applied to the Consumer Price Index for any time period to arrive at the annual growth rate for the Mamaroneck and Sheldrake area. Table H3 displays the procedure used in updating the growth rate for the Mamaroneck & Sheldrake area.

H7. INCREASED DEVELOPMENT. Estimates of flood damages are based on flood damage surveys made by the Corps of Engineers in connection with previous flood control reports. A complete inventory of the flood area was performed in 1982 to determine if all the structures were included in the previous surveys and to account for new structures in the area. Approximately 30 structures in reaches 1 thru 4 and 75 structures in reaches 5 & 6 were not accounted for in the previous surveys and have been included in the analysis. Damage estimates were received by comparisons with similar structures in the area. Stage damage curves and the average annual damage computation sheets were revised to reflect the additional structures.

H8. LOSS OF LIFE. During the September 1975 flood of record on the Mamaroneck River, one person drowned when the car he was traveling in was submerged. Red Cross estimates indicated that more than 200 people were evacuated from their residences in Mamaroneck during the flood.

II - BASIN DESCRIPTIONS

H9. GENERAL. The Mamaroneck and Sheldrake Rivers Basin, which drains into Long Island Sound at Mamaroneck Harbor, lies entirely within

Westchester County, New York, in the New York City Metropolitan Area. The basin encompasses parts of the Village and Town of Mamaroneck, the Cities of New Rochelle and White Plains, the Towns of Harrison and North Castle, and the Village of Scarsdale.

III - FLOODS OF RECORD

H10. GENERAL. The most damaging flood of record resulted from the storms of 15-16 October 1955, 16 June 1972, and 26-27 September 1975. The damages within the Mamaroneck and Sheldrake Rivers Basin for the June 1972 and September 1975 floods are estimated at \$6,490,000 and \$38,060,000 respectively. Other floods occurred in October 1877, September 1882, July 1889, October 1903, March 1936, July 1938, September 1938, July 1942, August 1942, September 1944, May 1946, March 1953, August 1955, August 1960, April 1961, March 1962, August 1971, September 1974, and April 1983 while other areas in Westchester County suffered floods in 1984, the Village of Mamaroneck received minimal flood damages. Flood damages within the subject basins are described in the following paragraphs.

H11. MAMARONECK AND SHELDRAKE RIVERS BASIN. Village of Mamaroneck, New York. The flood problem can be exemplified by the damages resulting from the June 1972 flood. Hundreds of residents, employees, and school children were evacuated by boats and trucks as the Mamaroneck and Sheldrake Rivers overflowed their banks, inundating local streets and numerous homes and business establishments. Areas inundated in the Village of Mamaroneck from this flood include approximately 107 acres of industrial, commercial and residential property. Along the Mamaroneck River the flood damage area is located on both banks between Ward Street and First Street. From First Street upstream to the New England Thruway, damages are confined to the left bank and in reach between Chestnut Avenue and the Westchester Joint Waterworks Dam, the flood damage area lies on the right bank. Along the Sheldrake River the flood damage area is on both banks between the confluence with the Mamaroneck River and Fenimore Road. During the June 1972 storm, 26 industrial structures, 33 commercial establishments, 5 public buildings and 207 dwellings were flooded. Columbus Park was completely submerged. The industrial park was inundated to a depth of two feet and many businesses were not able to resume production for a week or more. Hardest hit industrial areas were at the Sealectro Corporation plant on Hoyt Street, the largest employer in the village with over 650 employees, and the Bordow Corporation, located at Mamaroneck and Jefferson Avenues, which had several feet of water in its buildings. The main floors of many dwellings between Mamaroneck Avenue and the Mamaroneck River were flooded to a depth of one foot. Other areas with significant damages include the residential and business areas of the Washingtonville section of the Village of Mamaroneck, and residents who live along the

upper Mamaroneck River on Chestnut and Winfield Avenues in the Village. Along Chestnut Avenue basements were flooded to a depth of 5 feet causing severe content damage. Several homes along Winfield Avenue Bridge were inundated. Total damage from the June 1972 flood in the Village of Mamaroneck is estimated at \$6,773,000.

H12. The record flood of September 1975 produced stages in the Village of Mamaroneck approximately 1.5 feet higher than those produced during the June 1972 storm. Total flood damages from the September 1975 flood in the Village of Mamaroneck are estimated at \$39,535,000. More than 65 percent of these damages were suffered by the industrial and commercial establishments of the Village, particularly at the reach along the right bank of the lower Sheldrake River. This storm resulted in flood stages of up to 3 feet above the main floors of several of the industries in this reach. Again the hardest hit industrial plants along the Sheldrake River included Sealectro Corporation, and also Marval Industries (plastics), Elgene Chemicals, Westchester Light Company and Magnetic Media Corporation (electronics). Additionally, several industries which were not seriously affected by past floods also suffered damages from the September 1975 storm, including Sockolof Brothers (wood products) Phillips Offset Company and Schrier Brothers (paper company). The residential areas of the Village were also severely flooded during this storm. The damages in the Village of Mamaroneck resulting from the September 1975 storm, including a breakdown of the residential, commercial, industrial, and public components, are contained in Table H1.

H13. Town of Harrison, New York. Areas inundated in the Town of Harrison during the 1972 flood included the Maple Moor Golf Course, the Hutchinson River Parkway and approximately 9 acres of residential property along the left bank of the Mamaroneck River, from West Street upstream to Winfield Avenue. In this reach, the Mamaroneck River forms the boundary with the Village of Mamaroneck, and this area lies directly across from the Chestnut Avenue area in the Village. During the June 1972 storm, 10 dwellings at this area experienced basement and grounds flooding resulting in damages estimated at \$51,700. The September 1975 flood of record resulted in damages estimated to be \$145,400 at this area. Damages also occurred along the East Branch of the Mamaroneck River during the June 1972 storm. During this flood, and also the September 1975 flood, approximately 6 homes on Pinehurst and Tamershan Drives, and Duxbury Road suffered basement and grounds damage. Additionally, during the June 1972 flood a dry stone wall near the foot of Crocker Lake Dam on the East Branch was damaged. The flood of September 1975 resulted in approximately \$93,000 of damage along the East Branch of the Mamaroneck River in Harrison, including approximately \$83,000 non-recurring damage at Crocker Lake Dam.

IV - FLOOD PROBLEM AREAS

H14. GENERAL. As discussed in the preceding paragraphs, flood damages along the Mamaroneck and Sheldrake Rivers are centered largely at the Village of Mamaroneck and the Town of Harrison. A preliminary evaluation has been made to determine the improvements required to prevent damages experienced up to the floods of record along the above-mentioned areas in the Mamaroneck and Sheldrake Rivers. The evaluation revealed that along the Mamaroneck and Sheldrake Rivers at the Village of Mamaroneck, flood damages were sufficient to indicate the feasibility of flood protection. Accordingly, the remainder of this appendix considers the development of damages and benefits at these areas.

H15. INVESTIGATIONS. The data used to compute stage vs. damage curves, and in the average annual flood damage calculations, are based on damage surveys made in relation to the June 1972 flood on the Mamaroneck River and Sheldrake Rivers in the Village of Mamaroneck. An estimate was also made of the damage which would be sustained by each structure, should a flood with a stage 3 feet higher occur. Adjustments in the damages were made to reflect any new development, and non-recurring damages were eliminated. Sometimes a single parcel of land has been occupied by different tenants since the Referenced Flood occurred, with the property lying vacant during the period between occupation. Because the land use does not usually vary with a change in ownership, the original damages from the Reference Flood are used in the average annual damage calculations. All the areas in this study are fully developed, although some additional future development is a possibility. Information on assessed valuation was obtained from publications of the United States Census Bureau.

H16. MAMARONECK AND SHELDRAKE RIVERS BASIN. The flood damage area is located in the Village of Mamaroneck and the Town of Harrison, New York. On the Mamaroneck River damages start occurring below Tompkins Avenue and extend upstream to the Westchester Joint Waterworks Dam. On the Sheldrake River damages occur from the confluence with the Mamaroneck River upstream to the Village line at the New York State Thruway Bridge.

H17. To facilitate the collection of flood damage data and the calculation of flood damages the areas susceptible to flooding along the Mamaroneck and Sheldrake Rivers were divided into seven separate reaches. The first reach extends from Tompkins Avenue upstream to the New Haven Railroad along the Mamaroneck River. Reach 2 extends along the Mamaroneck River from the New Haven Railroad upstream to the First Street Bridge and along the Sheldrake River from the confluence upstream to Mamaroneck Avenue. Reach 3 lies between First Street and the New England Thruway Bridge along the Mamaroneck River. The fourth

reach lies along the Mamaroneck River from the New England Thruway Bridge to the Westchester Joint Waterworks Dam. Reach 5 extends along the Sheldrake River from Mamaroneck Avenue to a point 400 feet upstream of the Fenimore Road Bridge where there is a ridge line between Center and Fayette Avenues. On the New Haven Railroad side of this ridge Reach 5 extends as far as Rockland Road. Reach 6, which lies along the Sheldrake River from approximately 400 feet upstream of Fenimore Road to Rockland Road, is contained between the Sheldrake River and the ridge described above. Reach 7 extends from Rockland Road upstream to the New England Thruway. It should be noted that all of these reaches lie within the area to be protected by the recommended plan.

H18. Reaches 1 and 2, Tompkins Avenue to First Street on Mamaroneck River. Flooding occurs in this area on both the left and right banks. The area consists of 112 acres, developed with 8 industrial structures, 35 commercial establishments, 4 public buildings and 160 residences. The Standard Project Flood would inundate the area to depths in excess of 16 feet, and homes and factories would be flooded to a depth of 14 feet over the main floor. Total flood damages that would result from the Standard Project Flood, including residential, commercial, industrial, public, municipal, and utility damages are estimated a approximately \$1,290,000 for Reach 1 and \$27,685,000 for Reach 2. The bulk of the damages in Reach 2 are along the right bank of the Mamaroneck River. Reach 2 right bank damages at the reference flood (RF), reference flood stage plus 3 feet (RF+3), and the Standard Project Flood are estimated at \$3,432,000, 13,104,000, and \$26,416,000 respectively. Residential damages for Reach 2RB constitute approximately twenty percent of the total damages for the reference flood. This proportion of residential damage remained fairly constant for elevations throughout the stage-damage relationship as incremental flood plain areas were progressively added up to the Standard Project Flood.

H19. Reach 3, First Street to the New York State Thruway. Flooding in this area is located on the left bank of the Mamaroneck River. This area consists of 14 acres, developed with 31 single family homes The Standard Project Flood would inundate the area to depths in excess of 14 feet and would result in damages estimated at \$3,266,000. Homes would be flooded to depths in excess of 12 feet above the main floor.

H20. Reach 4, New York State Thruway to the Westchester Joint Waterworks Dam. Flooding in this reach is located on both banks of the Mamaroneck River above Chestnut Avenue. The area has 36 acres of land containing 41 residences and 1 public utility. The Standard Project Flood would submerge parts of the area to depths in excess of 10 feet with 5 feet of water on the first floors of some of these homes. Damages within the Village of Mamaroneck for the Standard Project Flood

for this reach are estimated at \$7,634,000.

H21. Reaches 5, 6 and 7, Mamaroneck Avenue to the New York State Thruway. Flooding in this area is on both banks of the Sheldrake River. The flooding extends past the New Haven Railroad embankment on the right bank and past the New York State Thruway embankment on the left. The reaches are primarily developed with an industrial park, and commercial establishments along the Mamaroneck Avenue. Land use in the industrial park varies from electronic equipment manufacturing and printing plants to auto repair shops, junk yards and construction companies. Around the industrial park, especially on both banks of Reach 5, there are large residential tracts. The Standard Project Flood would inundate 138 acres developed with 105 industrial sites, 43 commercial establishments, 142 residences, and 4 public buildings, and would result in total damages estimated at \$146,000,000, \$35,000,000 and \$572,000 for Reaches 5, 6, and 7 respectively. The Standard Project Flood would result in stages in excess of 11 to 12 feet above the ground or 9 to 10 feet above the main floor of most of the industrial sites and 12 feet above the main selling floor of the commercial sites.

H22. The greatest proportion of the flood damages suffered Reaches 5, 6, and 7 are contained in Reach 5RB, and Reach 6. The Standard Project Flood plain area in Reach 5 right bank is fairly low-lying and flat, and is quite expansive; this reach includes not only areas between the right bank of the Sheldrake River and the New Haven Railroad, but the less frequent floods would result in flooding areas which lie south of the railroad since floodwaters would pass under the Mamaroneck Avenue Railroad Bridge. Damages for the RF, RF+3, and Standard Project Flood for Reach 5RB are estimated at \$2,111,000, \$52,400,000, and \$141,200,000 respectively. Reach 6 on the other hand is a confined reach, lying between the ridge line along Fayette and Center Avenues and the right bank of the Sheldrake River. No additional structures are incrementally added at elevations above approximately the RF+6' stage, since at this point the entire confined reach is inundated. Therefore the increase in damages with stage in Reach 6 for elevations above RF+6' reflects progressively severe flooding to the structures in this area. Damages for the RF, RF+3', and Standard Project Flood for Reach 6 are estimated at \$55,800, \$8,500,000, and \$35,600,000 respectively.

V - AVERAGE ANNUAL FLOOD DAMAGES

H23. GENERAL. Average annual damages were computed separately for each reach using the stage vs. damage curves previously discussed. Discharge-frequency data were also developed for the Mamaroneck and Sheldrake Rivers the derivation of which is described in Appendix A,

Hydrology. Correlation of stage-damage relations with the discharge-frequency data, through the use of stage-discharge curves for existing conditions shown in Appendix B Hydraulics, results in a damage-frequency relationship that can be converted to equivalent existing annual damages. This relationship for the damage reaches was mathematically integrated over the entire range of flood frequencies by use of the Expected Annual Damage Program, to determine the average annual damages under existing conditions.

H24. The stage-discharge curves mentioned above were developed for each of the considered reaches reflecting existing conditions, and also conditions as modified by the proposed plans of protection. Thus the damage-frequency relationship for the various damage reaches can also be mathematically integrated to obtain the average annual damages as would be modified by the proposed project, through the use of the improved conditions stage-discharge curves. The difference between the average annual damages under existing and improved conditions is the average annual damages prevented by the plans of improvement.

H25. ANNUAL FLOOD DAMAGES. Estimates of average annual flood damages were computed above and below the reference flood, from the stage of zero damage up to the stage of the Standard Project Flood.

H26. In the Village of Mamaroneck below the New England Thruway (Reaches 1-2, 5-7), average annual damages under existing conditions are estimated at \$5,779,130 at the Standard Project Flood level. In the Village of Mamaroneck (and Town of Harrison) upstream of the New England Thruway (Reaches 3-4), average annual damages under existing conditions are estimated at \$366,900 for the Standard Project Flood.

VI - FUTURE FLOOD DAMAGES

H27. AFFLUENCE FACTOR. For the communities in the flood plains between 1969 and 1983, per capita income grew faster than in the New York SMSA. In the Mamaroneck and Sheldrake Rivers flood plain, the per capita income annual growth rate for Mamaroneck Village was 4.71%, and in Westchester County area the average annual growth rate was 4.38%. Both of these growth rates are greater than the 3.53% growth rate of the New York SMSA. Although locational or other factors can cause per capita income in one area to be a multiple of per capita income in another, it is unreasonable to expect this multiple to continue to increase. Therefore the growth of both residential contents and per capita income for the flood plains is projected at the same rate as per capita income of the New York SMSA. The average content value to structure value ratio for the Mamaroneck and Sheldrake area has been determined as 32 percent. The average annual equivalent factor is 1.24 based on the 8 7/8% interest rate. The effect of this growth in

TABLE H4
FUTURE RESIDENTIAL
AVERAGE ANNUAL DAMAGES

Total Existing (1988)	\$489,100
Growth, existing to base year (1988 - 1994)	47,800 -----
Total Base Year 1995	\$536,900
Growth over project economic life (1995 - 2045)	69,600 -----
Total residential damages	\$606,500
Total Future Damages	\$117,400

TABLE H5
 PER CAPITA MONEY INCOME NEW YORK STANDARD
 METROPOLITAN STATISTICAL AREA, WESTCHESTER
 COUNTY VILLAGES OF MAMARONECK
 (1969 AND 1983)

Area	1969	1983	Annual Growth Rate in Per Cent
New York SMSA	\$6,105	\$9,924	3.53
Westchester County	\$8,079	\$14,721	4.38
Mamaroneck Village	\$8,427	\$16,042	4.71

Source: 1984 Population and 1983 Per Capita Income Estimates
 for Counties and Incorporated Places.

TABLE H6
 RESIDENTIAL STRUCTURE AND CONTENTS VALUES
 (1988 PRICE LEVEL)

AREA	AVERAGE VALUE STRUCTURES	AVERAGE VALUE CONTENTS	PERCENTAGE CONTENTS
REACHES 1, 2 VILLAGE OF MAMARONECK (Mamaronock River)	118,200	32,100	27
REACHES 3, 4 VILLAGE OF MAMARONECK TOWN OF HARRISON (Mamaronock River)	127,100	40,400	32
REACHES 5, 6, 7 VILLAGE OF MAMARONECK (Sheldrake River)	110,900	41,000	37
TOTAL	118,733	37,833	32

TABLE H7a
 LOCAL POPULATION ESTIMATES (NORTHEAST) USED TO
 OBTAIN ADDITIONAL POPULATION FIGURES FOR NYC,
 WESTCHESTER COUNTY, MAMARONECK VILLAGE AND TOWN,
 1984.

AREA	1960	1970	1980	1984
New York SMSA	9,540,000	9,970,000	9,120,000	N/A
New York City	7,800,000	7,900,000	7,100,000	7,200,000
Westchester County	809,000	894,000	867,000	867,000
Mamaroneck Village	10,600	11,000	10,300	17,300
Mamaroneck Town	29,100	31,200	29,000	28,000

NOTE: Numbers have been rounded.
 N/A: Not available for 1984.

TABLE H7b
 POPULATION, PERSONAL INCOME, AND EARNINGS BY INDUSTRY, HISTORICAL AND PROJECTED,
 SELECTED YEARS, 1969 - 2035 - NEW YORK PMSA

	1969	1978	1983	1990	2000	2035
Population	9,024,000	8,380,000	8,290,600	8,253,800	8,433,200	8,752,300
Total personal Income	48,659,000	49,425,100	53,595,200	60,181,100	68,602,400	94,534,600
Manufacturing Earnings	9,367,500	7,082,400	6,330,600	7,028,300	7,332,900	8,523,100
Wholesale and retail trade	8,150,500	7,066,660	6,960,600	7,808,300	8,811,600	11,349,900

Source: 1985 OBERS Projections

*New York PMSA consists of New York City and the counties of Rockland, Westchester, Nassau and Suffolk,
 all in New York State.

1) All Ober's projection after 1975 are based on 1972 dollars.

TABLE H7C
LABOR FORCE - EMPLOYMENT AND UNEMPLOYMENT

	<u>Mamaroneck, N.Y.</u>		<u>Westchester County</u>	
	<u>1970</u>	<u>1980</u>	<u>1970</u>	<u>1980</u>
EMPLOYMENT	7,363	13,189	329,811	381,569
UNEMPLOYED	248	301	10,321	9,611
TOTAL LABOR FORCE	7,611	13,490	340,132	391,180
				<u>1987</u>
				470,465
				14,535
				485,000

content value on residential flood damages is shown below. Average annual damages from growth in residential content value is \$117,400. Tables H5 and H6 display the annual growth rate in percent and the residential structure and content values. Table H7A through H7C display population data, Personal Income, and Labor Force Data.

VII -ESTIMATES OF BENEFITS

H28. GENERAL. The benefits derived from the recommended plan of protection along the Mamaroneck and Sheldrake Rivers consist of the average annual flood damages the improvement prevents, benefits from advanced replacement of bridges, less frequent pavement maintenance, traffic and time delay, flood insurance administration costs and Red Cross disaster relief. The benefits have been evaluated in accordance with Economic And Environmental Principles and Guidelines for Water and Related Land Resources Implementation studies. All estimates of average annual benefits are based on a project life of 100 years. Each type of benefit is discussed in the following paragraphs.

H29. FLOOD DAMAGE REDUCTION BENEFITS. Flood damage reduction benefits from the proposed projects were estimated by evaluating damages with and without the proposed projects, under both existing and future conditions. As shown in Table H8 the average annual benefits that accrue as a result of the proposed flood control plans of protection are estimated at \$6,134,850 along the Mamaroneck and Sheldrake Rivers at the Village of Mamaroneck.

H30. Future urban inundation reduction benefits were evaluated through the use of affluence factors for productivity increases for urban property in the case of residential contents. Residential contents is defined as personal property within the structure not affixed to the structure, such as furniture, decorations and other furnishing, clothing, etc. These benefits are presented in Table H9 for the Mamaroneck and Sheldrake Rivers, were computed utilizing affluence factors based on the most probable future conditions of the study areas, and the values of residential structure and content values shown in Table H6. As shown in Table H9, the affluence factors were applied to the existing average annual residential content damage for each reach. The percentage of residential content damage for each reach was based on field data obtained from the damage surveys made in relation to particular reference flood. The percentages of residential content damage based on the referenced floods, which are summarized in Table H6, were then applied to the total average annual damages for each reach to arrive at the existing average annual damages attributed to residential contents, as shown in Table H9. It is recognized that, in general, the percentage of residential content damage at the reference flood would not remain constant for higher and lower stages. However,

TABLE H8
 SUMMARY CALCULATION OF AVERAGE ANNUAL BENEFITS
 EXISTING CONDITIONS
 MAMARONECK AND SHELDRAKE RIVERS BASIN
 1988 PRICE LEVEL

VILLAGE OF MAMARONECK

AREA	EXISTING ANNUAL DAMAGES	RESIDUAL ANNUAL DAMAGES	AVERAGE ANNUAL BENEFITS
REACH 1	\$19,860	\$0	\$19,860
REACH 2	\$859,160	\$110	\$859,050
LB	\$30,030	\$0	\$30,030
REACH 3	\$106,040	\$970	\$105,070
REACH 4	\$182,390	\$4,030	\$178,360
LB	\$78,470	\$820	\$77,650
REACH 5	\$4,044,970	\$0	\$4,044,970
LB	\$229,830	\$0	\$229,830
REACH 6	\$579,980	\$0	\$579,980
REACH 7	\$15,290	\$5,240	\$10,050
VILLAGE SUBTOTAL	\$6,146,000	\$11,200	\$6,134,900

TABLE H9
 SUMMARY CALCULATION OF AVERAGE ANNUAL BENEFITS
 FUTURE CONDITIONS
 VILLAGE OF MAMARONECK

	REACH 1	REACH 2R	REACH 2L	REACH 3	REACH 4R	REACH 4L	REACH 5R	REACH 5L	REACH 6	REACH 7	TOTAL
1. TOTAL AVG. ANN. BENEFITS EXISTING CONDITIONS	19,860	859,160	30,030	106,040	182,390	78,470	4,044,970	229,830	579,980	15,290	6,146,020
2. RESIDENTIAL CONTENTS BENEFITS (EXIST. COND.)	2,190	154,260	10,330	31,640	45,320	62,220	80,460	29,790	69,140	3,690	489,040
3. BENEFITS OTHER THAN RESIDENTIAL CONTENTS (1) - (2)	17,670	704,900	19,700	74,400	137,070	16,250	3,964,510	200,040	510,840	11,600	5,656,980
4. FUTURE RESIDENTIAL CONTENTS BENEFITS AFFLUENCE FACTOR = 1.24 (1.24 * (2))	2,716	191,282	12,809	39,234	56,197	77,153	99,770	36,940	85,734	4,576	606,410
5. TOTAL AVG. ANN. BENEFITS FUTURE CONDITIONS (3) + (4)	20,386	896,182	32,509	113,634	193,267	93,403	4,064,280	236,980	596,574	16,176	6,263,390

data from the referenced flood, in most reaches, provided an indicator of the percent of residential content damage which was generally representative to that portion of the range of flood stages which produced the bulk of the average annual damages.

H31. As shown in Table H9 the average annual benefits that would accrue under future conditions are estimated at \$6,263,400 along the Mamaroneck and Sheldrake Rivers at the Village of Mamaroneck.

H32. ADVANCE REPLACEMENT OF BRIDGES. The plans of protection along the Mamaroneck and Sheldrake Rivers will require the replacement of several existing bridges. The bridges to be replaced are the Ward Street, Halstead Ave, Station Plaza, Hillside Ave., Tompkins Ave., and Valley Place Sewer Bridge. The replacement of an existing bridge as project cost actually extends the life of the structure with a reduction of maintenance costs. These net reductions were considered as benefits accruing to the plans of protection. The costs of the new bridges have been updated to the current price level and interest rate, also the remaining useful life of the bridges have been recalculated and presented in present year (1988) terms. For the Village of Mamaroneck the average annual benefits from advanced replacement of bridges are estimated at \$293,400 as displayed in Table H10. The calculations for determining the advance replacement of bridges benefit category are displayed on Table H10A through H10F.

H33. LESS FREQUENT PAVEMENT MAINTENANCE. The benefits that would be realized from less frequent pavement maintenance attributed to the plan of protection were updated for interest rate only. The square yard cost to resurface pavement has been checked and remains the same as what was used in the feasibility study. For the Village of Mamaroneck the average annual benefits from less frequent pavement maintenance are \$59,000. The calculations for determining the less frequent pavement maintenance benefit are displayed on Table H11.

H34. TRAFFIC DELAY. Mamaroneck Ave. is closed South of the New England Thruway when flood waters are about .5 foot over the road, and remain closed for approximately 2 hours, including clean-up time. When the flood waters reach a depth of 1.5 feet on the roadway the road will remain closed approximately 4 hours. With 4 feet and 6.8 feet, Mamaroneck Ave. will remained closed approximately 7 and 13 hours respectively. Traffic expecting to exit off the New England Thruway at Mamaroneck Ave. will be forced to remain on the thruway and get off at the Weaver St. (Rt 125) exit and work their way back to Mamaroneck Ave. via the Boston Post Road (Rt 1). Computation of Damages. Increased mileage is based upon examination of the hypothetical alternative route described above. Starting at the Mamaroneck Ave. exit ramp on the New England Thruway traveling to the Weaver St. exit, to the Boston Post Road and back to Mamaroneck Ave. The additional distance traveled due

TABLE H10
 AVERAGE ANNUAL BENEFITS FROM
 ADVANCED REPLACEMENT OF BRIDGES

MAMARONECK AND SHELDRAKE RIVERS, NEW YORK
 (October 1988 Price Level)

BRIDGE	STREAM	Estimated Cost of New Bridge	Annual Benefits	Remaining Life
Ward Street	Mamaroneck River	\$723,000	\$49,745	3
Halstead Avenue	Mamaroneck River	\$979,000	\$86,904	0
Station Plaza	Mamaroneck River	\$552,000	\$49,000	0
Hillside Avenue	Mamaroneck River	\$528,000	\$36,389	3
Tompkins Avenue	Mamaroneck River	\$705,000	\$62,581	0
Valley Place	Mamaroneck River	\$220,000	\$8,756	10
TOTAL			\$293,400	

TABLE H10A
 COMPUTATION OF BENEFITS DERIVED FROM
 ADVANCED REPLACEMENT OF BRIDGES
 WARD AVENUE BRIDGE

COST OF NEW BRIDGE (\$)	\$723,000
LIFE OF NEW BRIDGE (YEARS)	50
PROJECT LIFE	100
REMAINING USEFUL LIFE OF EXISTING BRIDGE (YEARS)	3
ANNUAL MAINTENANCE OF EXISTING BRIDGE (\$)	1000
INTEREST RATE	8.875%
CAPITOL RECOVERY FACTOR (BRIDGE LIFE)	0.090032
CAPITOL RECOVERY FACTOR (PROJECT LIFE)	0.088768
ANNUAL FINANCIAL COST OF NEW BRIDGE	65093.35
PRESENT WORTH FACTOR OF NEW BRIDGE AFTER EXPIRATION OF OLD BRIDGE	11.06049
PRESENT WORTH FACTOR	2.536944
SINGLE PAYMENT PRESENT WORTH FACTOR	0.774846
BENEFIT CREDIT AT BEGINNING OF YEAR	\$719,965
PRESENT WORTH OF BENEFIT. CREDIT	\$557,862
PRESENT WORTH OF MAINTENANCE CREDIT	\$2,537
TOTAL PRESENT WORTH	\$560,399
ANNUAL CREDIT	\$49,745

TABLE H10B
 COMPUTATION OF BENEFITS DERIVED FROM
 ADVANCED REPLACEMENT OF BRIDGES
 HALSTEAD AVENUE BRIDGE

COST OF NEW BRIDGE (\$)	\$979,000
LIFE OF NEW BRIDGE (YEARS)	50
PROJECT LIFE	100
REMAINING USEFUL LIFE OF EXISTING BRIDGE (YEARS)	0
ANNUAL MAINTENANCE OF EXISTING BRIDGE (\$)	1000
INTEREST RATE	8.875%
CAPITOL RECOVERY FACTOR (BRIDGE LIFE)	0.090032
CAPITOL RECOVERY FACTOR (PROJECT LIFE)	0.088768
ANNUAL FINANCIAL COST OF NEW BRIDGE	88141.62
PRESENT WORTH FACTOR OF NEW BRIDGE AFTER EXPIRATION OF OLD BRIDGE	11.10712
PRESENT WORTH FACTOR	0
SINGLE PAYMENT PRESENT WORTH FACTOR	1
BENEFIT CREDIT AT BEGINNING OF YEAR	\$979,000
PRESENT WORTH OF BENEFIT CREDIT	\$979,000
PRESENT WORTH OF MAINTENANCE CREDIT	\$0
TOTAL PRESENT WORTH	\$979,000
ANNUAL CREDIT	\$86,904

TABLE H10C
 COMPUTATION OF BENEFITS DERIVED FROM
 ADVANCED REPLACEMENT OF BRIDGES
 STATION PLAZA BRIDGE

COST OF NEW BRIDGE (\$)	\$552,000
LIFE OF NEW BRIDGE (YEARS)	50
PROJECT LIFE	100
REMAINING USEFUL LIFE OF EXISTING BRIDGE (YEARS)	0
ANNUAL MAINTENANCE OF EXISTING BRIDGE (\$)	1000
INTEREST RATE	8.875%
CAPITOL RECOVERY FACTOR (BRIDGE LIFE)	0.090032
CAPITOL RECOVERY FACTOR (PROJECT LIFE)	0.088768
ANNUAL FINANCIAL COST OF NEW BRIDGE	49697.83
PRESENT WORTH FACTOR OF NEW BRIDGE AFTER EXPIRATION OF OLD BRIDGE	11.10712
PRESENT WORTH FACTOR	0
SINGLE PAYMENT PRESENT WORTH FACTOR	1
BENEFIT CREDIT AT BEGINNING OF YEAR	\$552,000
PRESENT WORTH OF BENEFIT CREDIT	\$552,000
PRESENT WORTH OF MAINTENANCE CREDIT	\$0
TOTAL PRESENT WORTH	\$552,000
ANNUAL CREDIT	\$49,000

TABLE H10D
 COMPUTATION OF BENEFITS DERIVED FROM
 ADVANCED REPLACEMENT OF BRIDGES
 HILLSIDE AVENUE BRIDGE

COST OF NEW BRIDGE (\$)	\$528,000
LIFE OF NEW BRIDGE (YEARS)	50
PROJECT LIFE	100
REMAINING USEFUL LIFE OF EXISTING BRIDGE (YEARS)	3
ANNUAL MAINTENANCE OF EXISTING BRIDGE (\$)	1000
INTEREST RATE	8.875%
CAPITOL RECOVERY FACTOR (BRIDGE LIFE)	0.090032
CAPITOL RECOVERY FACTOR (PROJECT LIFE)	0.088768
ANNUAL FINANCIAL COST OF NEW BRIDGE	47537.05
PRESENT WORTH FACTOR OF NEW BRIDGE AFTER EXPIRATION OF OLD BRIDGE	11.06049
PRESENT WORTH FACTOR	2.536944
SINGLE PAYMENT PRESENT WORTH FACTOR	0.774846
BENEFIT CREDIT AT BEGINNING OF YEAR	\$525,783
PRESENT WORTH OF BENEFIT CREDIT	\$407,401
PRESENT WORTH OF MAINTENANCE CREDIT	\$2,537
TOTAL PRESENT WORTH	\$409,938
ANNUAL CREDIT	\$36,389

TABLE H10E
 COMPUTATION OF BENEFITS DERIVED FROM
 ADVANCED REPLACEMENT OF BRIDGES
 TOMPKINS AVENUE BRIDGE

COST OF NEW BRIDGE (\$)	\$705,000
LIFE OF NEW BRIDGE (YEARS)	50
PROJECT LIFE	100
REMAINING USEFUL LIFE OF EXISTING BRIDGE (YEARS)	0
ANNUAL MAINTENANCE OF EXISTING BRIDGE (\$)	1000
INTEREST RATE	8.875%
CAPITOL RECOVERY FACTOR (BRIDGE LIFE)	0.090032
CAPITOL RECOVERY FACTOR (PROJECT LIFE)	0.088768
ANNUAL FINANCIAL COST OF NEW BRIDGE	63472.77
PRESENT WORTH FACTOR OF NEW BRIDGE AFTER EXPIRATION OF OLD BRIDGE	11.10712
PRESENT WORTH FACTOR	0
SINGLE PAYMENT PRESENT WORTH FACTOR	1
BENEFIT CREDIT AT BEGINNING OF YEAR	\$705,000
PRESENT WORTH OF BENEFIT CREDIT	\$705,000
PRESENT WORTH OF MAINTENANCE CREDIT	\$0
TOTAL PRESENT WORTH	\$705,000
ANNUAL CREDIT	\$62,581

TABLE H10F
 COMPUTATION OF BENEFITS DERIVED FROM
 ADVANCED REPLACEMENT OF BRIDGES
 VALLEY PLACE SEWER BRIDGE

COST OF NEW BRIDGE (\$)	\$220,000
LIFE OF NEW BRIDGE (YEARS)	50
PROJECT LIFE	100
REMAINING USEFUL LIFE OF EXISTING BRIDGE (YEARS)	10
ANNUAL MAINTENANCE OF EXISTING BRIDGE (\$)	1000
INTEREST RATE	8.875%
CAPITOL RECOVERY FACTOR (BRIDGE LIFE)	0.090032
CAPITOL RECOVERY FACTOR (PROJECT LIFE)	0.088768
ANNUAL FINANCIAL COST OF NEW BRIDGE	19807.10
PRESENT WORTH FACTOR OF NEW BRIDGE AFTER EXPIRATION OF OLD BRIDGE	10.89202
PRESENT WORTH FACTOR	6.453119
SINGLE PAYMENT PRESENT WORTH FACTOR	0.427285
BENEFIT CREDIT AT BEGINNING OF YEAR	\$215,739
PRESENT WORTH OF BENEFIT CREDIT	\$92,182
PRESENT WORTH OF MAINTENANCE CREDIT	\$6,453
TOTAL PRESENT WORTH	\$98,635
ANNUAL CREDIT	\$8,756

TABLE H11
 COMPUTATION OF BENEFITS DERIVED FROM
 LESS FREQUENT PAVEMENT MAINTENANCE
 MAMARONECK AND SHELDRAKE RIVERS
 (OCTOBER 1988 PRICE LEVEL)

FLOOD CONDITIONS

DESCRIPTION -----	RESULT -----
1. PAVEMENT LIFE (YEARS)	15
2. PROJECT LIFE (YEARS)	100
3. REQUIRED TIMES NECESSARY TO RESURFACE PAVEMENT DURING 100 YEAR PERIOD	6
4. PAVEMENT AREA TO BE RESURFACED (SY)	87,545
5. COST TO RESURFACE PAVEMENT (PER SY)	\$25
6. INTEREST RATE	8.875
7. PRESENT VALUE OF RESURFACING (25 * 87,545)	\$2,188,625
8. PRESENT WORTH FACTOR FOR 15, 30, 45, 60, 75 AND 90 YEARS	0.388
9. PRESENT WORTH OF PAVEMENT MAINTENANCE (.388 * 2,188,625)	\$849,187
10. ANNUAL COST OF PAVEMENT MAINTENANCE (.08877 * 849,187)	\$75,382

NON-FLOOD CONDITIONS

11. PAVEMENT LIFE (YEARS)	30
12. REQUIRED TIMES NECESSARY TO RESURFACE PAVEMENT DURING 100-YEAR PERIOD	3
13. PRESENT WORTH FACTOR FOR 30, 60 AND 90 YEARS	0.084
14. PRESENT WORTH OF PAVEMENT MAINTENANCE (.084 * 2,188,625)	\$183,845
15. ANNUAL COST OF PAVEMENT MAINTENANCE (.08877 * 183,845) (NON-FLOOD CONDITIONS)	\$16,320
16. ANNUAL COST OF PAVEMENT MAINTENANCE (FLOOD CONDITIONS)	\$75,382
17. TOTAL ANNUAL BENEFIT CREDIT (75,382 - 16,320)	\$59,062
ROUNDED	\$59,000

to the flooding of Mamaroneck Ave would be 5 miles. The average amount of traffic that travels north and south bound on Mamaroneck Ave. had been determined from survey data provided by the New York State Department of Transportation. The average daily traffic count for the vehicles traveling south bound on Mamaroneck Ave. is 9,800. The average daily traffic count for vehicles traveling north bound on Mamaroneck Ave. was 9,240. Conversion for estimated increased mileage during floods was made by using \$0.225/vehicle mile.

Results for selected depths of flooding on Mamaroneck Ave. are tabulated in Table below:

Traffic Delay Calculation

South Bound

9800 Vehicles	<u>2hrs</u> 24hrs	5 miles	.225 mile = \$920 with .5' of flooding
9800 Vehicles	<u>4hrs</u> 24hrs	5 miles	.225 mile = \$1,840 with 1.5' of flooding
9800 Vehicles	<u>7hrs</u> 24hrs	5 miles	.225 mile = \$3,220 with 4' of flooding
9800 Vehicles	<u>13hrs</u> 24hrs	5 miles	.225 mile = \$5,970 with 6.8' of flooding
9800 Vehicles	<u>18hrs</u> 24hrs	5 miles	.225 mile = \$8,270 with 13.2' of flooding

North Bound

9240 Vehicles	<u>2hrs</u> 24hrs	5 miles	.225 mile = \$866 with .5' of flooding
9240 Vehicles	<u>4hrs</u> 24hrs	5 miles	.225 mile = \$1,730 with 1.5' of flooding
9240 Vehicles	<u>7hrs</u> 24hrs	5 miles	.225 mile = \$3,030 with 4' of flooding
9240 Vehicles	<u>13hrs</u> 24hrs	5 miles	.225 mile = \$5,630 with 6.8' of flooding
9240 Vehicles	<u>18hrs</u> 24hrs	5 miles	.225 mile = \$7,796 with 13.2' of flooding

920 + 866	= \$1,786 total with .5' of flooding on Mamaroneck Ave.
1840 + 1730	= \$3,570 total with 1.5' of flooding on Mamaroneck Ave.
3220 + 3030	= \$6,250 total with 4.0' of flooding on Mamaroneck Ave.
5970 + 5630	= \$12,500 total with 6.8' of flooding on Mamaroneck Ave.
8270 + 7796	= \$16,066 total with 13.2' of flooding on Mamaroneck Ave.

H35. TIME DELAY. The cost of the additional mileage above, in calculating the total traffic delay cost at Mamaroneck, ignores the effect of the lost time to the commuter. The additional time required to travel the increased distance (as described previously) has been estimated as being 15 minutes. The value of time has been determined by calculating 1/3 of average wage rate (1/12 for children) for Westchester County, as prescribed by Principles and Guidelines. The average wage rate for Westchester County was attained from a September 1987 publication: Survey of Current Business. The average wage rate for Westchester County is \$8.95 per hour. The variables used in calculating the cost of time lost are; the average daily vehicle traffic on Mamaroneck Ave. (9800 south bound, 9240 north bound), the hourly delay time for the various depths of flooding, the hourly wage rate data and the increased travel time to avoid the flood event (15 minutes). The calculations for determining the wage rates for this analysis are displayed below:

North Bound Traffic on Mamaroneck Ave. has been estimated as being 50% shoppers, 50% trucks.

Also, estimated is the fact that for shoppers, one adult and one child is in the car, 2 adults for the trucks.

1-1/2 passengers for shoppers = $8.95 * 1/3 = \$2.95$ adult
 $8.95 * 1/12 = .75$ child
 $\$3.70$ per car

2 passengers for trucks = $8.95 * 1/3 = 2.95 * 2 = 5.90$ per truck

$\$9.60 / 2 = \4.80 average hourly time delay for vehicles traveling North bound on Mamaroneck Ave. South Bound traffic contains a higher percentage for shoppers: 75% cars = 3.70 per car x $.75 = 2.78$

25% Trucks = 5.90 per truck x $.25 = 1.48$
 4.26

$\$4.26 =$ average hourly time delay for vehicles traveling south bound on Mamaroneck Ave.

Calculations for delay at selected depths of flooding on Mamaroneck Ave. are displayed below:

Time Delay
South Bound

9800 Vehicles $\frac{2\text{hrs}}{24\text{hrs}}$ \$4.26 per hr $\frac{.15 \text{ min}}{60 \text{ min}} = \$ 870$ with .5' of flooding

9800 Vehicles $\frac{4\text{hrs}}{24\text{hrs}}$ \$4.26 per hr $\frac{.15 \text{ min}}{60 \text{ min}} = \$1,740$ with 1.5' of flooding

9800 Vehicles $\frac{7\text{hrs}}{24\text{hrs}}$ \$4.26 per hr $\frac{.15 \text{ min}}{60 \text{ min}} = \$3,044$ with 4' of flooding

9800 Vehicles $\frac{13\text{hrs}}{24\text{hrs}}$ \$4.26 per hr $\frac{.15 \text{ min}}{60 \text{ min}} = \$5,653$ with 6.8' of flooding

9800 Vehicles $\frac{18\text{hrs}}{24\text{hrs}}$ \$4.26 per hr $\frac{.15 \text{ min}}{60 \text{ min}} = \$7,828$ with 13.2 of flooding

North Bound

9240 Vehicles $\frac{2\text{hrs}}{24\text{hrs}}$ \$4.80 per hr $\frac{.15 \text{ min}}{60 \text{ min}} = \$ 924$ with .5' of flooding

9240 Vehicles $\frac{4\text{hrs}}{24\text{hrs}}$ \$4.80 per hr $\frac{.15 \text{ min}}{60 \text{ min}} = \$1,848$ with 1.5' of flooding

9240 Vehicles $\frac{7\text{hrs}}{24\text{hrs}}$ \$4.80 per hr $\frac{.15 \text{ min}}{60 \text{ min}} = \$3,234$ with 4' of flooding

9240 Vehicles $\frac{13\text{hrs}}{24\text{hrs}}$ \$4.80 per hr $\frac{.15 \text{ min}}{60 \text{ min}} = \$6,006$ with 6.8' of flooding

9240 Vehicles $\frac{18\text{hrs}}{24\text{hrs}}$ \$4.80 per hr $\frac{.15 \text{ min}}{60 \text{ min}} = \$8,316$ with 13.2 of flooding

\$ 870 + 924 = \$ 1,794 with .5' of flooding in Mamaroneck Avenue

1740 + 1848 = \$ 3,588 with 1.5' of flooding in Mamaroneck Avenue

3044 + 3234 = \$ 6,278 with 4.0' of flooding in Mamaroneck Avenue

5653 + 6006 = \$11,659 with 6.8' of flooding in Mamaroneck Avenue

7828 + 8316 = \$16,144 with 13.2' of flooding in Mamaroneck Avenue

Traffic rerouting	+	Time delay	=	Total Traffic delay
w/ .5 \$1,786	+	\$ 1,794	=	\$ 3,580
w/ 1.5 3,570	+	3,588	=	7,158
w/ 4.0 6,250	+	6,278	=	12,528
w/ 6.8 12,500	+	11,659	=	24,159
w/13.2 16,066	+	16,144	=	32,210

The average annual damages caused by time delay in the Mamaroneck and Sheldrake area is \$700.

H36. FIA COSTS. As stated in sub part G of the Water Resource Council Procedure for Evaluation of NED benefits, a national cost of the flood insurance program is its administration. Information received from the Federal Insurance Administration shows that the current cost to administer a flood insurance policy is \$85.00 annually. Expressing savings in these administration costs as project benefits is appropriate for properties that are removed from the 100 year floodplain. The Federal Insurance Administration has stated that for the Village of Mamaroneck there area approximately 262 structures that presently participate in the Federal Insurance Program. Calculating the amount of structure and the cost of administering each policy, arrives at an annual benefit of \$22,270 for the Mamaroneck and Sheldrake area.

H37. RED CROSS DISASTER RELIEF. As reported, during the September 1975 flood of record on the Mamaroneck River, Red Cross estimates indicate that more than 200 people were evacuated from their residences during the flood. The Red Cross is almost always involved when an emergency occurs, such as the September 1975 flood. The amount the Red Cross spends on a disaster relief emergency depends upon the type of emergency, the amount of families involved, the location of the emergency, and the severity of the event. For a flood emergency the Red Cross spends on an average, \$800 per family for emergency assistance. For smaller flood events the average cost is \$220 per family and if evacuation is required the cost per family is approximately \$1,020. Included in the cost of disaster relief, the Red Cross provides such items as food, clothing, bedding, personal items, tools, repairs to the heating equipment and minor repairs to the structure. Average annual damages attributable to Red Cross emergency relief have been calculated for the Mamaroneck and Sheldrake area. The stage damage curve determines the cost of emergency relief per family based on flood elevations above and below the main floor of the structure. As displayed in the October 1977 Feasibility report, for the 172 structures in reaches 1 and 2, the reference flood was approximately one foot on the main floor of the houses. For the 90 residential structures in reaches 3 and 4, the reference flood was respected to be at the main floor elevation, and for reaches 5, 6, and 7 the reference flood was approximately 3 feet lower than the main

cost, as there is no monetary outlay. The interest is computed monthly based on the Federal discount rate of 8 7/8 percent, considering the expenditure pattern over the 48 month construction period. The interest during construction and the total investment cost for the recommended plan are shown below:

	(LOWER) 15 months	(UPPER) 24 months	BASE YEAR
2.00	9.4 million	16.6 million	
50	8.6	15.6	
		(TUNNEL) 33 months	
		41.1 million	
		18	
		16.5	

Lower Mamaroneck IDC :	500,000	457,000
Upper Mamaroneck IDC :	1,600,000	1,504,000
Sheldrake River IDC :	5,400,000	
	1,600,000	1,467,000
Total IDC @ 8 7/8% :	\$ 7,500,000	
Total First Cost :	\$ <u>67,099,000</u>	
	\$ 74,599,000	

74,599,000 first cost X .088768 (100yr, 8 7/8%) = 6,622,000 Annual Cost

H42. JUSTIFICATION. The estimated annual costs, the estimated annual benefits, and the ratio of benefits to costs, which are summarized on the following table for the recommended plan at the Village of Mamaroneck is economically justified with benefit-to-cost ratio greater than 1.0.

TABLE H12
SUMMARY OF ANNUAL COSTS
RECOMMENDED PLAN

Investment Costs	
Project Costs	67,099,000
Interest During Construction	7,500,000
	74,599,000
Annual Costs	
Interest & Amortization	6,622,000
Operation and Maintenance	150,000
Total Annual Costs	6,772,000
Economic Summary	
Average Annual Benefits	7,418,000
Average Annual Costs	6,772,000
Net Annual Benefits	646,000
Benefit-Cost-Ratio	1.10

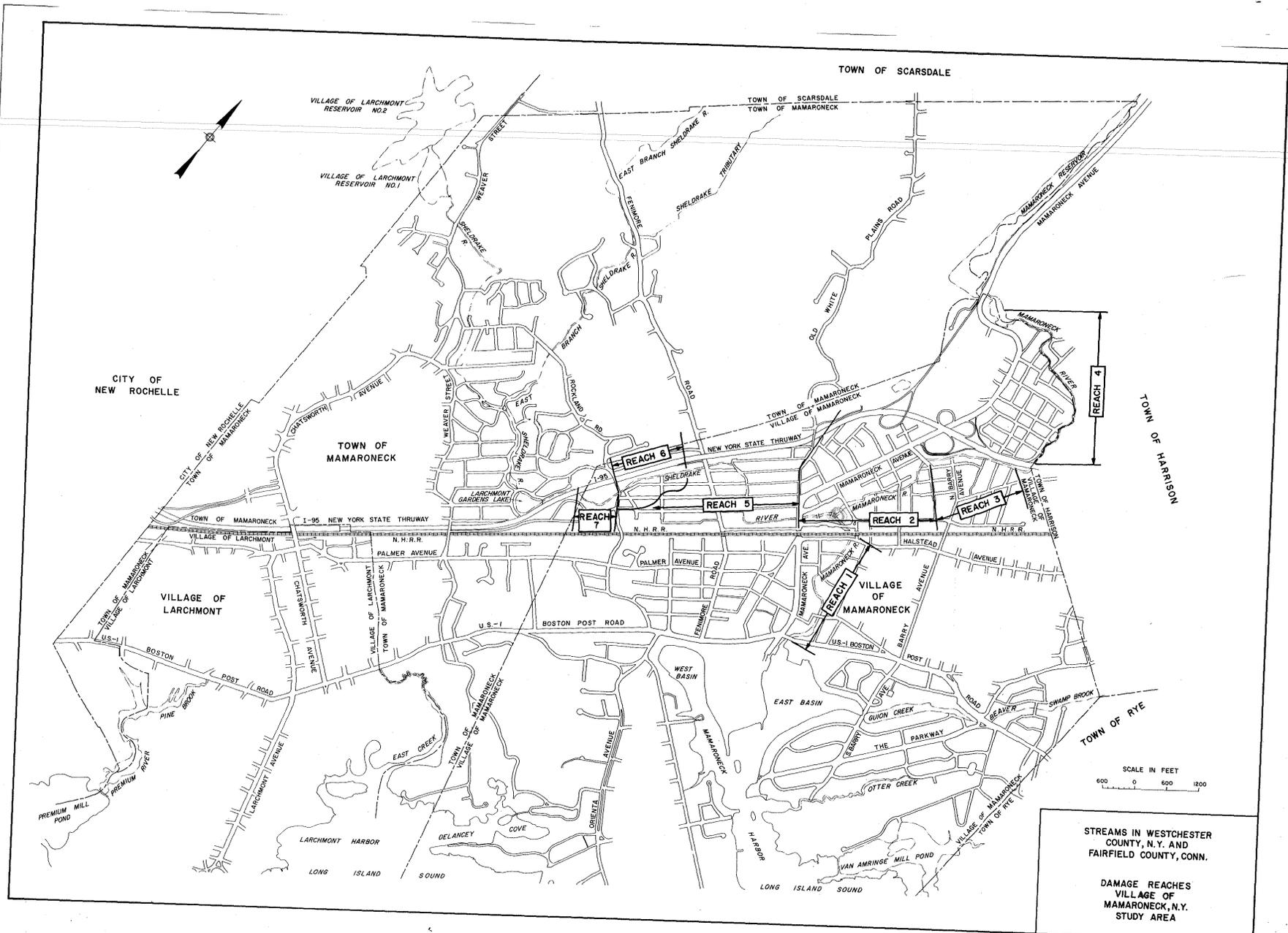
TABLE H13
SUMMARY OF BENEFITS

ANNUAL BENEFITS	
INUNDATION REDUCTION BENEFITS	\$6,134,850
AFFLUENCE FACTOR BENEFITS	\$117,400
ADVANCE REPLACEMENT OF BRIDGES	\$293,400
LESS FREQUENT PAVEMENT MAINTENANCE	\$59,000
TRAFFIC & TIME DELAY	\$700
FIA COST SAVINGS	\$22,300
RED CROSS DISASTER RELIEF	\$37,900
ADVANCE ACCRUAL OF PRE-PROJECT BENEFITS	\$752,000
TOTAL AVERAGE ANNUAL BENEFITS (OCTOBER 1988 PRICE LEVEL)	<hr/> \$7,417,550

H43. RISK AND UNCERTAINTY. As part of the Mamaroneck and Sheldrake Study effort, it is necessary to consider the extent of the risk and uncertainty that is associated with the economic analysis. In anticipation of future increases in the Federal interest rate, both benefits and costs for the selected plan were computed, utilizing interest rates higher than the current rate of 8 7/8%. An interest rate of 10% was utilized to test the sensitivity of the economic analysis of the proposed project. Table H14 presents the sensitivity of the Federal interest rates on the project benefits and costs.

TABLE H14
 SENSITIVITY OF ECONOMIC JUSTIFICATION FOR
 THE SELECTED PLAN OF IMPROVEMENT
 (\$ 000)

	8-7/8%	10%
ANNUAL BENEFITS	7,418	7,485
ANNUAL CHARGES	6,772	7,610
NET BENEFITS	646	(125)
BENEFIT-COST RATIO	1.10	0.98



SCALE IN FEET
 600 0 600 1200

STREAMS IN WESTCHESTER COUNTY, N.Y. AND FAIRFIELD COUNTY, CONN.
 DAMAGE REACHS VILLAGE OF MAMARONECK, N.Y. STUDY AREA

FIGURE #1

WESTCHESTER COUNTY STREAMS
MAMARONECK AND SHELDRAKE RIVERS
FLOOD CONTROL PROJECT
VILLAGE OF MAMARONECK

GENERAL DESIGN MEMORANDUM

APPENDIX I
PERTINENT CORRESPONDENCE

JANUARY 1989

MAMARONECK AND SHELDRAKE RIVERS BASIN
VILLAGE OF MAMARONECK
WESTCHESTER COUNTY, NEW YORK
FLOOD CONTROL PROJECT

GENERAL DESIGN MEMORANDUM

APPENDIX I - PERTINENT CORRESPONDENCE

TABLE OF CONTENTS

ITEM NUMBER	DESCRIPTION	PAGE
1	Letter (dated September 17, 1981) from Joseph P. Fraioli, Village Manager, Village of Mamaroneck, to James F. Kelley, Chief, Flood Protection Bureau, New York State Department of Environmental Conservation (NYSDEC). This letter constitutes an expression of intent.	I-1
2	Public Notice of preparation of CP&E Studies for flood control, dated September 1983	I-2
3	Letter (dated May 19, 1986) from James F. Kelley, Director, flood Protection Bureau, New York State Department of Environmental Conservation (NYSDEC). This letter constitutes an expression of intent.	I-6
4	Letter (dated March 4, 1988) from the New York District to James F. Kelley of NYSDEC. This letter sent the draft Local Cooperation Agreement (LCA) to NYSDEC, and asked for NYSDEC to review the draft LCA. The draft LCA is included as part of item 4.	I-8

APPENDIX I - PERTINENT CORRESPONDENCE

TABLE OF CONTENTS (Continued)

ITEM NUMBER	DESCRIPTION	PAGE
5	Letter (dated November 22, 1988) from the New York District to James F. Kelley of NYSDEC. This letter requests a letter of intent.	I-23
6	Letter (dated November 29, 1988) from James F. Kelley of NYSDEC. This is the letter of intent.	I-24

VILLAGE OF



MAMARONECK

Village Hall

Mamaroneck, N. Y. 10543

OFFICE OF THE
VILLAGE MANAGER

TELEPHONE
608 7041
AREA CODE 914

September 17, 1981

RECEIVED
SEP 21 1981
FLOOD PROTECTION BUREAU

Mr. James F. Kelley, Chief
Flood Protection Bureau
N.Y.S. Dept. of Environmental Conservation
50 Wolf Road
Albany, New York 12233

Re: Flood Control Project
Mamaroneck and Sheldrake Rivers

Dear Mr. Kelley:

Pursuant to telephone conversation with Mr. Tom Abbott of your office, please accept this as a letter of intent on behalf of the Village of Mamaroneck that it is still very much interested in the Corps of Engineers Flood Control Plan regarding the Mamaroneck and Sheldrake Rivers, as outlined in letter dated June 3, 1977, from our former Village Manager, copy of which is enclosed.

As you know, the project has been pending for a long time. The conditions regarding the flood problems that existed prior to the start of this project are still very much with us. The Village of Mamaroneck strongly urges that the study be continued in order to implement the project as expeditiously as possible.

Very truly yours,

Joseph P. Fraioli
Joseph P. Fraioli
Village Manager

JPF:jd
Enc.

cc: Mayor and Board
Attorney
Engineer
Clerk-Treasurer
Daily Times
Sound View News
Congressman R. Ottinger

I-1

Item 1

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 Federal Plaza
New York, New York 10278

Reply to Attention of:
Planning Division

Public Notice No.
September 1983

WESTCHESTER COUNTY STREAMS
MAMARONECK AND SHELDRAKE RIVERS BASIN
Notice of Preparation of Continuing Planning and Engineering
Studies for Flood Control

The New York District, Corps of Engineers is conducting preconstruction planning for a local flood control project along the Mamaroneck and Sheldrake Rivers in the Village of Mamaroneck and a portion of the Town of Harrison, New York (See Figure 1). This notice is to keep you informed of our progress and provide a means through which you may express your concerns and preferences regarding the considered flood control measures.

PRIOR STUDY -

In response to Congressional resolutions, the New York District and North Atlantic Division, Corps of Engineers conducted an Interim Survey Investigation of water resource problems along the Mamaroneck and Sheldrake Rivers. The Feasibility Report completed in March 1978 recommended to the Chief of Engineers construction of local flood protection projects in the Village and Town of Mamaroneck and Town of Harrison. The Chief of Engineers subsequently determined that the portion of the project in the Town of Mamaroneck could not be accomplished under Corps of Engineers flood control authorities and deleted it from further consideration.

RECOMMENDED PLAN

The recommendation plan of protection consists of a combination of channel modification, levees, floodwalls, and bridge replacements along the Mamaroneck and Sheldrake Rivers in the Village of Mamaroneck, and a diversion tunnel along the Sheldrake River in the Village from its inlet at Fenimore Road to the West Basin of Mamaroneck Harbor. The segments of the plan are described below.

Village of Mamaroneck - Mamaroneck River. The plan of protection involves a combination of channel modification, retaining walls and bridge replacement. The existing channel of the Mamaroneck River would be widened and deepened from a point downstream of Tompkins Avenue, upstream for approximately 10,000 feet to just past Winfield Avenue. The modified channel bottom along the Mamaroneck River would average 60 feet in width from the lower limit of the plan upstream to a point about 300 feet past Jefferson Avenue, and 45 feet in width from this point to the upstream limit of the channel works. The channel modification would include the relocation of the confluence of the two rivers to eliminate the two sharp bends in the existing alignment, and a number of discontinuous retaining walls. These walls lie along both banks from just below Valley Place upstream for 600 feet

to Station Plaza, along the right bank from First Street upstream for 1,700 feet to Lewis Street, and for 300 feet on the right bank at Willow Street. The plan additionally involves the replacement of the Ward Avenue, Halstead Avenue, Station Plaza and Hillside Avenue bridges, and the replacement of the Valley Place sewer bridge with an inverted syphon. Interior drainage is provided by a system of ditches and outlet drains through the line of protection, and several areas along the streams would be filled and graded. This plan is designed to protect against a flood with a .5 percent exceedence frequency (200 year flood) along the Mamaroneck River downstream of the New England Thruway, and against a flood with a 1 percent exceedence frequency (100 year flood) along the Mamaroneck River upstream of the Thruway to Winfield Avenue.

Village of Mamaroneck - Sheldrake River. The Sheldrake River would be diverted into a tunnel at Fenimore Road leading to the West Basin of Mamaroneck Harbor, for a distance of about 3,400 feet. This tunnel diversion would consist of three segments. For 1,600 feet from the Sheldrake River to Stanley Avenue, the tunnel consists of a 15 foot x 15 foot box culvert; from Stanley Avenue for 1,450 feet to just North of Boston Post Road, the diversion consists of a 15.5 foot diameter tunnel; and thence the tunnel consists of a 15 foot x 15 foot box culvert for a distance of about 350 feet to just south of Boston Post Road where the tunnel leads to an open channel and stilling basin at the West Basin of Mamaroneck Harbor. From the diversion inlet at Fenimore Road upstream to Rockland Road, the existing channel of the Sheldrake River would be modified into a semi-trapezoidal channel, with a retaining wall approximately 1,450 feet in length along the right bank, and thence to the New England Thruway the Channel would be trapezoidal with a levee 900 feet in length along the right bank. The total length of the channel modification along the Sheldrake River from the diversion inlet at Fenimore Road to the Thruway is approximately 2,700 feet, and the modified channel bottom would average 40 feet in width. The tunnel diversion and modified channel upstream of the inlet are designed to contain the Standard Project Flood along the Sheldrake River. This diversion system would divert the total flow of the Sheldrake River upstream of Fenimore Road into the tunnel. The stream flow in the Sheldrake River channel downstream of Fenimore Road to the confluence with the Mamaroneck River would be comprised of the incremental runoff which enters this reach of stream, and the existing capacity of the lower Sheldrake River would be maintained for this purpose.

Interior drainage for the works in the Village of Mamaroneck is provided by a system of ditches and drains through the line of protection, and several areas along the streams would be filled and graded. No residential, commercial or industrial structures would be acquired as part of this plan.

PRECONSTRUCTION PLANNING PROGRAM

A period of several years often elapses between the time when the feasibility report (evaluation of alternative plans and development of a recommended plan of improvement) is prepared and the required Congressional authorization for the project is obtained. Under the Continuing Planning and Engineering programs, study effort (on the recommended plan of improvement) is initialized prior to project authorization. This procedure is intended to expedite the accomplishment of all necessary studies to ready the project for construction.

The specific purposes of this program are to re-establish the most suitable plan for accomplishing the recommended improvements and to perform the detailed design of project features. These studies include as complete an analysis as necessary based on current criteria to:

- . Either affirm the validity of the recommended plan in light of current conditions and criteria, or to reformulate the plan as required by such conditions and criteria.
- . Provide for an updating of estimated project cost, benefits and environmental impacts.
- . Provide for coordination of all aspects of the project with the other governmental agencies, local interests and the public.
- . Provide a reasonable degree of assurance that the contemplated commitment of local cooperation will be carried out at the time the project is constructed.

STEPS REQUIRED PRIOR TO PROJECT CONSTRUCTION

The following chronological steps will be required prior to the construction of the Mamaroneck and Sheldrake Rivers project:

- . Accomplish Continuing Planning and Engineering Studies with acceptance by local interests and approvals by the Division Engineer and Chief of Engineers.
- . Project authorization by Congress. (Maybe concurrent to previous step).
- . Preparation of Plans and Specifications for project features.
- . Appropriation of construction funds by Congress.
- . Award contract for project construction.

WORK IN PROGRESS

At present, engineering, economic and environmental studies are being conducted under the Continuing Planning and Engineering Program. Work effort during 1983 and 1984 will concentrate on analyzing the recommended plan of improvement for project feasibility, and conducting the necessary hydrologic and hydraulic model studies required for project design.

Detailed design of the project's features will be conducted in subsequent years with completion of the study scheduled for late 1987. Future publications or meetings will describe work progress and any major issues concerning the project which may arise.

YOUR INVOLVEMENT

If you are interested in receiving future notices regarding the Mamaroneck study/project or wish to be deleted from our mailing list, please complete the enclosed form and return it to us. Also, if you have comments, questions, or suggestions about this project, please feel free to contact us. You may write to the address below or telephone our River Basin Section at (212) 264-1060.

U.S. Army Corps of Engineers
New York District
Planning Division
26 Federal Plaza
New York, New York 10278

May 19, 1986

Mr. Samuel P. Tosi, P.E.
Chief, Planning Division
New York District
Corps of Engineers
Dept. of the Army
26 Federal Plaza
New York, NY 10278

Dear Mr. Tosi:

Reference is made to your letter of May 14, 1986 concerning the state's interest in and the intent to cooperate with the Federal Government in the implementation of the proposed flood control project for the Mamaroneck and Sheldrake Rivers Basin in Mamaroneck, New York.

This letter constitutes an expression of intent by the New York State Department of Environmental Conservation to cooperate with the Federal Government in initiating construction of the Mamaroneck and Sheldrake Rivers Flood Control Project.

To facilitate construction of the Mamaroneck and Sheldrake Project, the State of New York assumes responsibility for all lands, easements and rights-of-way, and agrees to perform all necessary relocations of utilities as necessary for construction of the project during the period of project construction.

In addition, the State of New York will provide such funds as are necessary to meet the non-Federal requirements for construction during the term of construction. Based upon the present project cost estimate of which lands, easements and rights-of-way and relocations of utilities are less than 20 percent, the State of New York will bear 25 percent of the total first cost of the project, to be provided during the construction period. It is also understood that if the cost of the LERR is equal to or greater than 20% the State of New York will bear all cost of LERR + 5% during the construction period.

The State of New York will bear the costs of operating and maintaining the project upon completion of construction in accordance with regulations prescribed by the Secretary of the Army.

The New York State Department of Environmental Conservation is authorized by law to provide the non-Federal cooperation required for

the Mamaroneck and Sheldrake project, and prior to construction will enter into a binding written agreement with the Corps of Engineers.

It is understood that if Federal Legislation is enacted which changes cost-sharing and financing for the non-Federal interests, such cost sharing and financing provisions will supercede the terms in this letter.

Sincerely,

James F. Kelley
Director
Flood Protection Bureau

TEA:pt
cc: Manfredi/Keating



DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, N. Y. 10278-0090

March 4, 88

REPLY TO
ATTENTION OF:

Planning Division
River Basin Section A

Mr. James F. Kelley
Director, Flood Protection Bureau
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233-0001

Dear Mr. Kelley:

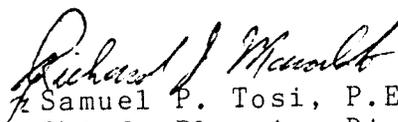
Enclosed is a copy of the draft Local Cooperation Agreement (LCA) for the Flood Control Project for Westchester County Streams, Mamaroneck and Sheldrake Rivers at Mamaroneck, New York.

At this time, we would like your review of the draft LCA. If you find it acceptable, please respond by letter that you would be willing to sign such an agreement. Enclosed is a sample letter indicating such agreement. If you do not find the draft LCA acceptable, please let us know your concerns.

We would appreciate your response to this letter by March 25, 1988.

If you have any questions, please contact Mr. Richard Gajdek or Mr. George Perlmutter of my staff at (212) 264-9086. Thank you for your attention in this matter.

Sincerely,


Samuel P. Tosi, P.E.
Chief, Planning Division

Enclosures

I - 8

Item 4

LOCAL COOPERATION AGREEMENT
BETWEEN
THE DEPARTMENT OF THE ARMY
AND
THE STATE OF NEW YORK
ACTING BY AND THROUGH ITS
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FOR CONSTRUCTION OF THE
FLOOD CONTROL PROJECT
FOR WESTCHESTER COUNTY STREAMS,
MAMARONECK AND SHELDRAKE
RIVERS AT MAMARONECK, NEW YORK

THIS AGREEMENT, entered into this _____ day
of _____, 1987, by and between the DEPARTMENT OF THE ARMY
(hereinafter referred to as the "Government"), acting by and
through the Assistant Secretary of the Army (Civil Works), and
the STATE OF NEW YORK (hereinafter referred to as the "State"),
acting by and through its Department of Environmental
Conservation.

WITNESSETH, THAT:

WHEREAS, the Flood control project for Westchester County
Streams, Mamaroneck and Sheldrake Rivers at Mamaroneck, New York
was authorized by Section 401 (a) of the Water Resources
Development Act of 1986 (PL 99-662 dated 17 November 1986); and,

WHEREAS, the Water Resources Development Act of 1986,
Public Law 99-662, specifies the cost-sharing requirements
applicable to the Project; and

WHEREAS, the State has the authority and capability to
furnish the cooperation hereinafter set forth and is willing to
participate in project cost-sharing and financing in accordance
with the terms of this Agreement;

NOW, THEREFORE, the parties agree as follows:

ARTICLE I - DEFINITIONS

For purposes of this Agreement:

a. The term "project" shall mean the following:

1. Mamaroneck River (Village of Mamaroneck) -
Channel modification along approximately 10,000 feet,
retaining walls for about 3,700 feet, replacement of
four bridges, and interior drainage works.
2. Sheldrake River (Village of Mamaroneck) - A
diversion tunnel about 3,000 feet in length from its
inlet at Fenimore Road to the West Basin of
Mamaroneck Harbor, channel modification along
approximately 2,700 feet, a retaining wall for about
1,700 feet, and a levee along about 1,000 feet.

b. The term "total project costs" shall mean all costs incurred by the State and the Government directly related to construction of the project. Such costs shall include, but not necessarily be limited to, actual construction costs, costs of applicable engineering and design, continuing planning and engineering costs incurred after October 1, 1985, supervision and administration costs, costs of project construction contract dispute settlements or awards, and the value of lands, easements, rights-of-way, relocations, and dredged material disposal areas provided for the project by the State, but shall not include any costs for betterments or operation and maintenance.

c. The term "period of construction" shall mean the time from the advertisement of the first construction contract to the time of acceptance of the project by the Contracting Officer.

d. The term "Contracting Officer" shall mean the Commander of the U.S. Army Engineer District, New York, or his designee.

e. The term "highway" shall mean any highway, thoroughfare, roadway, street, or other public or private road or way.

ARTICLE II - OBLIGATIONS OF THE PARTIES

a. The Government, subject to and using funds provided by the State and appropriated by the Congress, shall construct the project (including alterations or relocation of Railroad Bridges), applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations and policies. The State shall be afforded the opportunity to review and comment on all contracts, including relevant plans and specifications, prior to the issuance of invitations for bids. The State also shall be afforded the opportunity to review and comment on all modification and change orders prior to the issuance to the contractor of a Notice to Proceed. The Government will consider the views of the State, but award of the contracts and performance of the work thereunder shall be exclusively within the control of the Government.

b. When the Government determines that the project, or functional element thereof, is complete, the Government shall turn the project or element over to the State, which shall accept the project or element and be solely responsible for operating, maintaining, replacing, and rehabilitating the project in accordance with Article VIII hereof.

c. As further specified in Article VI hereof, the State shall provide, during the period of construction, a cash contribution of 5 percent of total project costs.

d. As further specified in Article III hereof, the State shall provide all lands, easements, rights-of-way, and dredged material disposal areas, and perform all relocations and alterations of buildings, utilities, highways, railroads, bridges, sewers, and related and special facilities determined by the Government to be necessary for construction of the project.

e. If the value of the contributions provided under paragraphs c. and d. of this Article represents less than 25 percent of total project costs, the State shall provide during the period of construction an additional cash contribution in the amount necessary to make its total contribution equal to 25 percent of total project costs.

f. No less than once each year the State shall inform affected interests of the limitations of the protection afforded by the project.

g. The State shall publicize floodplain information in the area concerned and shall provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the floodplain and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project.

ARTICLE III - LANDS, FACILITIES, AND RELOCATION ASSISTANCE

a. Prior to the advertisement of any construction contract, the State shall furnish to the Government all lands, easements, and rights-of-way, including suitable borrow and dredged material disposal areas, as may be determined by the Government to be necessary for construction of the project, and shall furnish to the Government evidence supporting the State's legal authority to grant rights-of-entry to such lands.

b. The State shall provide or pay to the Government the full cost of providing all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged material disposal areas necessary for construction of the project.

c. Upon notification from the Government, the State shall accomplish or arrange for accomplishment at no cost to the Government of all alterations and relocations of buildings, highways, railroads, bridges, (other than Railroad Bridges), storm drains, utilities, cemeteries, and other facilities, structures, and improvements determined by the Government to be necessary for construction of the project.

d. The State shall comply with the applicable provisions of the Uniform Relocations Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, approved January 2, 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent operation and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

ARTICLE IV - VALUE OF LANDS AND FACILITIES

a. The value of the lands, easements, and rights-of-way to be included in total project costs and credited toward the State's share of total project costs will be determined in accordance with the following procedures:

1. If the lands, easements, or rights-of-way are owned by the State as of the date this Agreement is signed, the credit shall be the fair market value of the interest at the time such interest is made available to the Government for construction of the Project. The fair market value shall be determined by an appraisal, to be obtained by the State, which has been prepared by an independent and qualified appraiser who is acceptable to both the State and the Government. The appraisal shall be reviewed and approved by the Government.

2. If the lands, easements, or rights-of-way are to be acquired by the State after the date this Agreement is signed, the credit shall be the fair market value of the interest at the time such interest is made available to the Government for construction of the project. The fair market value shall be determined as specified in subparagraph 1. above. If the State pays an amount in excess of the appraised fair market value, it may be entitled to a credit for the excess if the State has secured prior written approval from the Government of its offer to purchase such interest.

3. If the State acquires more lands, easements, or rights-of-way than are necessary for project purposes, as determined by the Government, then only the value of such portions of those acquisitions as are necessary for project purposes shall be included in total project costs and credited to the State's share.

4. Credit for lands, easements, and rights-of-way in the case of involuntary acquisitions which occur within a one-year period preceding the date this Agreement is signed or which occur after the date this Agreement is signed will be based on court awards, or on stipulated settlements that have received prior Government approval.

5. For lands, easements, or rights-of-way acquired by the State within a five-year period preceding the date this agreement is signed, or any time after this agreement is signed, credits provided under this paragraph will also include the actual incidental costs of acquiring the interest, e.g., closing and title costs, appraisal costs, survey costs, attorney's fees, plat maps, and mapping costs, as well as the actual amounts expended for any relocation assistance provided in accordance with the obligations under this Agreement.

b. The costs of relocations or modification of utilities or facilities that will be included in total project costs and credited towards the State's share of total project costs shall be that portion of the actual costs incurred by the State as set forth below:

1. Highways and Highway Bridges: Only that portion of the cost as would be necessary to construct substitute bridges and highways to the design standard that the State of New York would use in constructing a new bridge or highway under similar conditions of geography and traffic loads.

2. Utilities and Facilities (Including Railroads): Actual relocation costs, less depreciation, less salvage value, plus the cost of removal, less the cost of betterments. With respect to betterments, new materials shall not be used in any relocation or alteration if materials of value and usability equal to those in the existing facility are available or can be obtained as salvage from the existing facility or otherwise, unless the provision of new material is more economical. If, despite the availability of used material, new material is used, where the use of such new material represents an additional cost, such cost will not be included in total project costs.

ARTICLE V - CONSTRUCTION PHASING AND MANAGEMENT

a. To provide for consistent and effective communication between the State and the Government during the term of construction, the State and the Government shall appoint representatives to coordinate on scheduling, plans, specifications, modifications, contract costs, and other matters relating to construction of the project.

b. The representatives appointed above shall meet as necessary during the term of project construction and shall make such recommendations as they deem warranted to the Contracting Officer.

c. The Contracting Officer shall consider the recommendations of the representatives in all matters relating to the project, but the Contracting Officer, having ultimate responsibility for construction of the project, has complete discretion to accept, reject, or modify the recommendations.

ARTICLE VI - METHOD OF PAYMENT

a. The State shall provide, over the term of construction, the amounts required under Article II.c. and II.e. of this Agreement. Total project costs are presently estimated to be \$_____. In order to meet its share, the State must provide a total cash contribution presently estimated to be \$_____. The State's contribution is determined from the following: provide lands, easements, rights-of-way and relocations, presently estimated at \$_____ ; pay 11 percent of the costs allocated to flood control, presently estimated at \$_____, so that the total contribution of the local interests is equal to 25 percent of the cost allocated to flood control. The State will also have to bear all costs of operation, maintenance and replacement of flood control facilities presently estimated at \$_____ annually.

b. The State shall provide its required cash contribution in proportion to the rate of Federal expenditures over the term of the construction period in accordance with the following provisions:

1. For purposes of budget planning, the Government shall notify the State by _____ of each year of the estimated funds that will be required from the sponsor to meet its share of project costs for the corresponding Government fiscal year.

2. Sixty days prior to the award of the first construction contract, the Government shall notify the State of its share of project costs, including costs attributable to the project incurred prior to the initiation of construction, for the first fiscal year of construction. Within 30 days thereafter, the State shall verify to the satisfaction of the Government that it has deposited the requisite amount in an escrow account acceptable to the Government, with interest accruing to the State.

3. For the second and subsequent fiscal years of project construction, the Government shall, 60 days prior to the beginning of the fiscal year, notify the State of its share of project costs for that fiscal year. No later than 30 days prior to the beginning of the fiscal year, the State shall make the necessary funds available to the Government through the funding mechanism specified above. As construction of the project proceeds, the Government may adjust the amounts required to be provided under this paragraph to reflect actual project costs.

4. If at any time during the period of construction the Government determines that additional funds will be needed from the State to meet its required share of project costs, the Government shall so notify the State and the State, within 60 days from receipt of notice, shall make the necessary funds available through the funding mechanism specified above.

c. The Government will draw on the escrow account provided by the State such sums as it deems necessary to cover contractual and in-house fiscal obligations attributable to the project as they are incurred, as well as project costs incurred by the Government prior to the initiation of construction.

d. Upon completion of the project and resolution of all relevant contract claims and appeals, the Government shall compute the total project costs and tender to the State a final accounting of its share of project costs. In the event the total contribution by the State is less than its minimum required share of project costs at the time of the final accounting, the State shall, within 90 calendar days after receipt of written notice, make a cash payment to the Government of whatever sum is required to meet its minimum required share of project costs. In the event the State has made cash contributions in excess of 5 percent of total project costs which result in the State's having provided more than its required share of project costs, the Government shall within 90 days of the final accounting, subject to the availability of appropriations, return said excess to the State; however, the State shall not be entitled to any refund of the 5 percent cash contribution required pursuant to Article II.c. hereof. If the State's total contribution under this Agreement (including lands, easements, rights-of-way, relocations, and dredged material disposal areas provided by the sponsor) exceeds 50 percent of total project costs, the Government shall, subject to the availability of appropriations, refund the excess to the State within 90 days of the final accounting; however, the State shall not be entitled to any refund of the 5 percent cash contribution required pursuant to Article II.c. hereof.

ARTICLE VII - DISPUTES

Before any party to this Agreement may bring suit in any court concerning an issue relating to this Agreement, such party must first seek in good faith to resolve the issue through negotiation or other forms of nonbinding alternative dispute resolution mutually acceptable to the parties.

ARTICLE VIII - OPERATION, MAINTENANCE, AND REHABILITATION

a. After it is turned over by the Government, the State shall operate, maintain, replace, and rehabilitate the project upon completion in accordance with regulations or directions prescribed by the Government.

b. The State hereby gives the Government a right to enter, at reasonable times and in a reasonable manner, upon land which it owns or controls for access to the Project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, repairing, maintaining, replacing, or rehabilitating the project. If an inspection shows that the State for any reason is failing to fulfill its obligations under this Agreement without receiving prior written approval from the Government, the Government will send a written notice to the State. If the State persists in such failure for 30 calendar days after receipt of the notice, then the Government shall have a right to enter, at reasonable times and in a reasonable manner, upon lands the State owns or controls for access to the project for the purpose of completing, operating, repairing, maintaining, replacing, or rehabilitating the project. No completion, operation, repair, maintenance, replacement, or rehabilitation by the Government shall operate to relieve the State of responsibility to meet its obligations as set forth in this Agreement, or to preclude the Government from pursuing any other remedy at law or equity to assure faithful performance pursuant to this Agreement.

ARTICLE IX - RELEASE OF CLAIMS

The State shall hold and save the Government free from all damages arising from the construction, operation, and maintenance of the project, except for damages due to the fault or negligence of the Government or its contractors.

ARTICLE X - MAINTENANCE OF RECORDS

The Government and the State shall keep books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement to the extent and in such detail as will properly reflect total project costs. The Government and the State shall maintain such books, records, documents, and other evidence for a minimum of three years after completion of construction of the project and resolution of all claims arising therefrom, and shall make available at their offices at reasonable times, such books, records, documents, and other evidence for inspection and audit by authorized representatives of the parties to this Agreement.

ARTICLE XI - FEDERAL AND STATE LAWS

In acting under its rights and obligations hereunder, the State agrees to comply with all applicable Federal and state laws and regulations, including section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense Directive 5500.II issued pursuant thereto and published in Part 300 of Title 32, code of Federal Regulations, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."

ARTICLE XII - RELATIONSHIP OF PARTIES

The parties to this Agreement act in an independent capacity in the performance of their respective functions under this Agreement, and neither party is to be considered the officer, agent, or employee of the other.

ARTICLE XIII - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, or resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE XIV - COVENANT AGAINST CONTINGENT FEES

The State warrants that no person or selling agency has been employed or retained to solicit or secure this Agreement upon agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the State for the purpose of securing business. For breach or violation of this warranty, the Government shall have the right to annul this Agreement without liability, or, in its discretion, to add to the Agreement or consideration, or other wise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

ARTICLE XV - TERMINATION OR SUSPENSION

a. If at any time the State fails to make the payments required under this Agreement, the Secretary of the Army shall terminate or suspend work on the project until the State is no longer in arrears, unless the Secretary determines that continuation of work on the project is in the interest of the United States. Any delinquent payment shall be charged interest at a rate, to be determined by the Secretary of the Treasury,

equal to 150 per centum of the average bond equivalent rate of the 13-week Treasury bills auctioned immediately prior to the date on which such payment became delinquent, or auctioned immediately prior to the beginning of each additional 3-month period if the period of delinquency exceeds 3 months.

b. If the Government fails to receive annual appropriations in amounts sufficient to meet project expenditures for the then-current or upcoming fiscal year, the Government shall so notify the State. After 60 days either party may elect without penalty to terminate this Agreement or to suspend performance thereunder, and the parties shall conclude their activities relating to the project and proceed to a final accounting in accordance with Article VI.

ARTICLE XVI - OBLIGATION OF FUTURE APPROPRIATIONS

Nothing herein shall constitute, or be deemed to constitute, an obligation of future appropriations by the legislature of the State of New York.

ARTICLE XVII - NOTICES

a. All notices, requests, demands, and other communications required or permitted to be given under this Agreement shall be deemed to have been duly given if in writing and delivered personally, given by prepaid telegram, or mailed by first-class (postage-prepaid), registered, or certified mail, as follows:

If to the State:

Commissioner
New York State Department
Of Environment Conservation
50 Wolf Road
Albany, New York 12233

If to the Government:

Commander
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278

b. A party may change the address to which such communications are to be directed by giving written notice to the other in the manner provided in this section.

c. Any notice, request, demand, or other communication made pursuant to this Article shall be deemed to have been received by the addressee at such time as it is personally delivered or on the third business day after it is mailed, as the case may be.

ARTICLE XVIII - CONFIDENTIALITY

To the extent permitted by the law governing each party, the parties agree to maintain the confidentiality of exchanged information when requested to do so by the providing party.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

THE DEPARTMENT OF THE ARMY THE STATE OF NEW YORK

BY: _____
ROBERT W. PAGE
Assistant Secretary of
the Army (Civil Works)

BY: _____
RICHARD TORKELSON
Deputy Commissioner,
Department of
Environmental Conservation

DATE: _____ DATE: _____

EXHIBIT A

CERTIFICATE OF AUTHORITY

I, _____, do hereby certify that I represent the Attorney General of the State of New York, that the New York State Department of Environmental Conservation is a legally constituted public body with full authority and legal capability to perform the terms of the agreement between the Department of the Army and the State of New York in connection with the FLOOD CONTROL PROJECT FOR WESTCHESTER COUNTY STREAMS, MAMARONECK AND SHELDRAKE RIVERS AT MAMARONECK, NEW YORK, and to pay damages, if necessary, in the event of the failure to perform in accordance with Section 221 of Public Law 91-611 and that the person who has executed the contract on behalf of the State of New York, acting by and through its Department of Environmental Conservation, has acted within his statutory authority.

In Witness Whereof, I have made and executed this Certificate this _____ day of 1987 .

ATTORNEY GENERAL OF THE STATE OF NEW YORK

BY _____

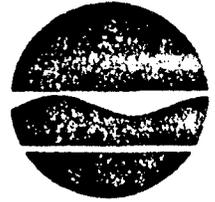
ASSISTANT ATTORNEY GENERAL OF THE STATE OF NEW YORK

STATE OF NEW YORK)
) SS:
COUNTY OF)

On this _____ day of _____ in the year 1987, before me, a Notary Public of New York, personally came _____, to me known and known to me to be the Assistant Attorney General of the State of New York, and the same person described in and who executed the within Certificate of Authority, dated _____, 1987, and he acknowledged he executed the same for the Attorney General of the State of New York as the Assistant Attorney General for the State of New York.

A Notary Public of New York

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-



Henry G. Williams
Commissioner

June 12, 1987

Mr. Samuel P. Tosi
Chief, Planning Division
NY District Corps of Engineers
26 Federal Plaza
New York, NY 10278

Dear Mr. Tosi:

This is to advise that the State has reviewed the draft local cooperation agreement for the Shinnecock Inlet Project and find it substantially satisfactory. We anticipate that the State will execute a mutually acceptable agreement at the appropriate time.

Sincerely,

James F. Kelley
Director
Bureau of Flood Protection

cc: H. Burger
J. Gilman

JFK/ks

SAMPLE LETTER
INDICATING AGREEMENT

I-22

Enclosure

Gajdek

November 22, 1988

PERLMUTTER/pm/9086

Planning Division
River Basin A

Mr. James F. Kelley
Director Flood Protection Bureau
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233

Dear Mr. Kelley:

This is to confirm our recent (during the week of Oct 31, 88) verbal request for a letter of intent to cooperate with the Corps of Engineers as the non-Federal sponsor for the Mamaroneck and Sheldrake Rivers, Village of Mamaroneck, New York Flood Control Project. Please make reference to the draft Local Cooperation Agreement (LCA) sent to you on March 4, 1988.

Please send the aforementioned letter of intent.

Thank you for your attention on this matter.

SIGNED

Richard J. Maraldo, P.E.
Acting Chief, Planning Division

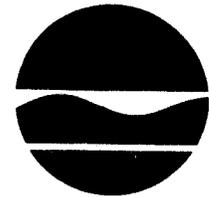
cf: Tosi
Maraldo/Hook
Bergmann
Pfeifer
Gajdek
Perlmutter

(PFEIFER
BERGMANN
HOOK
MARALDO

I - 23

Item 5

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233



Thomas C. Jorling
Commissioner

November 29, 1988

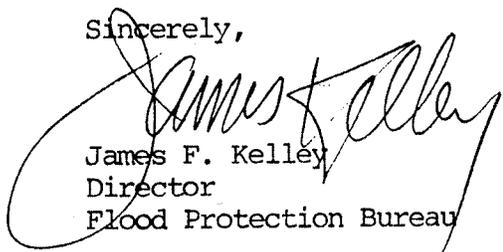
Mr. Richard J. Maraldo, P.E.
Acting Chief, Planning Division
NY Corp of Engineers
Department of the Army
26 Federal Plaza
New York, NY 10278

ATTN: Planning Division
River Basin A

Dear Mr. Maraldo:

In response to your letter of November 22, 1988, this is to confirm the intention of this Agency to enter into a Local Cooperation Agreement similar to the draft sent to us on March 4, 1988, with the federal government with respect to the Mamaroneck and Sheldrake Rivers, Village of Mamaroneck, New York Flood Control Project.

Sincerely,



James F. Kelley
Director
Flood Protection Bureau

RLK/JFK/no

cc: Marcogliese/Crawford
J. Fraioli

I-24

Item 6

WESTCHESTER COUNTY STREAMS
MAMARONECK AND SHELDRAKE RIVERS
FLOOD CONTROL PROJECT
VILLAGE OF MAMARONECK

GENERAL DESIGN MEMORANDUM

APPENDIX J
REAL ESTATE

JANUARY 1989

TABLE OF CONTENTS

	<u>Page Number</u>
Summary of Findings.....	J-1 to J-3
Photographs of Property.....	J-4 to J-10
Purpose of Report.....	J-11 to J-12
Date of Value Estimate.....	J-13
Site Identification.....	J-13
Utilities.....	J-13
Zoning.....	J-13
Flood Hazard Zone.....	J-14
Neighborhood Data.....	J-14 to J-15
Methodology.....	J-16
Market Data Approach to Land Value.....	J-17 to J-22
Calculation of Gross Value Estimate.....	J-23 to J-27
Final Gross Value Estimate.....	J-28
Certification.....	J-29
Contingent and Limiting Conditions.....	J-30 to J-31
 <u>Addenda</u>	
Comparable Sales	J-32 to J-41
Qualifications of Appraiser	J-42
 <u>Figures</u>	
Local Cooperation Requirements Sheets	Figures J1 through J22

Alfred Benvenuto

Appraiser - Consultant

1859 West 4th Street, Brooklyn, New York 11223

(718) 339-0373

.....

FLOOD CONTROL PROJECT

Mamaroneck and Sheldrake River Basins

Village of Mamaroneck
and

Town of Harrison

State of New York

.....

GROSS VALUE ESTIMATE

October 22, 1987

PREPARED FOR:

Army Corps of Engineers

PREPARED BY:

Alfred Benvenuto

Alfred Benvenuto

Appraiser - Consultant

1859 West 4th Street, Brooklyn, New York 11223

(718) 339-0373

October 31, 1987

Mr. Vincent Wahn, Chief Appraiser
CENAN-RE-E
Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

RE: FLOOD CONTROL PROJECT
Mamaroneck & Sheldrake River Basins
Village of Mamaroneck and Town of Harrison
Westchester County, State of New York

Dear Mr. Wahn:

I have completed an analysis of the area in which the above captioned Project is located. The purpose of the report is to estimate the gross value of the acquisition and easements of lands along the subject location. The conclusion of gross value estimate for the five categories is:

(A) Permanent Easement in Waterway:	\$ -0-
(B) Permanent Easement out of Waterway:	2,260,764
(C) Temporary Easement:	1,074,617
(D) Acquisition in Fee:	1,276,306
(E) Lands in Street Right-of-way:	-0-
Total	\$4,611,687

TOTAL GROSS VALUE OF LAND, say,

- \$4,612,000.00 -

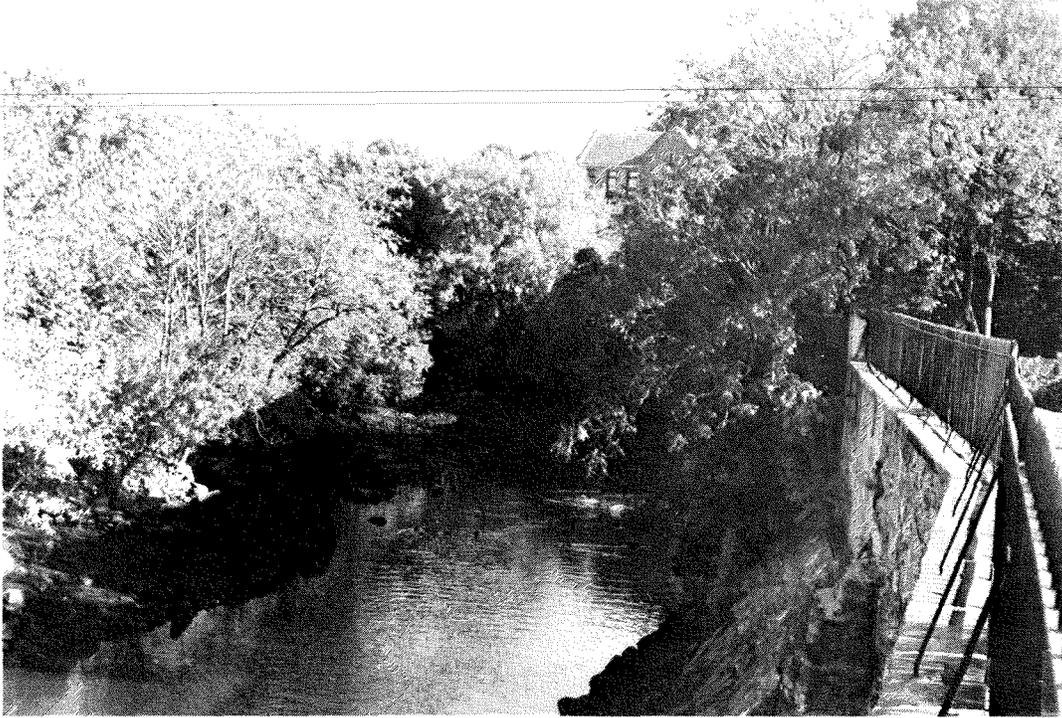
The accompanying report, of which this letter is a part, includes the supporting data and analysis upon which the value is based.

Very truly yours,



Alfred Benvenuto
Appraiser

Flood Control Project
Mamaroneck and Sheldrake River Basins
Westchester County, New York State



Downstream Limit North of US-1



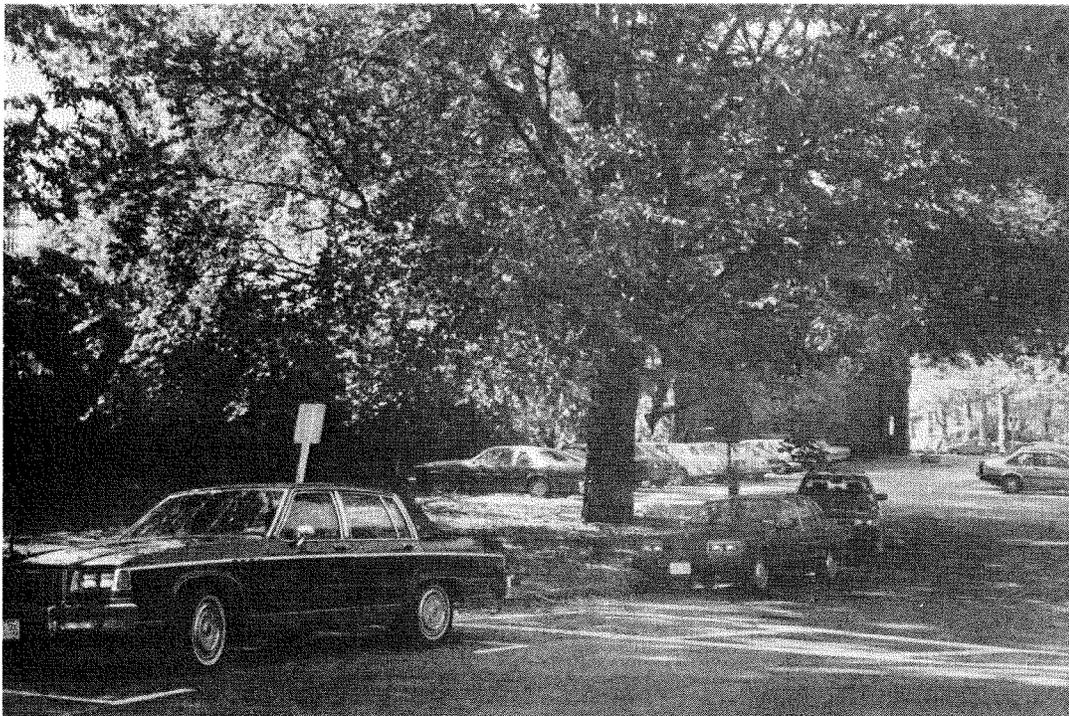
Tompkins Avenue Bridge North

J-4

Flood Control Project
Mamaroneck and Sheldrake River Basins
Westchester County, New York State



Tompkins Avenue Bridge North Parking Lot



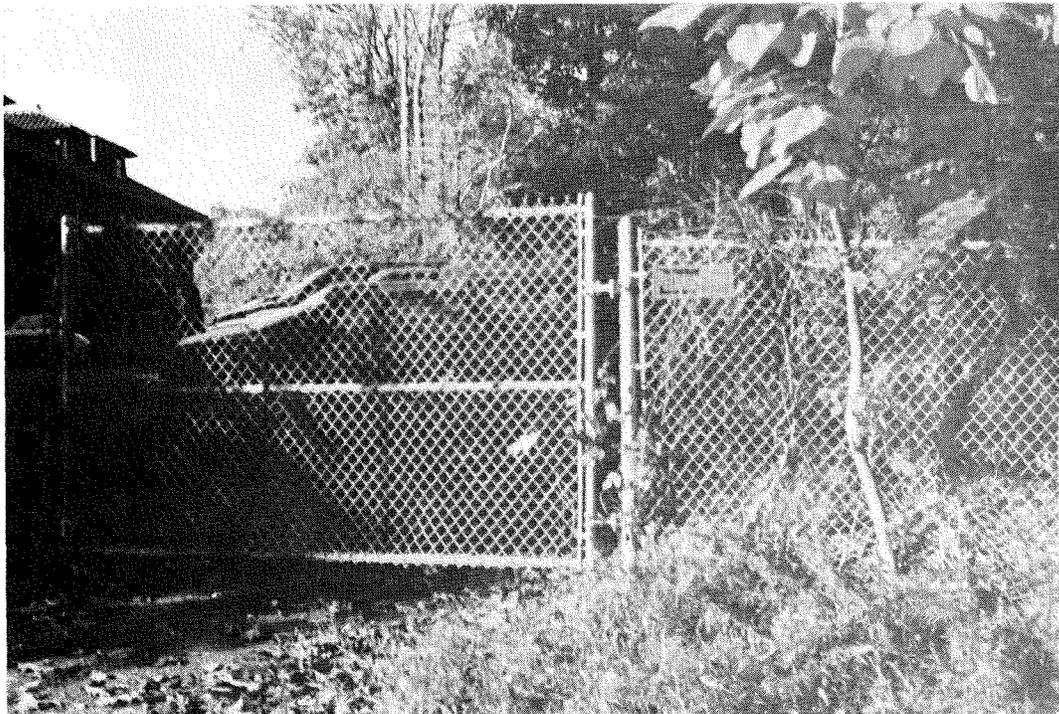
Station Plaza Parking Lot

J-5

Flood Control Project
Mamaroneck and Sheldrake River Basins
Westchester County, New York State



House on Cedar Street in Easement Area



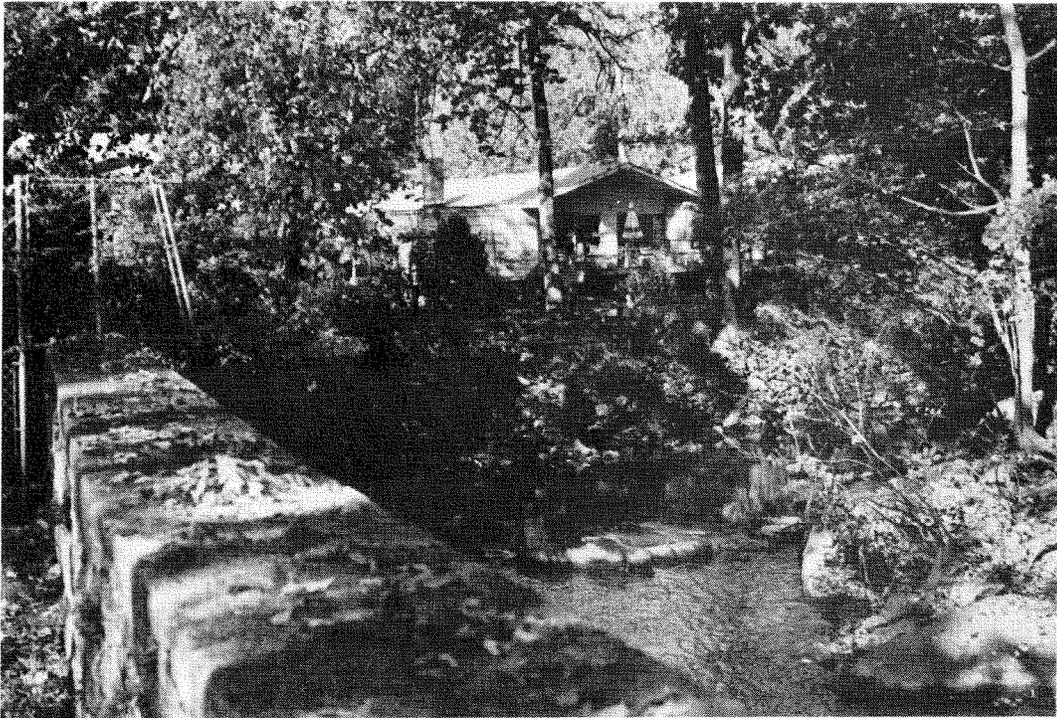
Righthand Bank at Winfield Avenue

J-6

Flood Control Project
Mamaroneck and Sheldrake River Basins
Westchester County, New York State



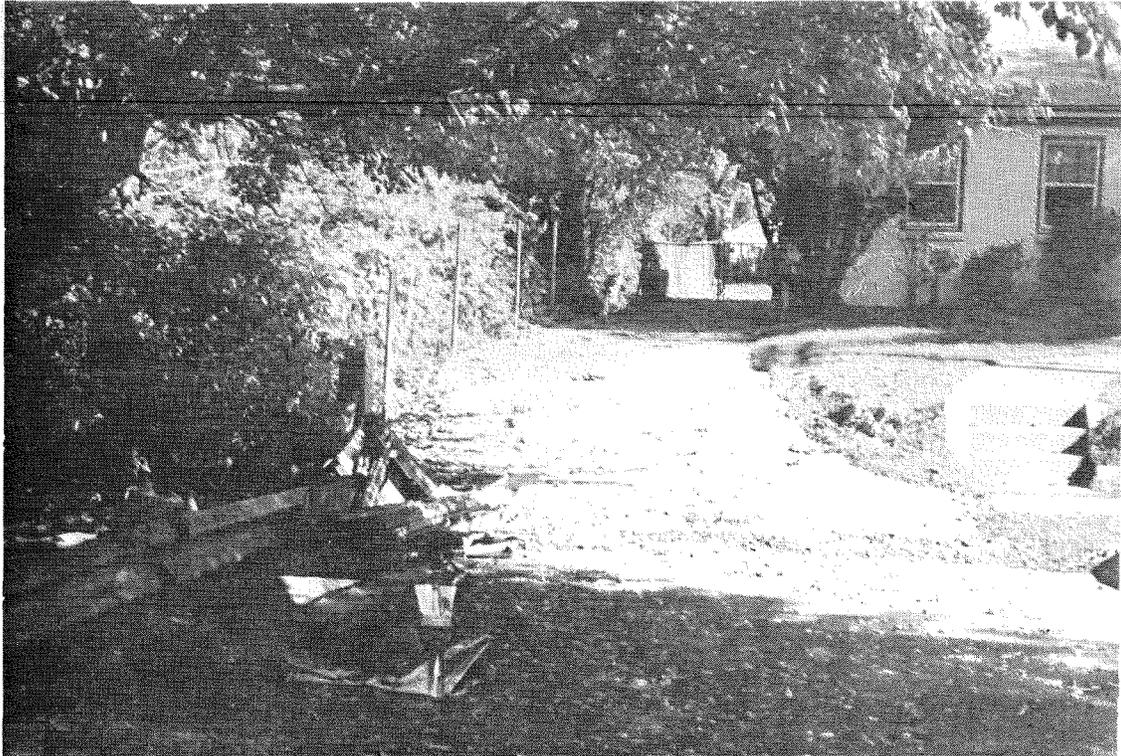
Winfield Avenue



Urban Street Looking East

J-7

Flood Control Project
Mamaroneck and Sheldrake River Basins
Westchester County, New York State



North Barry Avenue Temporary Easement



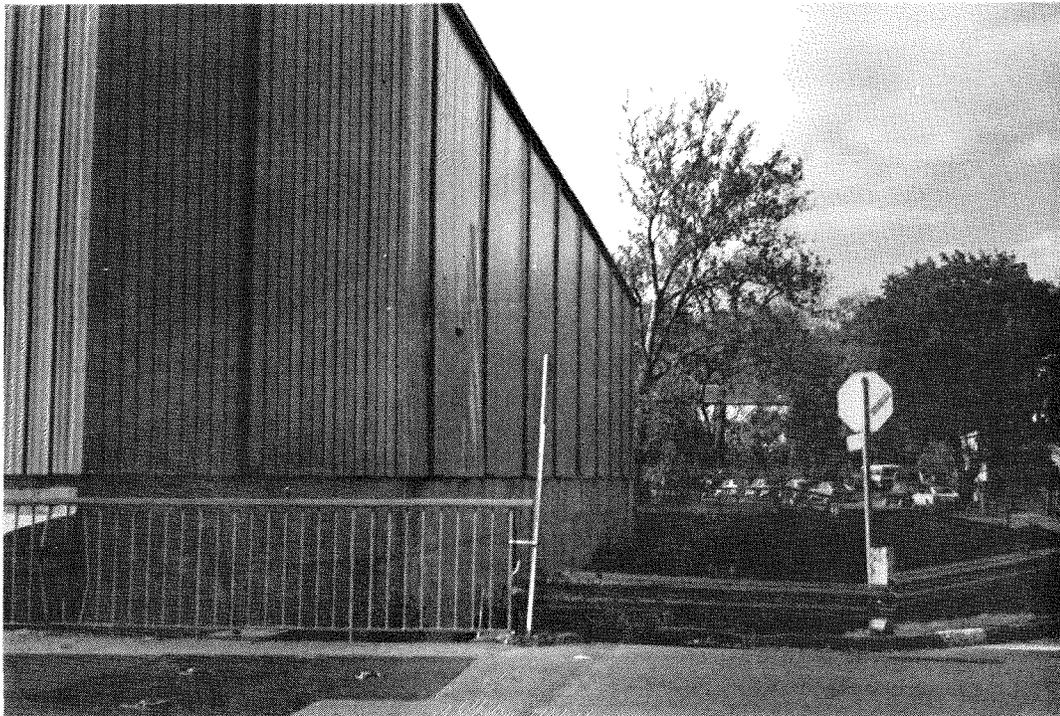
Lewis Street Temporary Easement

J-8

Flood Control Project
Mamaroneck and Sheldrake River Basins
Westchester County, New York State



Fenimore Road Looking Southeast



Building on Temporary Easement
Sheldrake River North of Center Street

J-9

Flood Control Project
Mamaroneck and Sheldrake River Basins
Westchester County, New York State



Mamaroneck Avenue Looking Northeast



East Plaza Looking Northeast

J-10

PURPOSE OF REPORT

Gross value estimate for the Flood Control Project at Mamaroneck and Sheldrake River Basins, Village of Mamaroneck and Town of Harrison, New York. The lands to be acquired for the widening of the river have been plotted on 25 drawings supplied by the Army Corps of Engineers. There will be five categories:

- (A) Permanent Easement in waterway - nominal value unusable land.
- (B) Permanent Easement out of waterway - 10% to 75% of flood plain land.
- (C) Temporary Easement for 1½ years - 10% return per year.
- (D) Acquisition in Fee - 25% to 75% of fee value of flood plain land.
- (E) Permanent Easement in street Right-of-way - nominal with village to maintain any future repairs.

PURPOSE OF REPORT (continued)

The market value of the land will be the Fee Simple interest.

Market Value Definition:

The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller, each acting prudently, knowledgeably and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

- (1) buyer and seller are typically motivated;
- (2) both parties are well informed or well advised, and each acting in what he considers his own best interest;
- (3) a reasonable time is allowed for exposure in the open market;
- (4) payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto; and
- (5) the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

Fee Simple Definition: An absolute fee; a fee without limitations to any particular class of heirs or restrictions, but subject to the limitations of eminent domain, escheat, police power, and taxation. An inheritable estate.

DATE OF VALUE ESTIMATE

October 22, 1987

SITE IDENTIFICATION

The Mamaroneck and Sheldrake Rivers, subject of this report, are located in the Village of Mamaroneck and Town of Harrison at:

- (1) north of the New York Thruway to Winfield Avenue on the boundary between the Village and the Town;
- (2) south of the New York Thruway bridge to Tompkins Avenue;
- (3) an extension of the Sheldrake River between Mamaroneck Avenue and Fenimore Road;
- (4) Fenimore Road from Stanley Avenue north to New York Thruway, along Thruway between Fenimore Road and Rockland Road and westward to the Thruway;
- (5) Fenimore Road between Boston Post Road and Mamaroneck Harbor.

UTILITIES

Public utilities to the site are namely, gas, electricity, telephone, water and sewer.

ZONING

The land north of the Thruway along the Mamaroneck River is zoned on both sides for residential. The Village of Mamaroneck side of the river is totally residentially developed.

The land south of the Thruway along the Mamaroneck River and extending to Tompkins Avenue is mostly zoned and developed as residential with some commercial. The area between Fenimore and Rockland Roads and along much of the north-south section of the Sheldrake River are zoned industrial/commercial, but has some residential development.

FLOOD HAZARD ZONE

The major portion of the subject lands along the Mamaroneck River lie in a 100-year floodway fringe zone. A portion of the subject lies in the 500-year flood zone.

The major portion of the Sheldrake River between Mamaroneck Avenue and Fenimore Road is not in a flood hazard zone. The Sheldrake River south of the New England Thruway is in a floodway fringe area.

Lands on the town of Harrison side of the river are located in a flood hazard zone.

NEIGHBORHOOD DATA

The subject location south of the Thruway along the Mamaroneck River and extending to Tompkins Avenue is mostly developed as residential with some commercial. Most of the vacant land on the Harrison side of the river is owned by the Town. The immediate area along the river is improved with modest homes and interspersed with commercial garage-type buildings.

Primarily a residential community with a central business district and a small area zoned for light industry, the Village of Mamaroneck comprises 3.5 square miles located twenty-three miles northeast of New York City. It is bounded on the north by the Town of Harrison, on the south by the Long Island Sound, on the east by the Town of Rye, and on the west by the unincorporated area of the town of Mamaroneck. About one-third of the village lies in the Town of Rye, while the Town of Mamaroneck also includes the village of Larchmont.

Mamaroneck has an all-volunteer, 325-man fire department. The Mamaroneck School System comprises four elementary schools, one middle and one high school, serving half of the Mamaroneck Village and all of neighboring Larchmont. Many other Mamaroneck students attend the much smaller Rye Neck school system, which also services an affluent section of Rye called Green Haven. Mamaroneck has several parochial schools as well.

NEIGHBORHOOD DATA (continued)

The 1980 census put the median annual family income in the village at \$30,959 with 434 families at \$50,000 or more. Fewer than half the residents commute to work, real estate agents say, a far lower proportion than in most of the rest of the county.

The waterfront along the Long Island Sound lures newcomers and residents, and virtually doubles the value of property on it. Mamaroneck's waterfront houses range in price from \$550,000 up to nearly \$3 million. Houses within walking distance of the shore cost \$125,000 to \$375,000.

The main shopping along Mamaroneck Avenue is very active and offers a diversification of stores. A major commercial strip is located along the Boston Post Road paralleling the shoreline. Mamaroneck has exceptional recreational facilities available. One focal point is Harbor Island Park, a 44 acre recreational area jutting into the harbor with 8 tennis courts, numerous ball fields, boating docks and moorings, swimming floats, and a municipal beach manned in the summer by lifeguards.

The Emelin Theatre for the Performing Arts, part of the village's Free Library, seats up to 300 people, and offers concerts, children's theater, plays, films, musicals, and dance programs.

Highway access is good with both US1 and I95 conveniently located at the subject area. Public transportation is by Metro-North with Grand Central Terminal just 35 minutes distant.

METHODOLOGY

In order to arrive at a "gross value estimate" for the lands to be acquired, it will be necessary to develop a square foot factor for residential and industrial/commercial lands. Because the subject property is vacant land, the only applicable approach to value is the Market Data Approach.

Consideration was given to the abstraction method of valuing land but the Village Assessor indicated that a revaluation has not taken place in the last thirty years and, therefore, the assessed value ratio of land to total assessment cannot be relied upon.

A search of the Municipal records of both the Village of Mamaroneck and the Town of Harrison produced the comparable sales listed in the addendum. The sales were adjusted for location, size, zoning, time of sale, and flood hazard zone.

The Village and Town Assessors assisted in giving information for this analysis.

The factors will be calculated as follows:

- (A) Permanent Easement in Waterway
Nominal value unusable land.
- (B) Permanent Easement out of Waterway
10% to 75% of flood plains land.
- (C) Temporary Easement for 1½ Years
10% return per year.
- (D) Acquisition in Fee - Flood Plain Land
25% to 75% of fee value of land.
- (E) Permanent Easement in Street R.O.W.
Nominal with Village to maintain any future repairs.

MARKET DATA APPROACH TO LAND VALUE

In this approach, the appraiser compiles information of comparable sales of properties sold in the area. These sales are adjusted for location, size, shape, zoning and time of sale. In the process, a per square foot factor is developed.

Residential Uplands - Town of Harrison

Sale #1 Block 545, Lot 78
Sold 7/87 for \$285,000.
Lot Size 43,560 square feet
Zoning R-1
Sq. Ft. Factor: \$6.54

Sale #2 Block 644, Lot 1
Sold 5/87 for \$100,000.
Lot Size 12,040 square feet,
Zoning R-2.5
Sq. Ft. Factor: \$8.31

Sale #3 Block 508, Lot 78
Sold 5/87 for \$250,000.
Lot Size 43,560 square feet,
Zoning R-1
Sq. Ft. Factor: \$5.74

Sale #4 Block 545, Lot 62
Sold 5/87 for \$400,000.
Lot Size 64,556 square feet,
Zoning R-1
Sq. Ft. Factor: \$6.20

Sale #5 Block 545, Lot 80
Sold 3/87 for \$225,000.
Lot Size 43,560 square feet,
Zoning R-1
Sq. Ft. Factor: \$5.16

MARKET DATA APPROACH TO LAND VALUE

(continued)

Residential Uplands - Town of Harrison (continued)

The indicated value range is \$5.16 to \$8.31 per square foot. Adjustments for location, frontage, topography, size and time were taken into account which derived an indicated factor for uplands in the subject area of \$6.50 per square foot.

The floodway fringe area value would be 75% of uplands or, say \$4.90 per square foot.

Residential Uplands - Mamaroneck

Sale #1 Block 3, Lot 1A3
Sold 2/87 for \$108,000.
Lot Size 8,010 square feet
Zoning R2-F
Sq. Ft. Factor: \$13.4896

Sale #2 Block 28, Lots 11B, 12, and 13
Sold 10/86 for \$85,000.
Lot Size 6,250 square feet
Zoning R-20
Sq. Ft. Factor: \$13.60

Residential uplands factor is, say \$13.50 per square foot.

The subject residential land is located in a flood plain. The floodway fringe area would be 75% of uplands or, say \$10.00 per square foot.

MARKET DATA APPROACH TO LAND VALUE

(continued)

Industrial and Commercial Flood Plain Lands - Mamaroneck

Sale #1

Block 88, Lots 3, 12, 13, 14 and 15A
Sold 12/86 for \$175,000.
Lot size 11,089 square feet
Zoning R-M3/C1
Sq. Ft. Factor: \$15.78

Sale #2

Block 111, Lots 29 through 42
Sold 8/87 for \$990,000.
Lot size 43,801 square feet
Zoning M-1
Frame Buildings 12,250 sq. ft.

To arrive at a value for the land, the buildings were given a value of \$20 per sq. ft. $12,250 \text{ sq. ft.} \times \$20 = \$245,000$
 $\$990,000 \text{ less } \$245,000 = \$745,000 \div 43,801 = \$17.00 \text{ per sq. ft.}$
The abstracted factor for land is \$17.00 per sq. ft.

This sale is a lumber yard with frame buildings on the land. In conversation, it was indicated that the owner may raze the buildings currently on the land, therefore indicating a higher factor.

MARKET DATA APPROACH TO LAND VALUE

(continued)

Summary of Market Value Factors:

- (1) Residential Uplands Town of Harrison
\$6.50 per square foot

- (2) Residential Lands in Floodway Fringe Area
Town of Harrison
\$4.90 per square foot

- (3) Residential Uplands - Mamaroneck
\$13.50 per square foot

- (4) Residential Lands in Flood Plains - Mamaroneck
\$10.00 per square foot

- (5) Residential Permanent Easement Lands in Waterway "A"
Mamaroneck
- No Value -

- (6) Residential Permanent Easement Lands
Out of Waterway "B" - Mamaroneck
10%-75% of Flood Plains Land
\$.75 to \$5.60 per sq. ft.

MARKET DATA APPROACH TO LAND VALUE

(continued)

Summary of Market Value Factors: (continued)

(7) Residential Temporary Easement "C" - Mamaroneck

10% of Flood Plains Land for 1½ years
\$1.50 per sq. ft. rental value

(8) Acquisition in Fee "D" - Mamaroneck

25%-75% of Flood Plains Land
\$1.90 to \$5.60 per sq. ft.

(9) Industrial/Commercial Lands in Flood Plains
Mamaroneck

\$16.00 per sq. ft.

(10) Industrial/Commercial Permanent Easement
in Waterway "A" - Mamaroneck

- No Value -

MARKET DATA APPROACH TO LAND VALUE

(continued)

Summary of Market Value Factors: (continued)

- (11) Industrial/Commercial Permanent Easement
out of Waterway "B" - Mamaroneck

10%-75% of Flood Plains Land
\$1.60 to \$12.00 per sq. ft.

- (12) Industrial/Commercial Temporary Easement
"C" - Mamaroneck

10% of Flood Plains Land for 1½ years
\$2.40 per sq. ft. rental value

- (13) Industrial/Commercial Acquisition in Fee
"D" - Mamaroneck

25%-75% of Flood Plains Land
\$4.00 to \$12.00 per sq. ft.

- (14) Lands in the Right-of-Way of a Street - "E"

- No Value -
Village to assume maintenance of pipe after completion.

CALCULATION OF GROSS VALUE ESTIMATE

- (A) - Permanent Easement in Waterway
- (B) - Permanent Easement out of Waterway
- (C) - Temporary Easement
- (D) - Acquisition in Fee
- (E) - Land in the Right-of-Way of Street

<u>Sheet #</u>	<u>Size Zoning</u>	<u>Sq.Ft.</u>	<u>Sq.Ft. Factor</u>	<u>- - - - - V a l u e - - - - -</u>				
				<u>(A)</u>	<u>(B)</u>	<u>(C)</u>	<u>(D)</u>	<u>(E)</u>
1	(A) 50% C-2 50% R2-F	26,136	\$ --	\$ -0-				
	(B) 50% C-2 50% R2-F	4,356	3.50		\$ 15,246			
	(C) 60% C-2 40% R2-F	17,424	1.75			\$ 30,492		
2	(A) 50% C-2 50% R2-F	39,204	--	-0-				
	(B) 40% C-2 60% R2-F	65,340	5.00		326,700			
	(C) 60% C-2 40% R2-F	39,204	1.75			68,607		
	(D) 40% C-2 60% R2-F	30,492	5.00				\$152,460	
3	(A) 50% C-2 50% R2-F	34,848	--					
	(B) 40% C-2 60% R2-F	39,204	5.00		196,020			
	(C) 50% C-2 50% R2-F	52,272	1.50			78,408		
	(D) 40% C-2 60% R2-F	30,492	5.00				152,460	
4	(A) 5% C-2 5% C-1 90% R-20	56,628	--	-0-				
	(B) 5% C-2 5% C-1 90% R-20	43,560	3.00		130,680			
	(C) 5% C-2 5% C-1 90% R-20	74,052	1.75			129,591		
	(D) 5% C-2 5% C-1 90% R-20	34,848	3.00				104,544	

J-23

CALCULATION OF GROSS VALUE ESTIMATE

(continued)

- (A) - Permanent Easement in Waterway
- (B) - Permanent Easement out of Waterway
- (C) - Temporary Easement
- (D) - Acquisition in Fee
- (E) - Land in the Right-of-Way of Street

<u>Sheet #</u>	<u>Size Zoning</u>	<u>Sq.Ft.</u>	<u>Sq.Ft. Factor</u>	<u>- - - - - V a l u e - - - - -</u>				
				<u>(A)</u>	<u>(B)</u>	<u>(C)</u>	<u>(D)</u>	<u>(E)</u>
5	(A) 5% C-1 95% R2-F	30,492	--	-0-				
	(B) 5% C-1 95% R-2F	43,560	5.00		217,800			
	(C) R2-F	26,136	1.50			39,204		
	(D) R2-F	30,492	3.00				91,476	
6	(A) 75% R2-F 20% R-20 5% C-1	43,560	--	-0-				
	(B)* 70% R2-F 25% R-20 5% C-1	39,204	5.00		196,020			
	(C) 75% R2-F 20% R-20 5% C-1	26,136	1.50			39,204		
	(D) 95% R2-F 5% R-20	21,780	3.00				65,340	
7	(A) R-20	30,492	--	-0-				
	(B) R-20	39,204	5.00		196,020			
	(C) R-20	30,492	1.50			45,738		
	(D) R-20	21,780	3.00				65,340	
8	(A) 75% R-20 25% R-1	34,848	--	-0-				
	(B) 75% R-20 25% R-1	34,848	5.00		174,240			
	(C) 75% R-20 25% R-1	30,492	1.50			45,738		
	(D) 75% R-20 25% R-1	30,492	3.00				91,476	

J-24

CALCULATION OF GROSS VALUE ESTIMATE

(continued)

- (A) - Permanent Easement in Waterway
- (B) - Permanent Easement out of Waterway
- (C) - Temporary Easement
- (D) - Acquisition in Fee
- (E) - Land in the Right-of-Way of Street

<u>Sheet #</u>	<u>Size Zoning</u>	<u>Sq.Ft.</u>	<u>Sq.Ft. Factor</u>	<u>- - - - - V a l u e - - - - -</u>				
				<u>(A)</u>	<u>(B)</u>	<u>(C)</u>	<u>(D)</u>	<u>(E)</u>
9	(A) 50% R-20 50% R-1	26,136	--	-0-				
	(B) 50% R-20 50% R-1	30,492	4.00		121,968			
	(C) 50% R-20 50% R-1	39,204	1.25			49,005		
	(D) 50% R-20 50% R-1	30,492	2.50				76,230	
10	(A) 50% R-5 50% R-1	26,136	--	-0-				
	(B) R-1	34,848	5.00		174,240			
	(C) 20% R-5 80% R-1	17,424	1.25			21,780		
	(D) 5% R-5 95% R-1	39,204	2.50				98,010	
11	(A) 50% R-5 50% R-1	21,780	--	-0-				
	(B) 20% R-5 80% R-1	34,848	3.00		104,544			
	(C) 50% R-5 50% R-1	34,848	1.00			34,848		
	(D) 10% R-5 90% R-1	43,560	2.50				108,900	
13	(A) 80% M-1 15% C-1 5% R-20	13,068	--	-0-				
	(C) 80% M-1 15% C-1 5% R-20	8,712	2.40			20,909		

CALCULATION OF GROSS VALUE ESTIMATE

(continued)

- (A) - Permanent Easement in Waterway
- (B) - Permanent Easement out of Waterway
- (C) - Temporary Easement
- (D) - Acquisition in Fee
- (E) - Land in the Right-of-Way of Street

<u>Sheet #</u>	<u>Size Zoning</u>	<u>Sq.Ft.</u>	<u>Sq.Ft. Factor</u>	<u>- - - - - V a l u e - - - - -</u>				
				<u>(A)</u>	<u>(B)</u>	<u>(C)</u>	<u>(D)</u>	<u>(E)</u>
14	(A) 90% M-1 5% R4F-P 5% R4F	21,780	--	-0-				
	(C) 80% M-1 10% R4F-P 10% R4F	13,068	2.25			29,403		
15	(A) 60% M-1 40% R4F	26,136	--	-0-				
	(C) 60% M-1 40% R4F	26,136	2.00			52,272		
16	(A) R-20	13,068	--	-0-				
	(B) R-20	8,712	5.00		43,560			
	(C)* 75% R-20 25% M-1	45,516	2.00			91,032		
	(E) M-1	21,780	--					-0-
17	(A) R-20	13,068	--	-0-				
	(B) R-20	39,204	5.00		196,020			
	(C) R-20	26,136	2.00			52,272		
	(D) R-20	30,492	5.00				152,460	
18	(A) R-20	21,780	--	-0-				
	(B) R-20	21,780	5.00		108,900			
	(C) R-20	17,424	2.00			34,848		
	(D) R-20	30,492	5.00				152,460	
19	(A) 50% R-20 50% R-5	26,136	--	-0-				
	(C) 50% R-20 50% R-5	17,424	1.50			26,136		

CALCULATION OF GROSS VALUE ESTIMATE

(continued)

- (A) - Permanent Easement in Waterway
- (B) - Permanent Easement out of Waterway
- (C) - Temporary Easement
- (D) - Acquisition in Fee
- (E) - Land in the Right-of-Way of Street

Sheet #	Size Zoning	Sq.Ft.	Sq.Ft. Factor	- - - - - V a l u e - - - - -				
				(A)	(B)	(C)	(D)	(E)
20	(C) 50% M-1 50% R-5	17,424	2.00			34,848		
	(E) 50% M-1 50% R-5	30,492	--					-0-
21	(C) 40% R-2F 40% R-5 10% R-7.5 10% R-142	17,424	1.50			26,136		
	(E) 40% R-2F 40% R-5 10% R-7.5 10% R-142	30,492	--					-0-
22	(B) R-20	2,178	5.00		10,890			
	(C) 35% R-142 35% C-1 30% R-7.5	26,136	2.00			52,272		
	(D) R-20	1,742	5.00				8,710	
	(E) 35% R-142 35% C-1 30% R-7.5	17,424	--					-0-
23	(A) R-20	21,780	--	-0-				
	(B) R-20	4,356	5.00		21,780			
	(C) R-20	21,780	1.50			32,670		
	(D) R-20	4,356	5.00				21,780	

*House and building located in area of taking.

FINAL GROSS VALUE ESTIMATE

Village of Mamaroneck

(A)	Permanent Easement in Waterway.....	\$ -0-
	Residential 9.91 Acres	
	Commercial 2.19 Acres	
(B)	Permanent Easement out of Waterway:	
	Residential 8.33 Acres.....	\$1,630,521
	Commercial 1.22 Acres.....	255,537
(C)	Temporary Easement:	
	Residential 10.20 Acres.....	\$ 681,337
	Commercial 3.04 Acres.....	246,808
(D)	Acquisition in Fee:	
	Residential 6.45 Acres.....	\$1,021,915
	Commercial 1.36 Acres.....	132,422
(E)	Lands in Street Right-of-way.....	\$ -0-
	Residential .96 Acres	
	Commercial .64 Acres	
	Mamaroneck Total Land Value.....	\$3,968,540

Town of Harrison

(B)	Permanent Easement 1.95 Acres.....	\$ 374,616
(C)	Temporary Easement 1.50 Acres.....	81,130
(D)	Acquisition in Fee 1.65 Acres.....	187,308
	Town of Harrison Land Value.....	\$ 643,054
	Total Project Land Value.....	\$4,611,594

TOTAL PROJECT LAND VALUE, say:

- \$4,611,500.00 -

CERTIFICATION

The Appraiser certifies and agrees that:

1. The Appraiser has no present or contemplated future interest in the property appraised; and neither the employment to make the appraisal, nor the compensation for it, is contingent upon the appraised value of the property.
2. The Appraiser has no personal interest in or bias with respect to the subject matter of the appraisal report or the participants to the sale. The "Estimate of Market Value" in the appraisal report is not based in whole or in part upon the race, color or national origin of the prospective owners or occupants of the property appraised, or upon the race, color or national origin of the present owners or occupants of the properties in the vicinity of the property appraised.
3. The Appraiser has personally inspected the property, both inside and out, and has made an exterior inspection of all comparable sales listed in the report. To the best of the Appraiser's knowledge and belief, all statements and information in this report are true and correct, and the Appraiser has not knowingly withheld any significant information.
4. All contingent and limiting conditions are contained herein (imposed by the terms of the assignment or by the undersigned affecting the analyses, opinions, and conclusions contained in the report).
5. This appraisal report has been made in conformity with and is subject to the requirements of the Code of Professional Ethics and Standards of Professional Conduct of the appraisal organizations with which the Appraiser is affiliated.
6. All conclusions and opinions concerning the real estate that are set forth in the appraisal report were prepared by the Appraiser whose signature appears on the appraisal report, unless indicated as "Review Appraiser." No change of any item in the appraisal report shall be made by anyone other than the Appraiser, and the Appraiser shall have no responsibility for any such unauthorized change.

CONTINGENT AND LIMITING CONDITIONS

The certification of the Appraiser appearing in the appraisal report is subject to the following conditions and to such other specific and limiting conditions as are set forth by the Appraiser in the report.

1. The Appraiser assumes no responsibility for matters of a legal nature affecting the property appraised or the title thereto, nor does the Appraiser render any opinion as to the title, which is assumed to be good and marketable. The property is appraised as though under responsible ownership.
2. Any sketch in the report may show approximate dimensions and is included to assist the reader in visualizing the property. The Appraiser has made no survey of the property.
3. The Appraiser is not required to give testimony or appear in court because of having made the appraisal with reference to the property in question, unless arrangements have been previously made therefor.
4. Any distribution of the valuation in the report between land and improvements applies only under the existing program of utilization. The separate valuations for land and building must not be used in conjunction with any other appraisal and are invalid if so used.
5. The Appraiser assumes that there are no hidden or unapparent conditions of the property, subsoil, or structures, which would render it more or less valuable. The Appraiser assumes no responsibility for such conditions, or for engineering which might be required to discover such factors.
6. Information, estimates, and opinions furnished to the Appraiser, and contained in the report, were obtained from sources considered reliable and believed to be true and correct. However, no responsibility for accuracy of such items furnished the Appraiser can be assumed by the Appraiser.

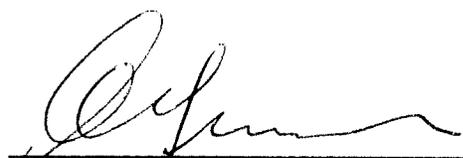
CONTINGENT AND LIMITING CONDITIONS

(continued)

7. Disclosure of the contents of the appraisal report is governed by the Bylaws and Regulations of the professional appraisal organizations with which the Appraiser is affiliated.

8. Neither all, nor any part of the content of the report, or copy thereof (including conclusions as to the property value, the identity of the Appraiser, professional designations, reference to any professional appraisal organizations, or the firm with which the Appraiser is connected), shall be used for any purposes by anyone but the client specified in the report, the borrower if appraisal fee paid by same the mortgagee or its successors and assigns, mortgage insurers, consultants, professional appraisal organizations, any state or federally approved financial institution, any department, agency, or instrumentality of the United States or any state or the District of Columbia, without the previous written consent of the Appraiser; nor shall it be conveyed by anyone to the public through advertising, public relations, news, sales, or other media, without the written consent and approval of the Appraiser.

9. On all appraisals, subject to satisfactory completion, repairs, or alterations, the appraisal report and value conclusion are contingent upon completion of the improvements in a workmanlike manner.



Alfred Benvenuto
Appraiser

A D D E N D A

J-32

MAMARONECK RESIDENTIAL LAND SALE #1

Location: S/S Cedar Street
505' west of Jefferson Avenue

Block/Lot: Block 3, Lot 1A3

Sale Date: February 23, 1987

Land Area: 8,010 square feet (121' x 89' irreg.)

Sale Price: \$108,000.00

Price Per Sq. Ft.: \$13.48

Zoning: Residential, R2-F

This property is uplands and not located in a flood hazard zone. Lands in a flood plain would be reduced 75%. The topography is level and the soil conditions are good as evidenced by the new home construction on the side.

The adjusted factor for lands in a flood plain is, say
\$10.00 per sq. ft.

J-33

MAMARONECK RESIDENTIAL LAND SALE # 2

Location: Southwest Corner of
Soundview Avenue and Bryant Circle

Block/Lot: Block 28, Lots 11B, 12 and 13

Sale Date: October, 1986

Land Area: 6,250 square feet (62.5' x 100')

Sale Price: \$85,000.00

Price per Sq. Ft.: \$13.60

Zoning: Residential, R-20

This property is uplands and not located in a flood hazard zone. Lands in a flood zone would be reduced 75%. The topography consists of steep hills. The soil conditions appear satisfactory to build upon. Plus adjustment for time and a minus adjustment for topography is applied.

The adjusted factor for lands in a flood plain is, say:

\$10.00 per sq. ft.

J-34

MAMARONECK COMMERCIAL LAND SALE #1

Location: E/S Mamaroneck Avenue
50' south of Sheldrake Place,
through block to Van Ranst Place

Block/Lot: Block 88, Lots 3, 12, 14, and 15A

Sale Date: December, 1986

Land Area: 11,089 square feet (75' x 200', irreg)

Sale Price: \$175,000.00

Price per Sq. Ft.: \$15.78

Zoning: Commercial. C1 or R-M3

This property is located in a floodway fringe area in the downtown section of the Village.

No adjustment is necessary for flood hazard zone. A plus adjustment for time will give an adjusted factor of, say:

\$16.00 per sq. ft.

J-35

MAMARONECK COMMERCIAL LAND SALE #2

Location: West blockfront on Fenimore Road
between Railroad Way & Waverly Avenue

Block/Lot: Block 111, Lots 29 through 42

Sale Date: August, 1987

Land Area: 43,801 square feet (134' x 346', irreg)

Building Area: 12,250 square feet

Sale Price: \$990,000.00

Price per Sq. Ft.: Abstracted \$17.00

Zoning: Industrial, M-1

This property is located in a floodway fringe area in an industrial area of the Village. No adjustments are necessary for flood hazard zone or time.

To abstract a land value, the building value is removed from the total sales price; the remainder is divided by the land sq. ft. to obtain a factor.

Building Value \$20.00 per sq. ft. $\$20 \times 12,250 = \$245,000.$
Sales price \$990,000 less \$245,000 = \$745,000
 $\$745,000 \div 43,801 = \$17.00.$

Abstracted factor, say:

\$17.00 per sq. ft.

J-36

TOWN OF HARRISON RESIDENTIAL LAND SALE #1

Location: Mt. Holly Drive
Block/Lot: Block 545, Lot 78
Grantor: O'Callaghan
Grantee: M. Ferrante
Page/Liber: Page 270; Liber 8906
Sale Date: July, 1987
Land Area: 43,560 square feet (114' x 382', Irr.)
Sale Price: \$285,000.00
Price per Sq. Ft.: \$6.54
Flood Hazard Zone: Not in a Flood Hazard Area
Zoning: R-1

Uplands located near subject land. No adjustments necessary.

Adjusted Factor, say:

\$6.54 per sq. ft.

J-37

TOWN OF HARRISON RESIDENTIAL LAND SALE #2

Location: End of New Street
off Anderson Hill Road

Block/Lot: Block 644, Lot 1

Grantor: P. Passarelli

Grantee: A & U Bisignano

Page/Liber: Page 232; Liber 8841

Sale Date: May, 1987

Land Area: 12,040 square feet (56' x 215', Irreg)

Sale Price: \$100,000.00

Price per Sq. Ft.: \$8.31

Flood Hazard Zone: Not in a Flood Hazard Area.

Zoning: R-2.5

This plot is uplands and located near subject land. A minus adjustment for zoning and no adjustment for time.

The indicated factor is, say:

\$7.50 per sq. ft.

J-38

TOWN OF HARRISON RESIDENTIAL LAND SALE #3

Location: North Street
200' south of Muchmore Road

Block/Lot: Block 508, Lot 78

Grantor: National Vacuum Molding

Grantee: A & A Luongo

Page/Liber: Page 7; Liber 8835

Sale Date: May, 1987

Land Area: 43,560 (182' x 240' irreg.)

Sale Price: \$250,000.00

Price per Sq. Ft.: \$5.74

Flood Hazard Zone: Not in a Flood Hazard Area

Zoning: R-1

This plot is uplands in close proximity to the subject property. No adjustments are necessary.

The indicated factor is, say:

\$5.74 per sq. ft.

J-39

TOWN OF HARRISON RESIDENTIAL LAND SALE #4

Location: East Purchase Street
200' south of Flagler

Block/Lot: Block 545, Lot 62

Grantor: S. Goldstein

Grantee: A & V Pirro

Page/Liber: Page 174; Liber 8824

Sale Date: May, 1987

Land Area: 64,556 square feet (200' x 323' irr.)

Sale Price: \$400,000.00

Price per Sq. Ft.: \$6.20

Flood Hazard Zone: Not in a Flood Hazard Area

Zoning: R-1

This plot is uplands in a similar area to the subject. No adjustments are required.

The indicated factor is, say:

\$6.20 per sq. ft.

J-40

TOWN OF HARRISON RESIDENTIAL LAND SALE #5

Location: Mount Holly Drive
Block/Lot: Block 545, Lot 80
Grantor: O'Callaghan
Grantee: E & C Capalbo
Page/Liber: Page 152; Liber 8778
Sale Date: March, 1987
Land Area: 43,560 (147' x 296' irreg.)
Sale Price: \$225,000.00
Price per Sq. Ft.: \$5.16
Flood Hazard Zone: Not in a flood hazard zone.
Zoning: R-1

This property is uplands located near the subject land. Plus adjustment for time was applied.

The indicated factor is, say:

\$5.45 per sq. ft.

J-41

ALFRED BENVENUTO

APPRAISAL QUALIFICATIONS

EMPLOYMENT

1968-1975

Employed by George L. Clark, Inc., a real estate firm, in the capacity of a licensed real estate broker and sales manager. Duties consisted of sales, appraisals, rentals, real property management and supervision of the office staff and operations.

1975-1982

Employed by Greater New York Savings Bank as Senior Appraiser. Responsibilities included appraising real property for mortgage loans using the income, cost and market data approaches; administering the re-appraisal program of the bank's portfolio; training new employees in the field of appraisal; distributing the workload of the department and motivating the junior men to become more astute appraisers.

1982-Present

Employed by the City of New York, Division of Real Property, as Chief Appraiser. Duties include appraising the more complex properties owned or to be purchased by the City using the income, cost and market data approaches; training new appraisers to understand the concept of professional appraisals; reviewing all type reports; distributing the work assignments to the appraisers; performing auction appraisals for the regularly scheduled City auction sales.

1980-Present

Fee appraiser for Wasserman Realty on estates and market value purposes.

1985-Present

Fee appraiser for George L. Clark, Inc. on estates and market value purposes.

1986-Present

Fee appraiser for Boehm Appraisal Service on commercial properties in the state of New Jersey.

AREA OF EXPERTISE:

The greater New York metropolitan area and central New Jersey.

EXPERT TESTIMONY:

New York State Supreme Court.

APPRAISAL EDUCATION:

The following real estate courses have been completed:

-American Institute of Real Estate Appraisers:
Courses 1B and VIII.

Candidate for R.M. designation.

-Society of Real Estate Appraisers:

Courses 101, R-2, 201. Candidate for SRPA designation.

-New York University School of Continuing Education:
Completed nine courses and earned a Certificate in Mortgage Finance.

J-42

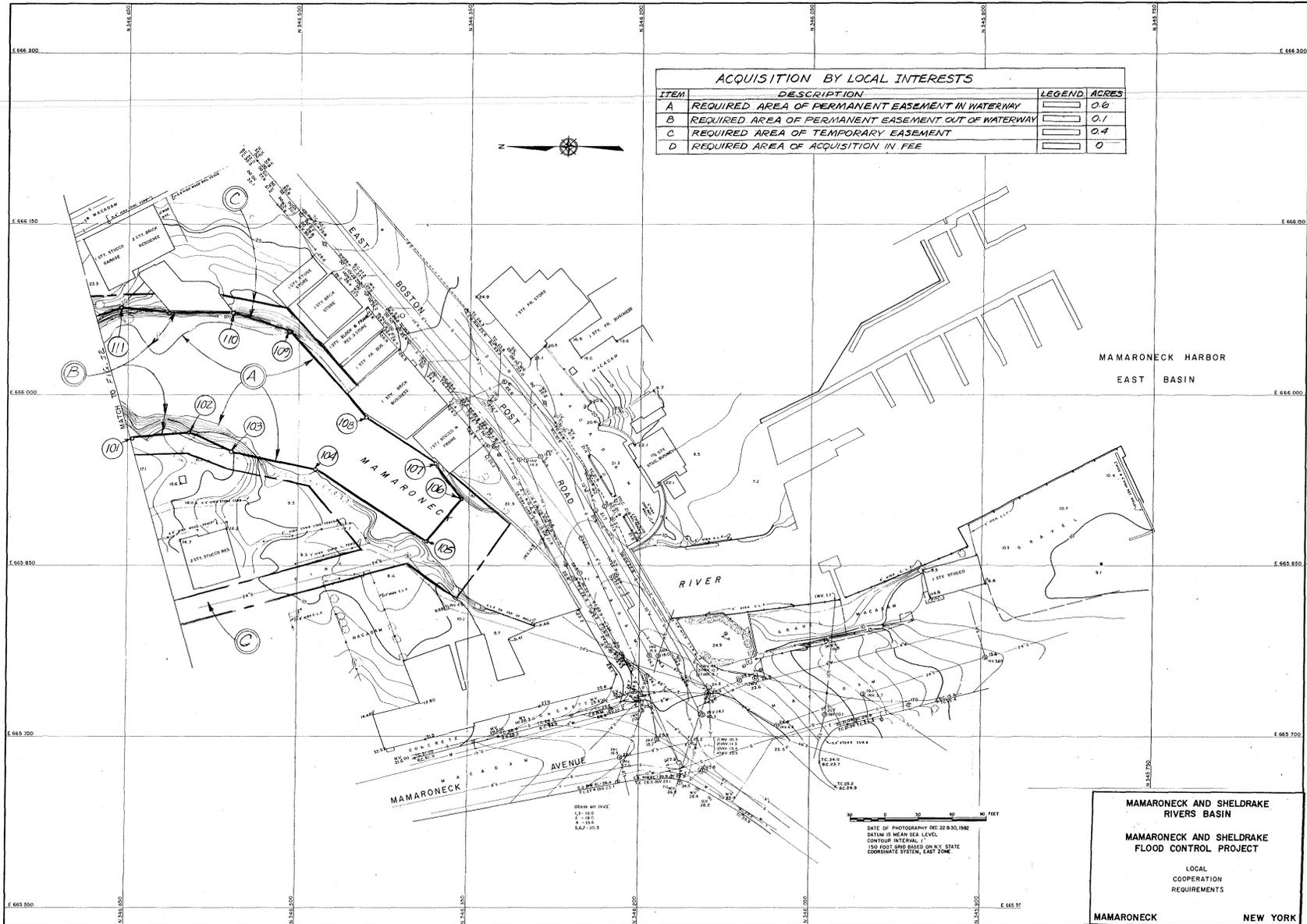
Local Cooperation Requirements Sheets

Figures J1 through J22

Local Cooperation Requirements Sheets

Figures J1 through J22

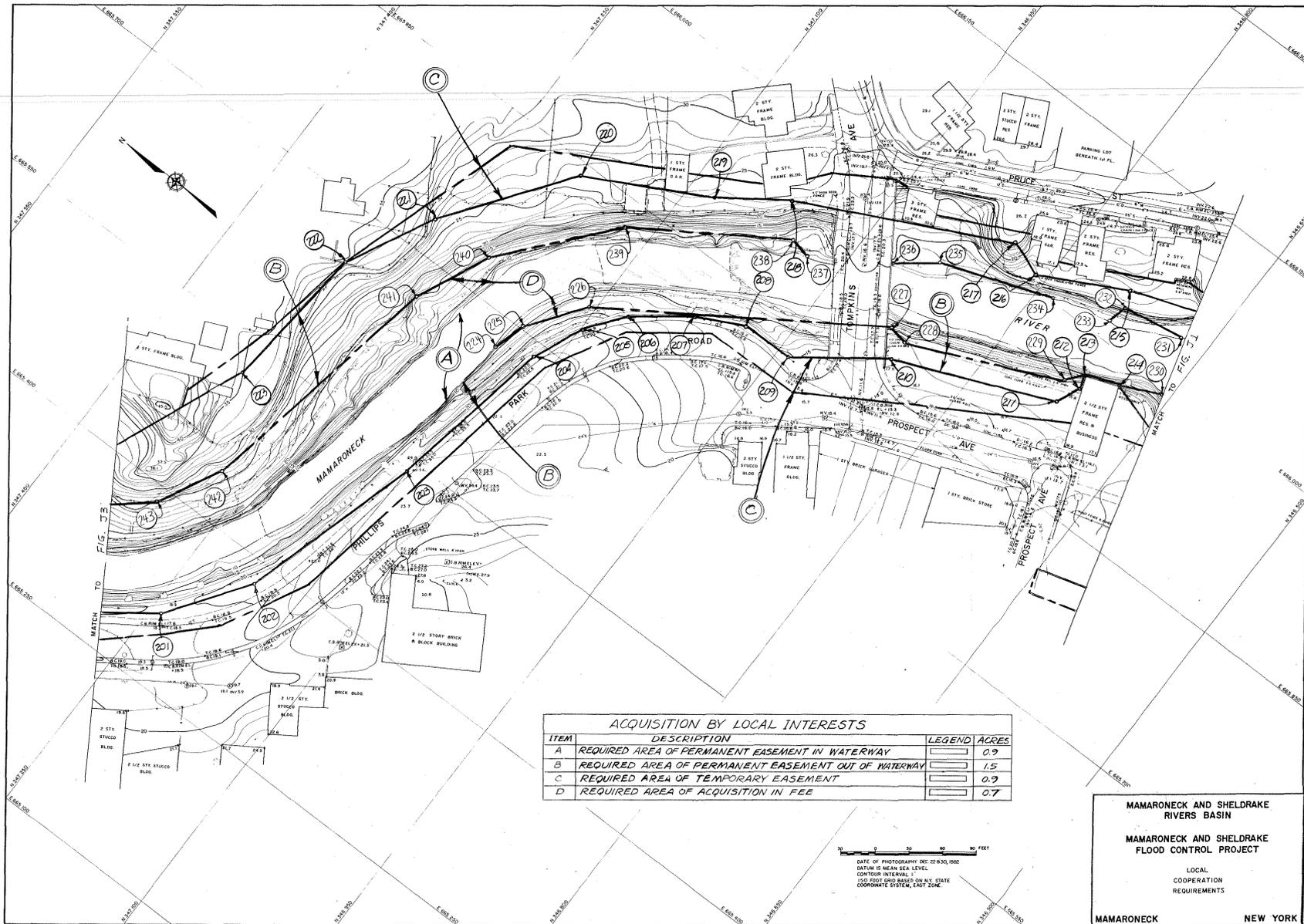
J-43



ACQUISITION BY LOCAL INTERESTS			
ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY	[Symbol]	0.6
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY	[Symbol]	0.1
C	REQUIRED AREA OF TEMPORARY EASEMENT	[Symbol]	0.4
D	REQUIRED AREA OF ACQUISITION IN FEE	[Symbol]	0

MAMARONECK HARBOR
EAST BASIN

MAMARONECK AND SHELDRAKE RIVERS BASIN
MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT
LOCAL COOPERATION REQUIREMENTS
MAMARONECK NEW YORK

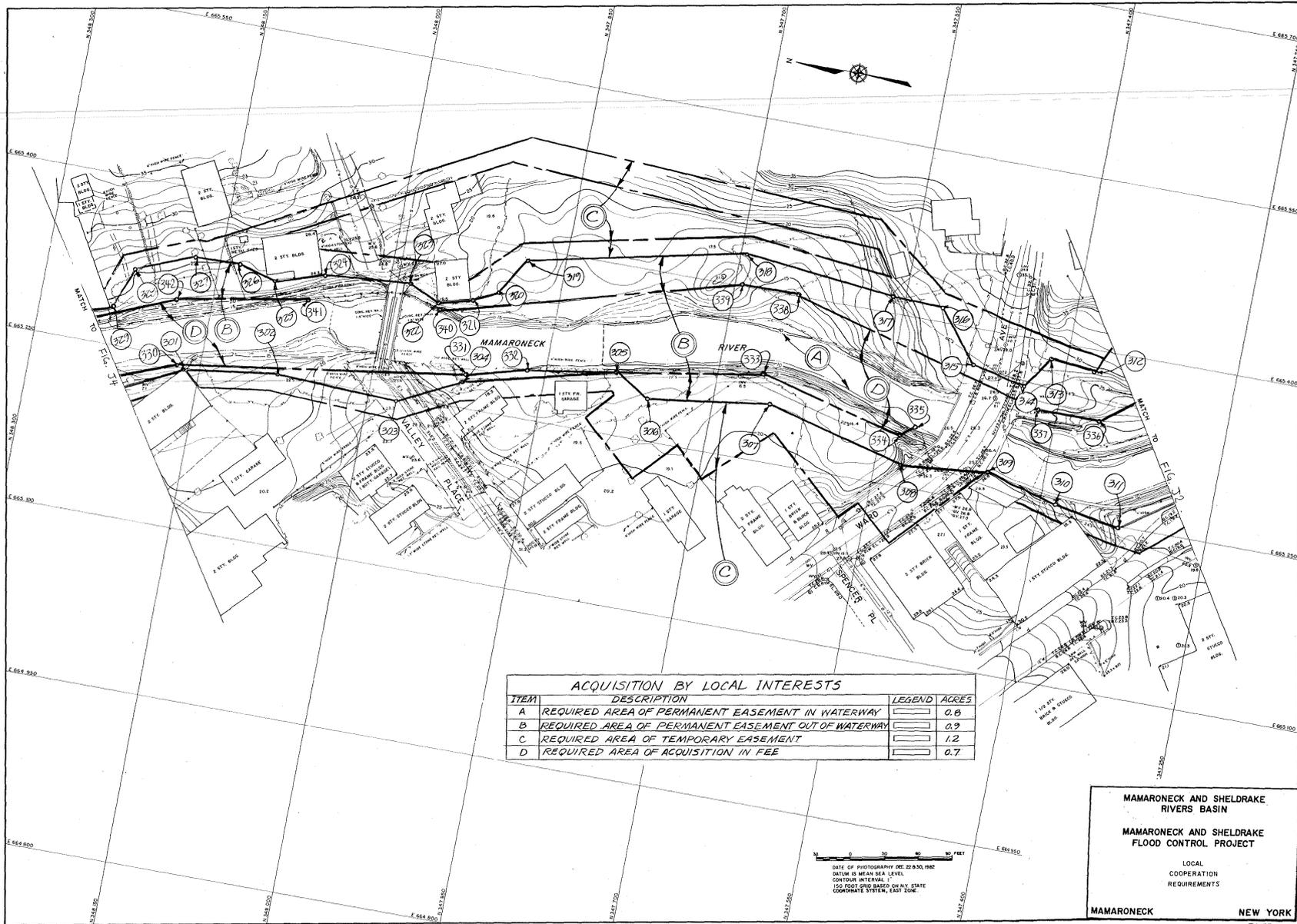


ACQUISITION BY LOCAL INTERESTS

ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		0.9
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		1.5
C	REQUIRED AREA OF TEMPORARY EASEMENT		0.9
D	REQUIRED AREA OF ACQUISITION IN FEE		0.7

DATE OF PHOTOGRAPHY DEC 28 30, 1982
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL 1
 100 FOOT GRID BASED ON N.Y. STATE COORDINATE SYSTEM, EAST ZONE.

MAMARONECK AND SHELDRAKE RIVERS BASIN
 MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT
 LOCAL COOPERATION REQUIREMENTS
 MAMARONECK NEW YORK
 FIGURE J2

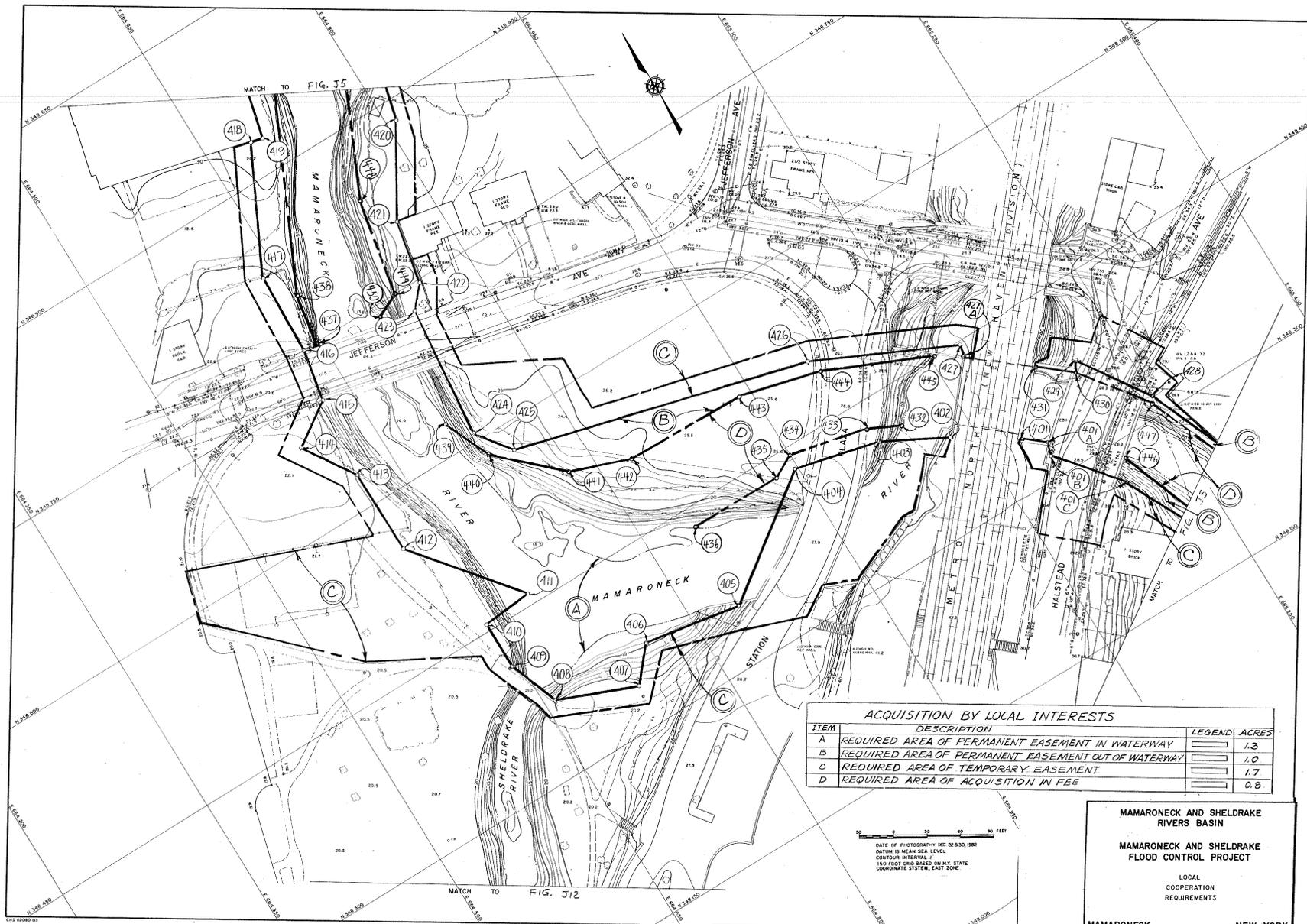


ACQUISITION BY LOCAL INTERESTS

ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		0.6
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		0.9
C	REQUIRED AREA OF TEMPORARY EASEMENT		1.2
D	REQUIRED AREA OF ACQUISITION IN FEE		0.7

0 20 40 60 80 FEET
 DATE OF PHOTOGRAPHY DEC 22 1950, 1962
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL 1'
 150 FOOT GRID BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE

**MAMARONECK AND SHELDRAKE
 RIVERS BASIN**
**MAMARONECK AND SHELDRAKE
 FLOOD CONTROL PROJECT**
 LOCAL
 COOPERATION
 REQUIREMENTS
MAMARONECK **NEW YORK**



ACQUISITION BY LOCAL INTERESTS

ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		1.3
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		1.0
C	REQUIRED AREA OF TEMPORARY EASEMENT		1.7
D	REQUIRED AREA OF ACQUISITION IN FEE		0.8

DATE OF PHOTOGRAPHY DEC 22 1950, 1952
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL 1'
 150 FOOT GRID BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE

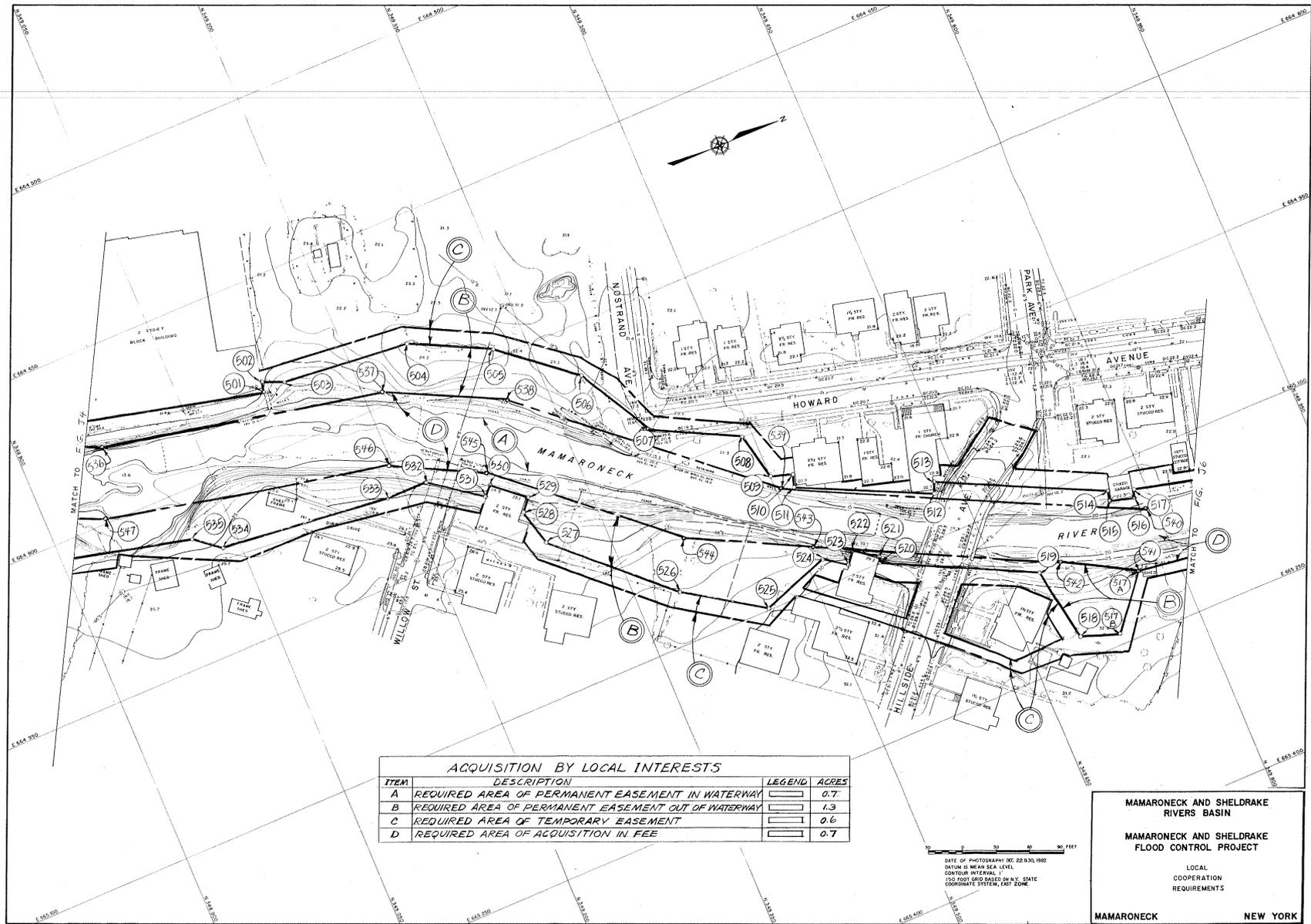
**MAMARONECK AND SHELDRAKE
 RIVERS BASIN**

**MAMARONECK AND SHELDRAKE
 FLOOD CONTROL PROJECT**

 LOCAL
 COOPERATION
 REQUIREMENTS

MAMARONECK **NEW YORK**

FIGURE J4



ACQUISITION BY LOCAL INTERESTS			
ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		0.7
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		1.3
C	REQUIRED AREA OF TEMPORARY EASEMENT		0.6
D	REQUIRED AREA OF ACQUISITION IN FEE		0.7

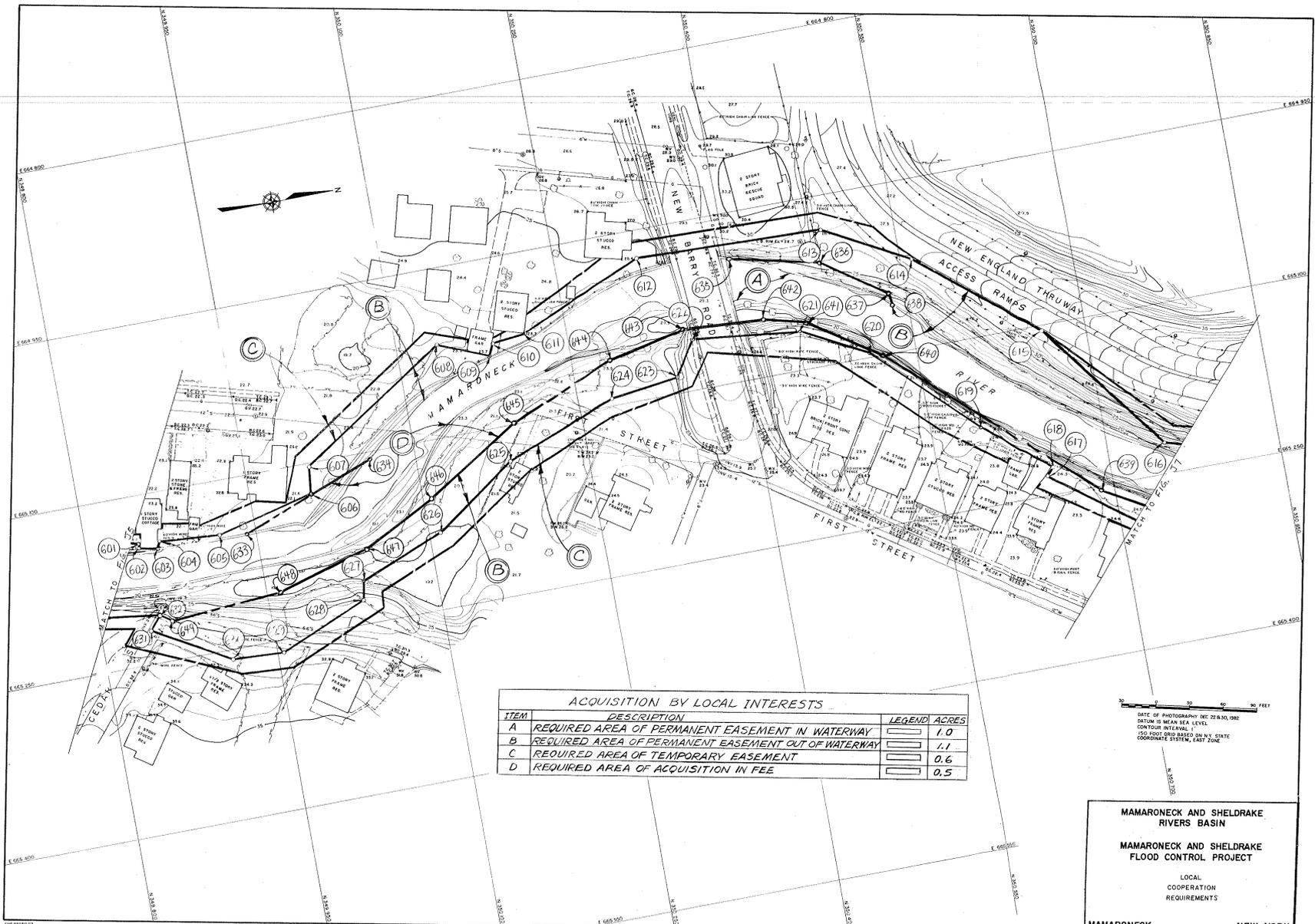
DATE OF PHOTOGRAPHY: DEC. 22, 1950, 1952
 DATUM: U.S. MEAN SEA LEVEL
 CONTOUR INTERVAL: 1'
 150 FOOT GRID BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE

**MAMARONECK AND SHELDRAKE
RIVERS BASIN**

**MAMARONECK AND SHELDRAKE
FLOOD CONTROL PROJECT**

LOCAL
COOPERATION
REQUIREMENTS

MAMARONECK **NEW YORK**

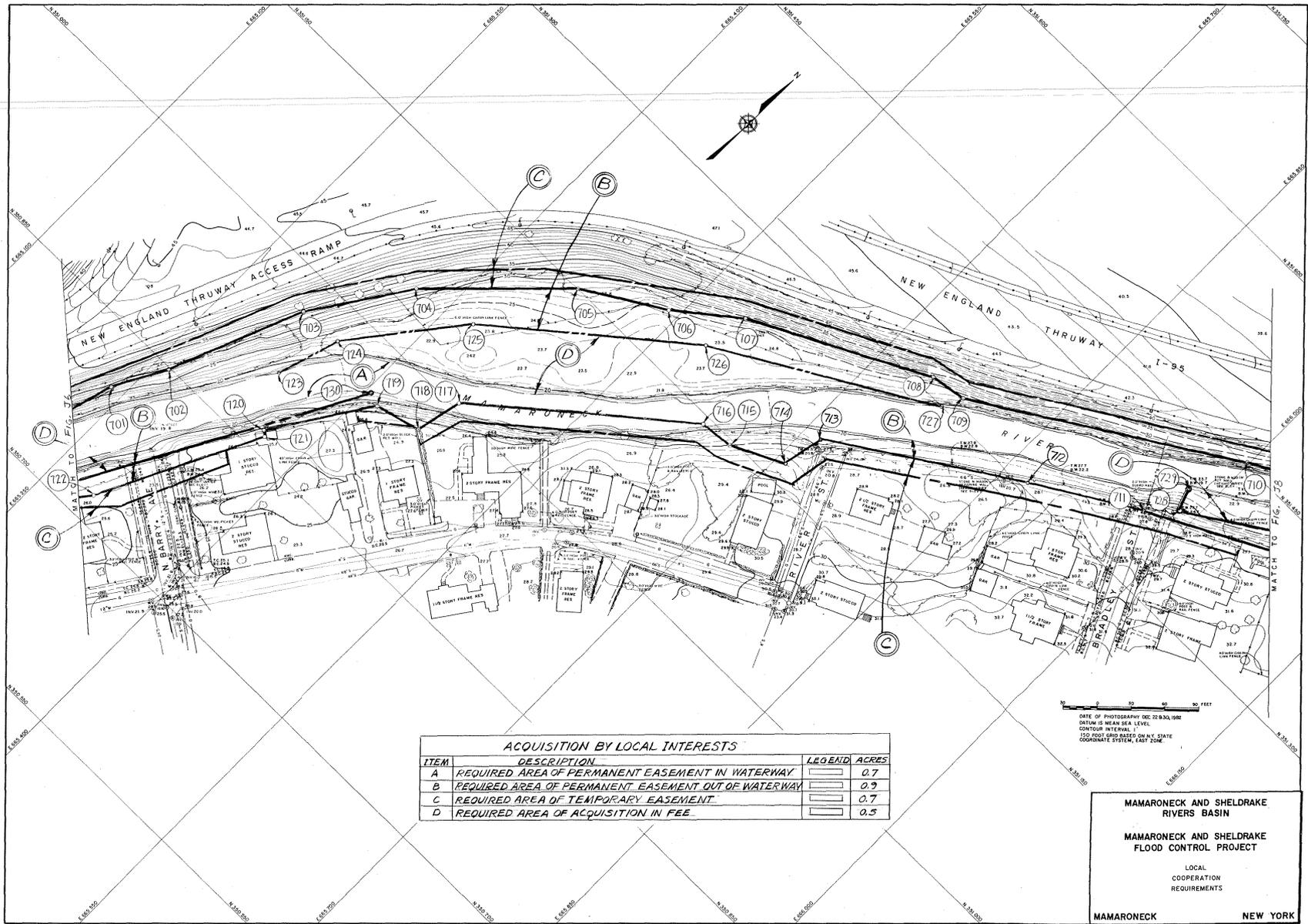


ACQUISITION BY LOCAL INTERESTS

ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		1.0
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		1.1
C	REQUIRED AREA OF TEMPORARY EASEMENT		0.6
D	REQUIRED AREA OF ACQUISITION IN FEE		0.5

DATE OF PHOTOGRAPHY DEC 22 8,50 1982
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL 1'
 100 FOOT GRID BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE

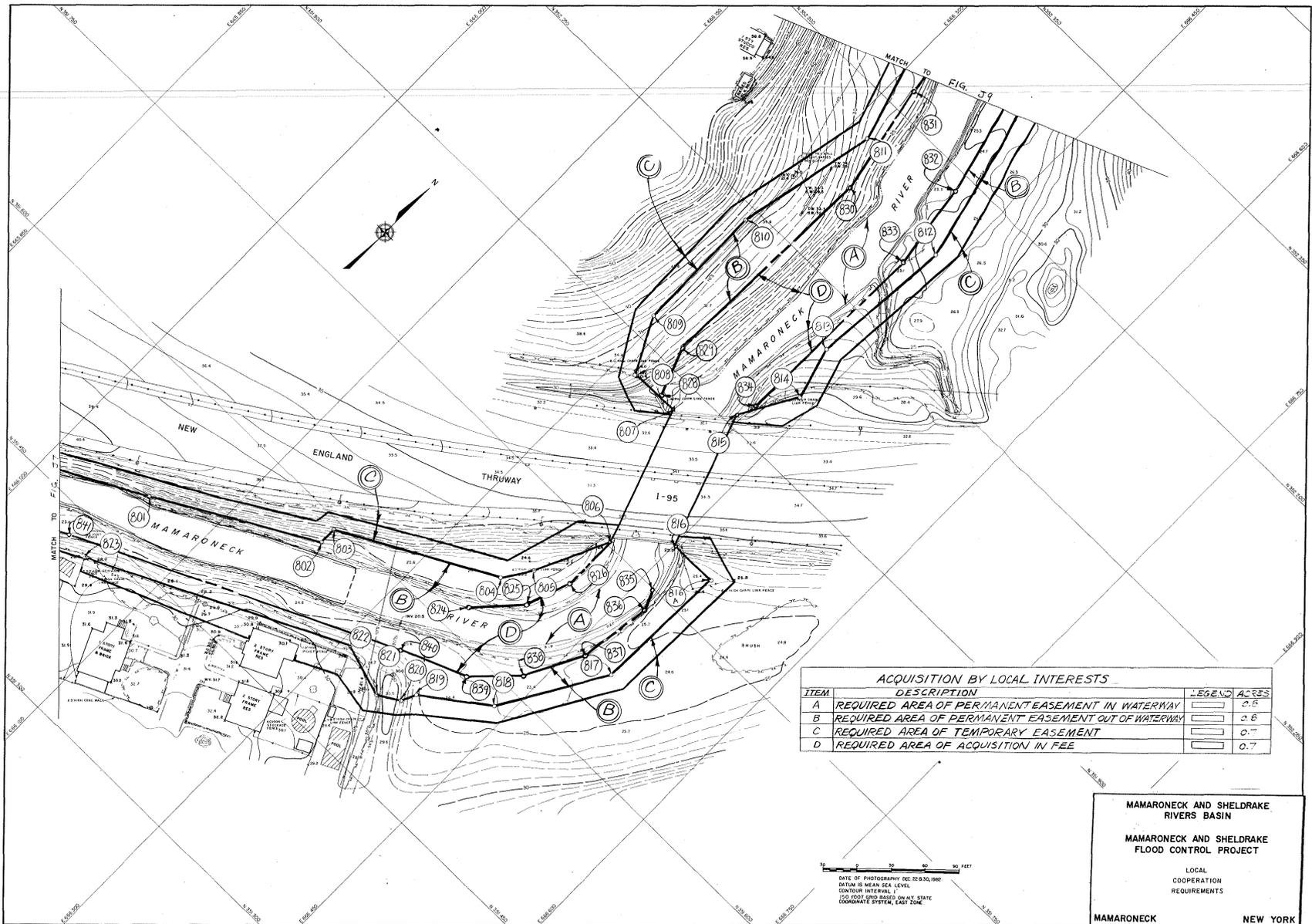
MAMARONECK AND SHELDRAKE
 RIVERS BASIN
 MAMARONECK AND SHELDRAKE
 FLOOD CONTROL PROJECT
 LOCAL
 COOPERATION
 REQUIREMENTS
 MAMARONECK NEW YORK
 FIGURE J-6



ACQUISITION BY LOCAL INTERESTS		
ITEM	DESCRIPTION	LEGEND ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY	0.7
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY	0.9
C	REQUIRED AREA OF TEMPORARY EASEMENT	0.7
D	REQUIRED AREA OF ACQUISITION IN FEE	0.5

DATE OF PHOTOGRAPHY DEC 28 30, 1962
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL 1'
 100 FOOT GRID BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE

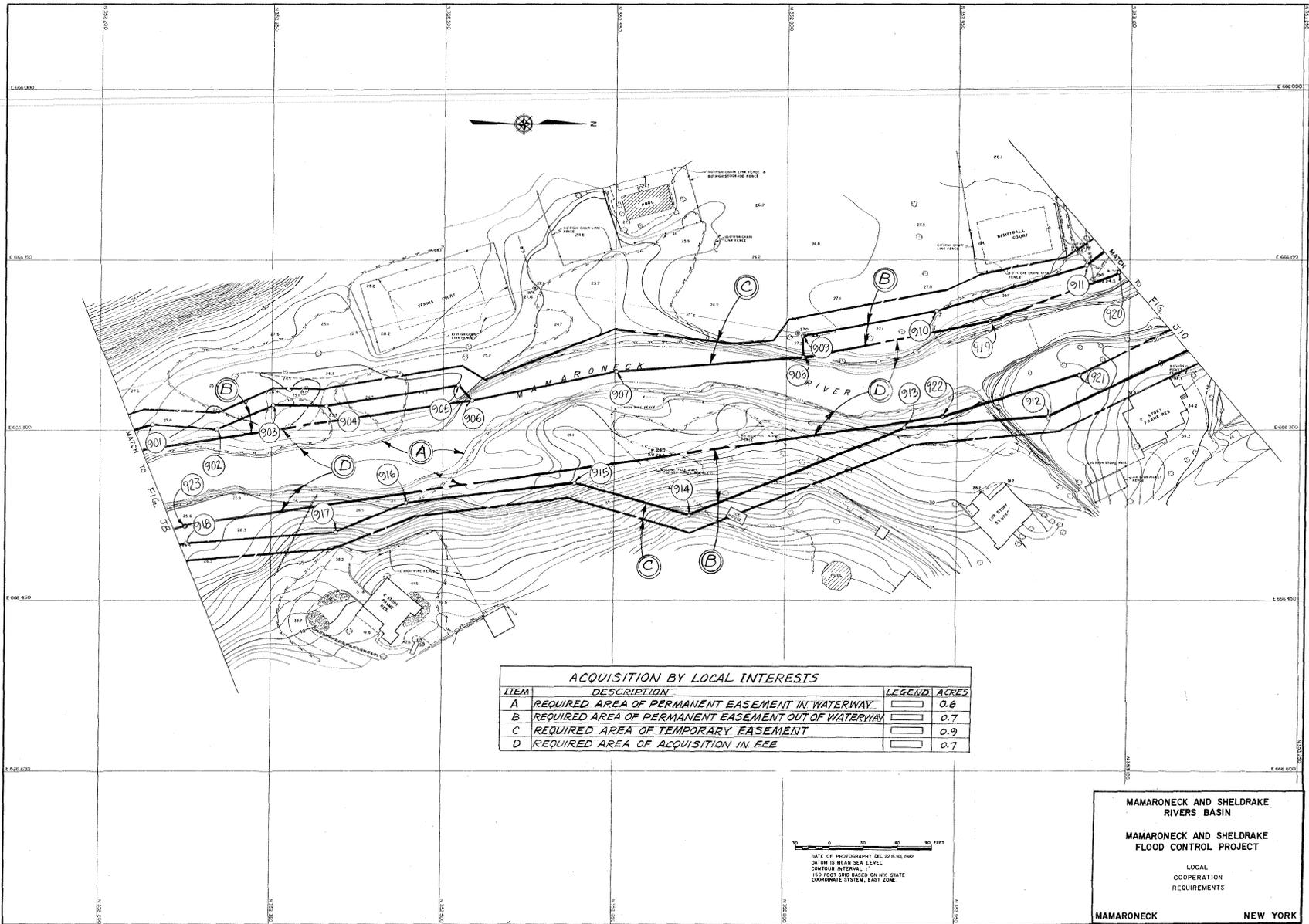
**MAMARONECK AND SHELDRAKE
 RIVERS BASIN**
**MAMARONECK AND SHELDRAKE
 FLOOD CONTROL PROJECT**
 LOCAL
 COOPERATION
 REQUIREMENTS
MAMARONECK NEW YORK



ACQUISITION BY LOCAL INTERESTS		
ITEM	DESCRIPTION	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY	0.8
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY	2.6
C	REQUIRED AREA OF TEMPORARY EASEMENT	0.7
D	REQUIRED AREA OF ACQUISITION IN FEE	0.7

DATE OF PHOTOGRAPHY: DEC. 22, 1950, 1952
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL: 1'
 150 FOOT GRID BASED ON N.Y. STATE COORDINATE SYSTEM, EAST ZONE

MAMARONECK AND SHELDRAKE RIVERS BASIN
MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT
 LOCAL COOPERATION REQUIREMENTS
MAMARONECK NEW YORK

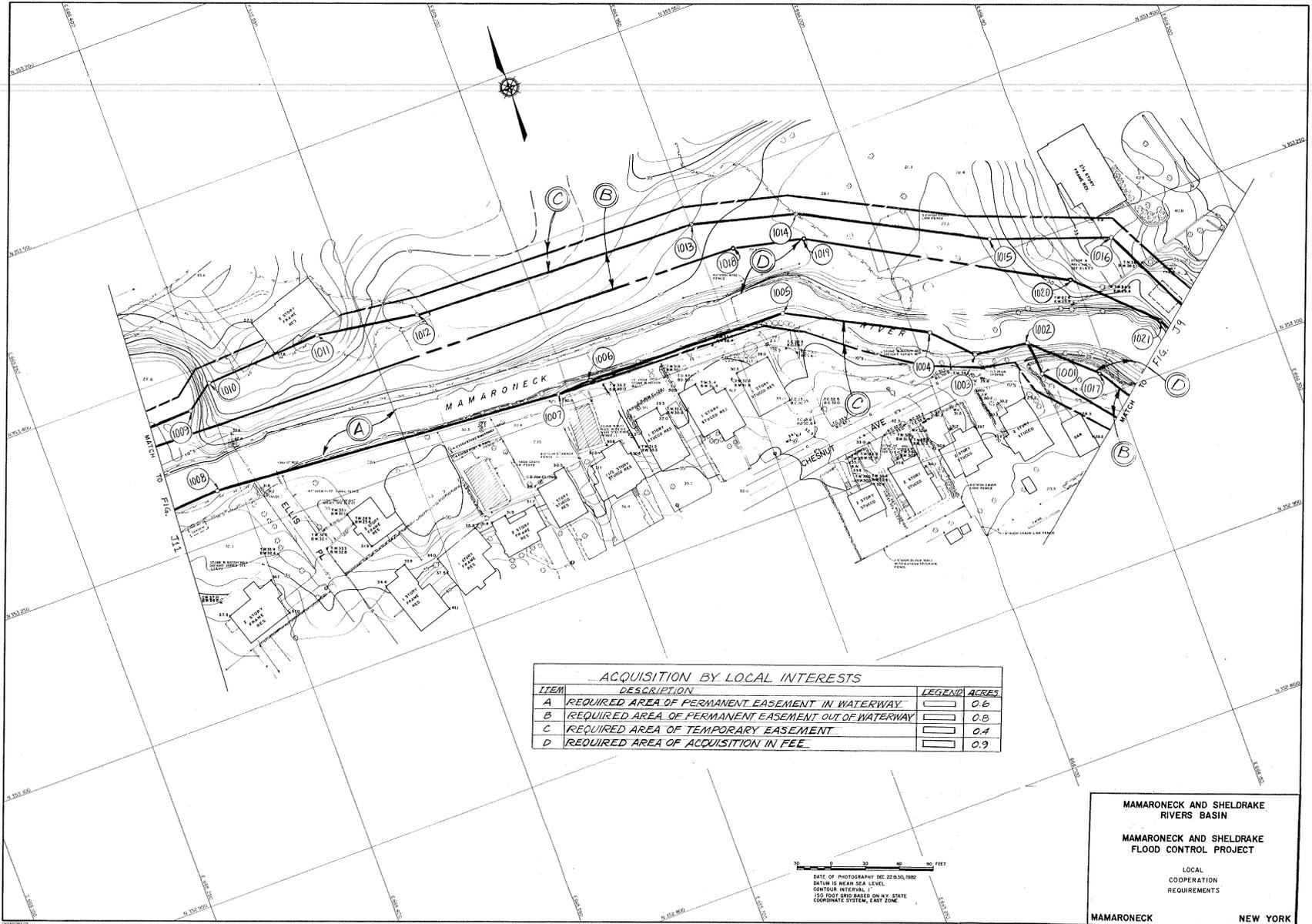


ACQUISITION BY LOCAL INTERESTS

ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		0.6
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		0.7
C	REQUIRED AREA OF TEMPORARY EASEMENT		0.9
D	REQUIRED AREA OF ACQUISITION IN FEE		0.7

0 30 60 90 FEET
 DATE OF PHOTOGRAPHY DEC 22-23, 1962
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL, 1'
 150 FOOT GRID BASED ON N.Y. STATE COORDINATE SYSTEM, EAST ZONE

MAMARONECK AND SHELDRAKE RIVERS BASIN
MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT
 LOCAL COOPERATION REQUIREMENTS
MAMARONECK NEW YORK



ACQUISITION BY LOCAL INTERESTS

ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		0.6
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		0.8
C	REQUIRED AREA OF TEMPORARY EASEMENT		0.4
D	REQUIRED AREA OF ACQUISITION IN FEE		0.9

DATE OF PHOTOGRAPHY DEC 22 9 30, 1982
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL 1'
 100 FOOT GRID BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE

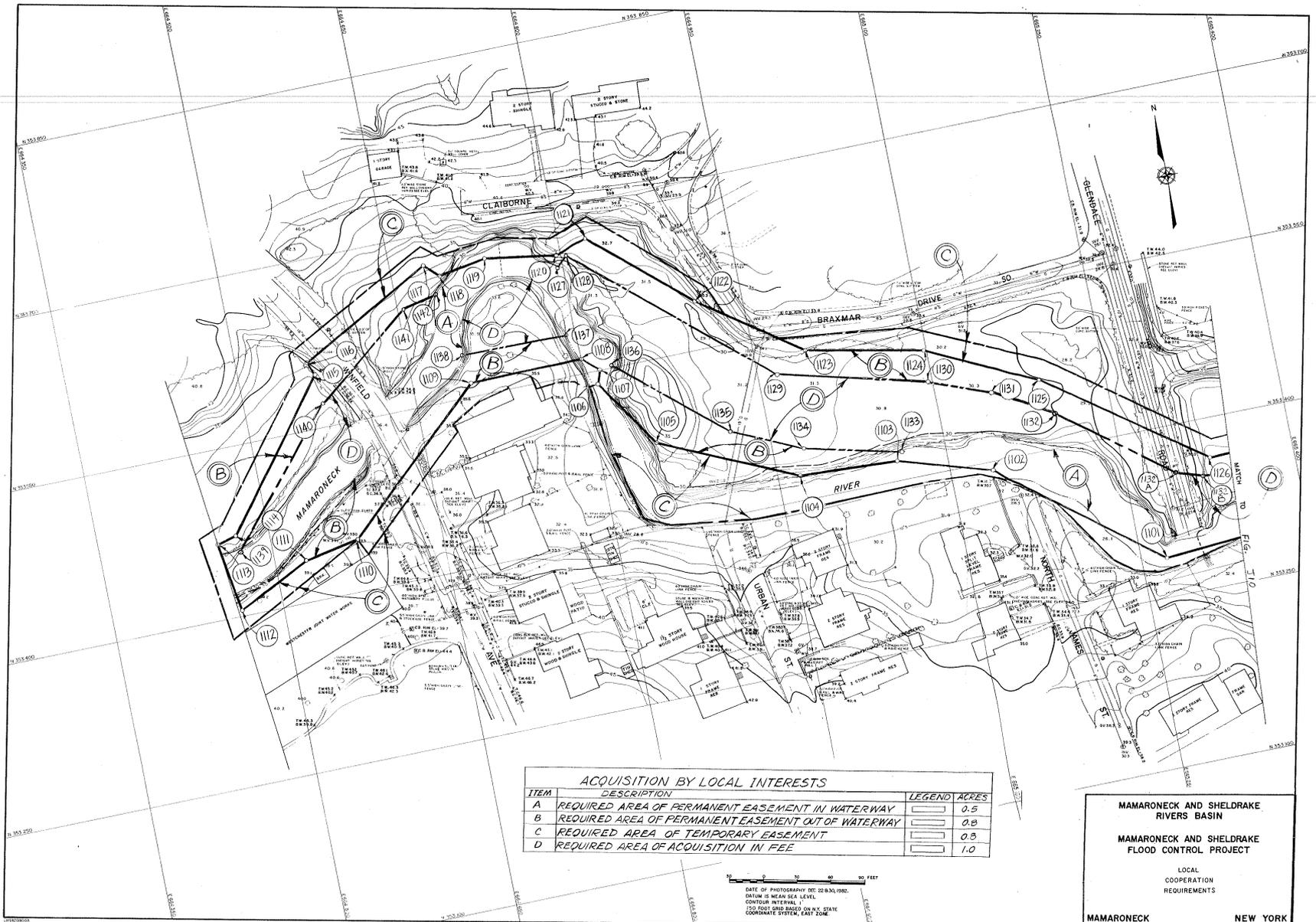
**MAMARONECK AND SHELDRAKE
 RIVERS BASIN**

**MAMARONECK AND SHELDRAKE
 FLOOD CONTROL PROJECT**

 LOCAL
 COOPERATION
 REQUIREMENTS

MAMARONECK **NEW YORK**

FIGURE J 10



ACQUISITION BY LOCAL INTERESTS

ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		0.5
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		0.8
C	REQUIRED AREA OF TEMPORARY EASEMENT		0.3
D	REQUIRED AREA OF ACQUISITION IN FEE		1.0

MAMARONECK AND SHELDRAKE RIVERS BASIN

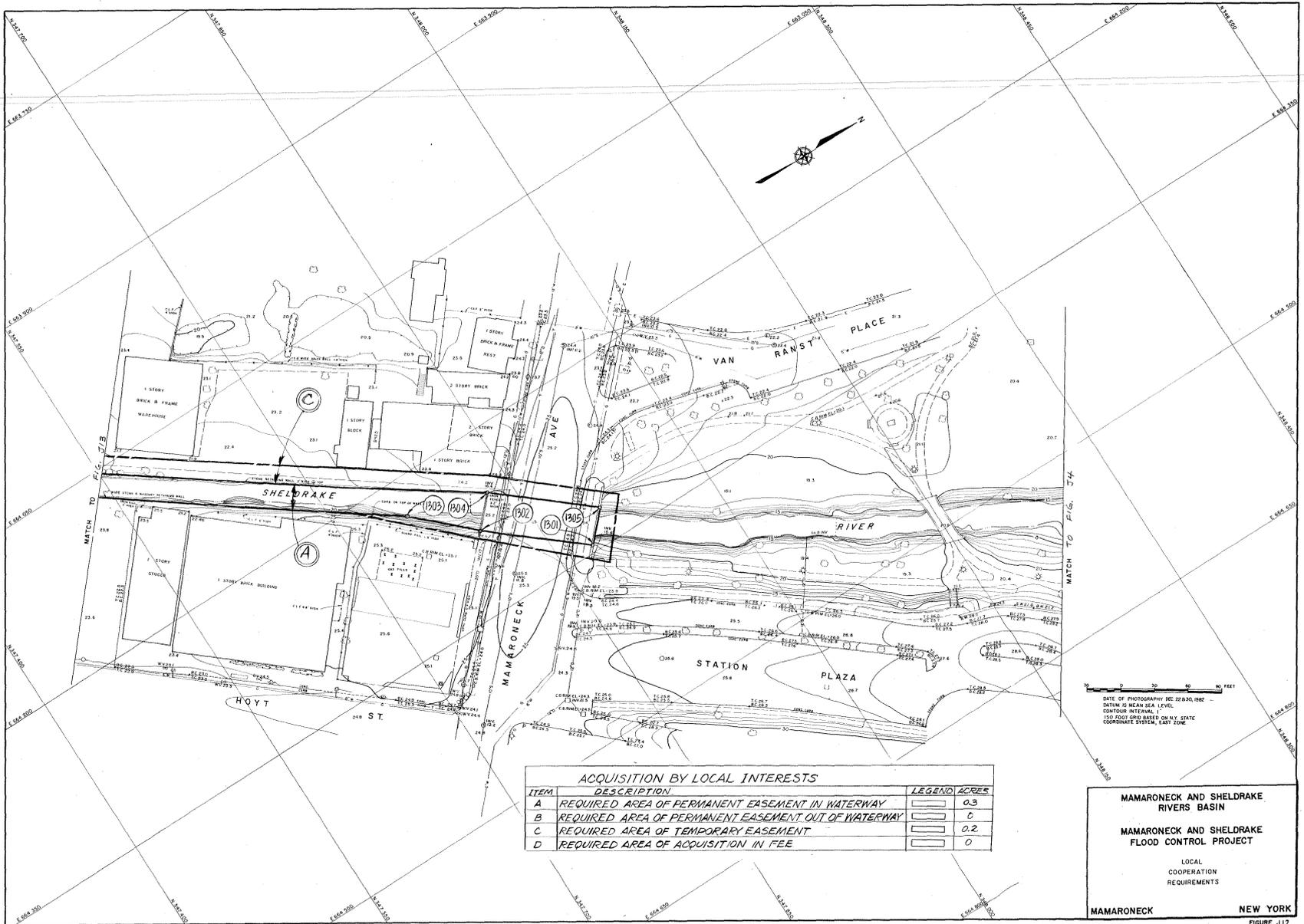
MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT

LOCAL COOPERATION REQUIREMENTS

MAMARONECK

NEW YORK

FIGURE J 11

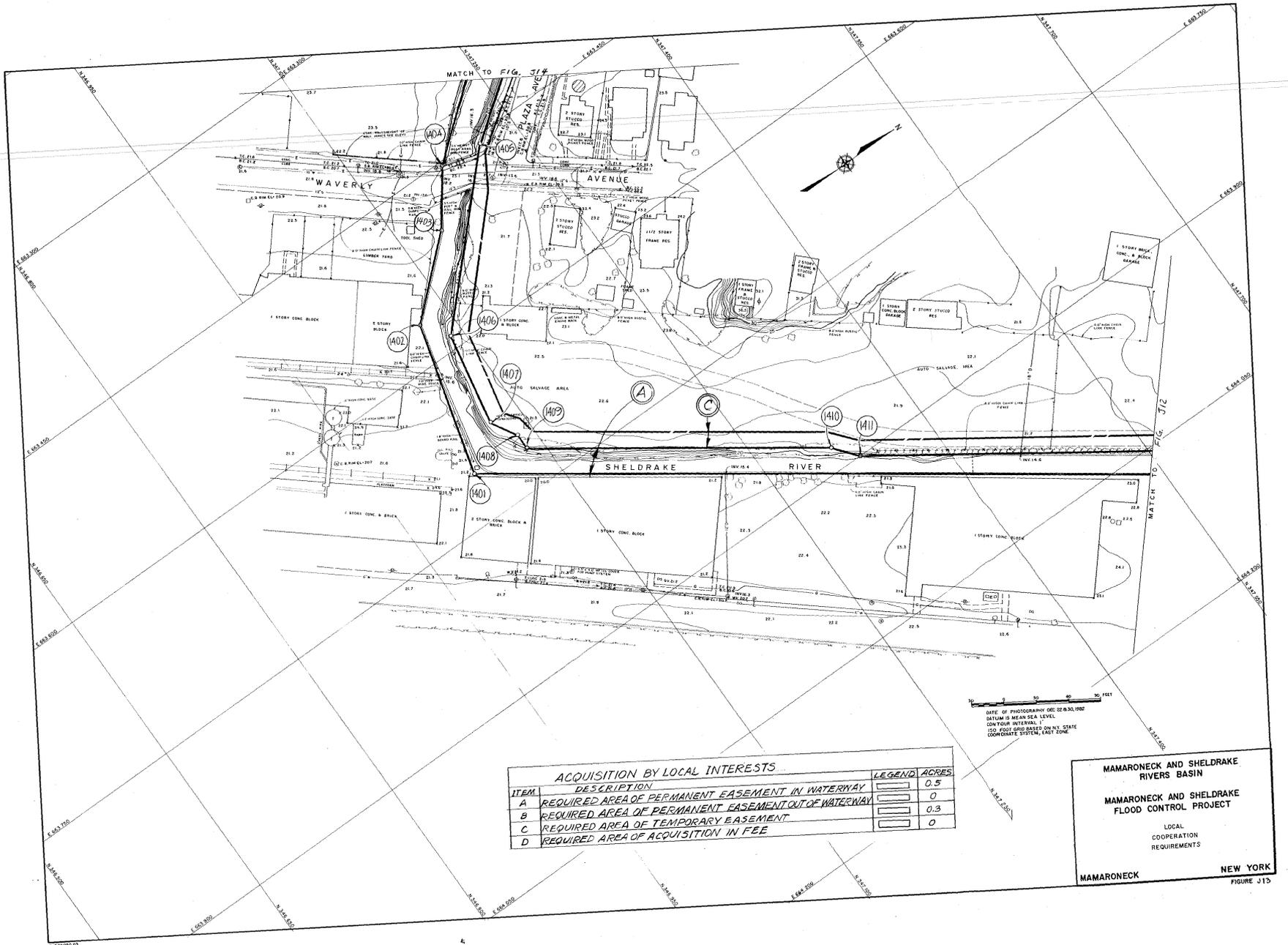


ACQUISITION BY LOCAL INTERESTS

ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY	[Symbol]	0.3
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY	[Symbol]	0
C	REQUIRED AREA OF TEMPORARY EASEMENT	[Symbol]	0.2
D	REQUIRED AREA OF ACQUISITION IN FEE	[Symbol]	0

DATE OF PHOTOGRAPHY (EC 02-8-30, 08F)
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL
 100 FEET (PROJ BASED ON N.Y. STATE COORDINATE SYSTEM, LAST ZONE)

MAMARONECK AND SHELDRAKE RIVERS BASIN
 MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT
 LOCAL COOPERATION REQUIREMENTS
 MAMARONECK NEW YORK



ACQUISITION BY LOCAL INTERESTS		LEGEND	ACRES
ITEM	DESCRIPTION		
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY	<input type="checkbox"/>	0.5
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY	<input type="checkbox"/>	0
C	REQUIRED AREA OF TEMPORARY EASEMENT	<input type="checkbox"/>	0.3
D	REQUIRED AREA OF ACQUISITION IN FEE	<input type="checkbox"/>	0

MAMARONECK AND SHELDRAKE RIVERS BASIN

MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT

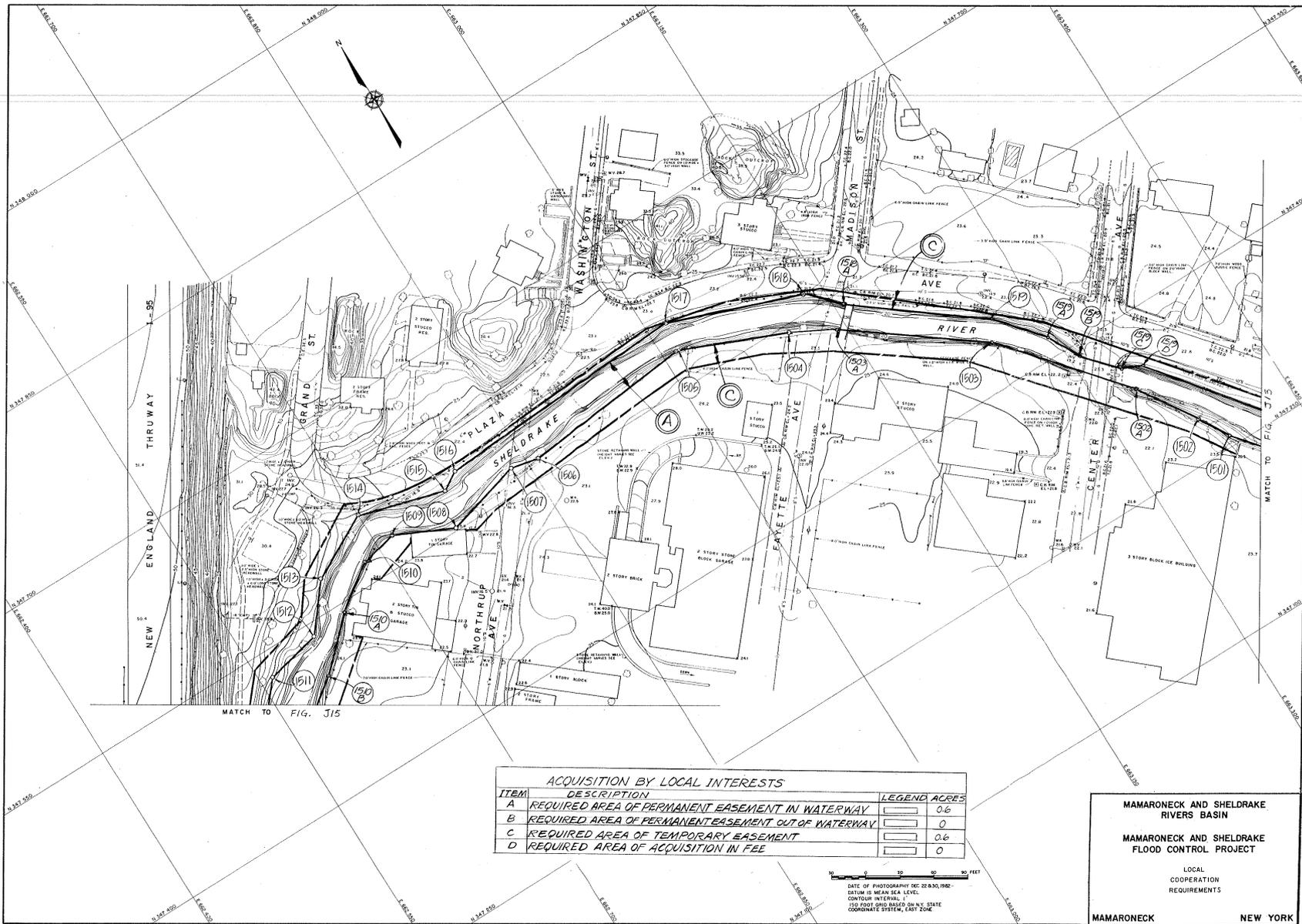
LOCAL COOPERATION REQUIREMENTS

MAMARONECK

NEW YORK

FIGURE J13

DATE OF PHOTOGRAPHY: DEC. 22, 1930, 1932
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL
 100 FEET (BASED ON N.Y. STATE COORDINATE SYSTEM, EAST ZONE)



MATCH TO FIG. 315

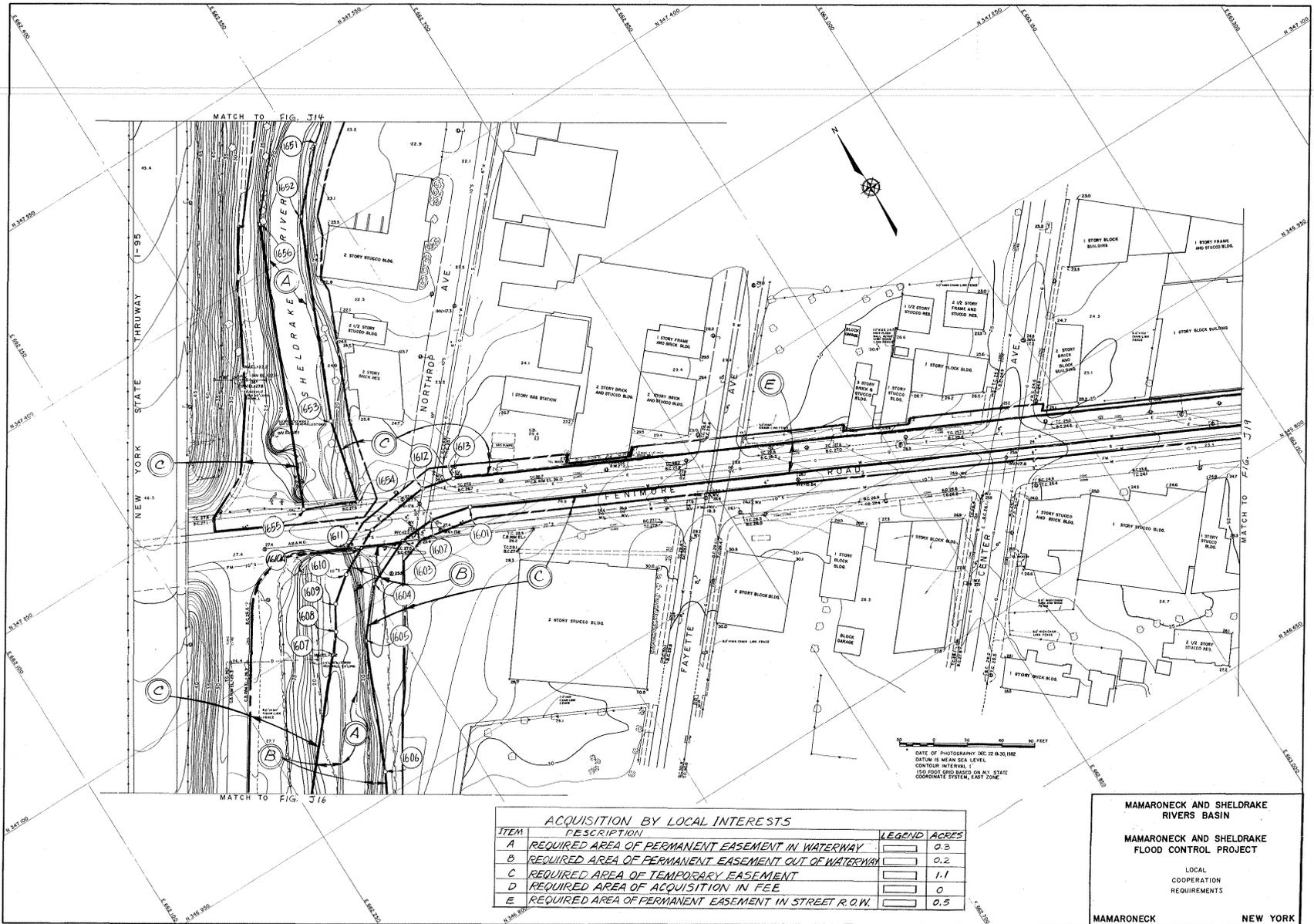
MATCH TO FIG. 315

ACQUISITION BY LOCAL INTERESTS

ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		0.6
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		0
C	REQUIRED AREA OF TEMPORARY EASEMENT		0.6
D	REQUIRED AREA OF ACQUISITION IN FEE		0

10 0 50 100 50 FEET
 DATE OF PHOTOGRAPHY DEC 22 1930, 1932
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL 1'
 150 FOOT GRID BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE

MAMARONECK AND SHELDRAKE
 RIVERS BASIN
 MAMARONECK AND SHELDRAKE
 FLOOD CONTROL PROJECT
 LOCAL
 COOPERATION
 REQUIREMENTS
 MAMARONECK NEW YORK



ACQUISITION BY LOCAL INTERESTS

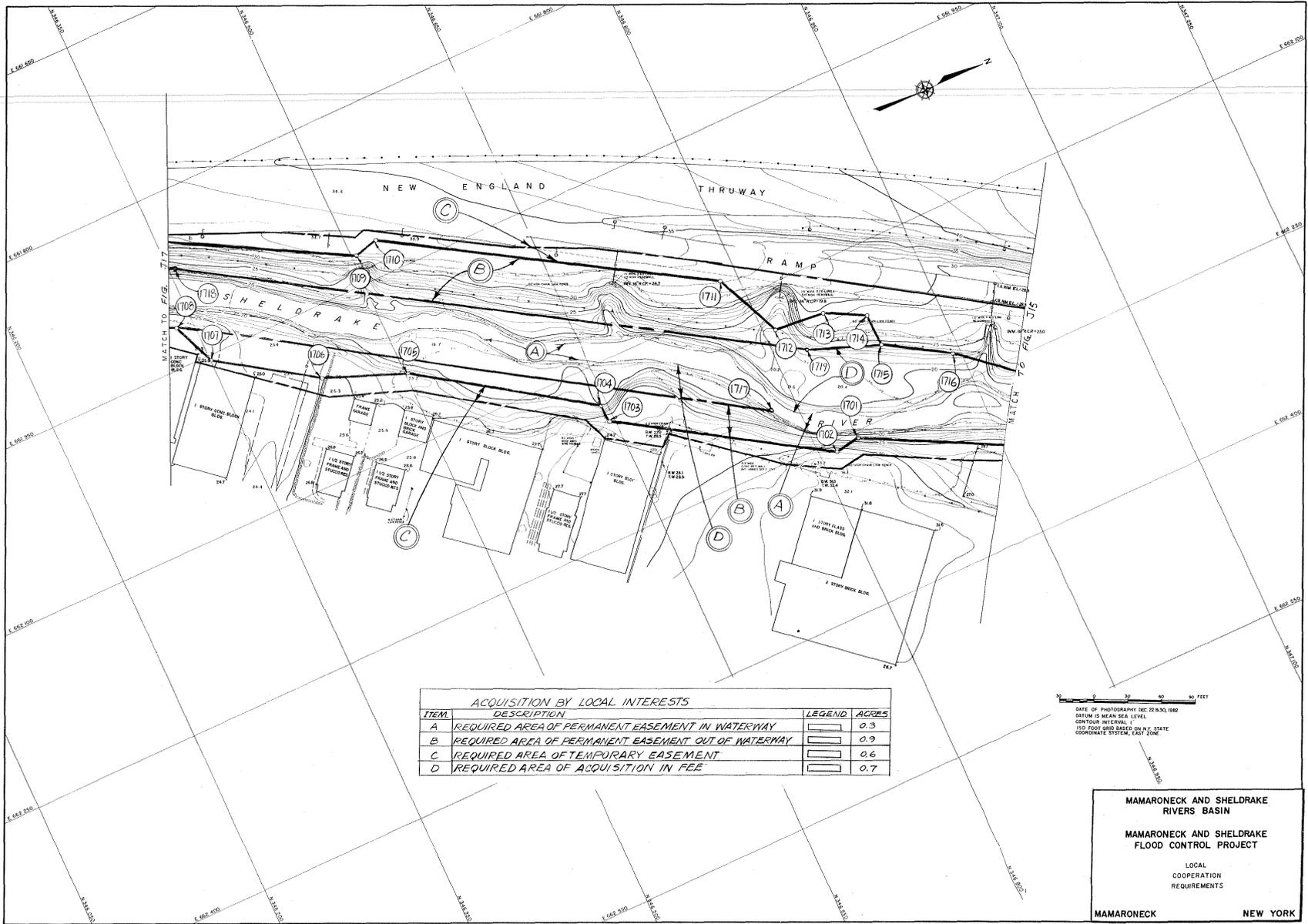
ITEM	DESCRIPTION	LEGEND	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		0.3
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		0.2
C	REQUIRED AREA OF TEMPORARY EASEMENT		1.1
D	REQUIRED AREA OF ACQUISITION IN FEE		0
E	REQUIRED AREA OF PERMANENT EASEMENT IN STREET R.O.W.		0.5

MAMARONECK AND SHELDRAKE RIVERS BASIN

MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT

LOCAL COOPERATION REQUIREMENTS

MAMARONECK NEW YORK

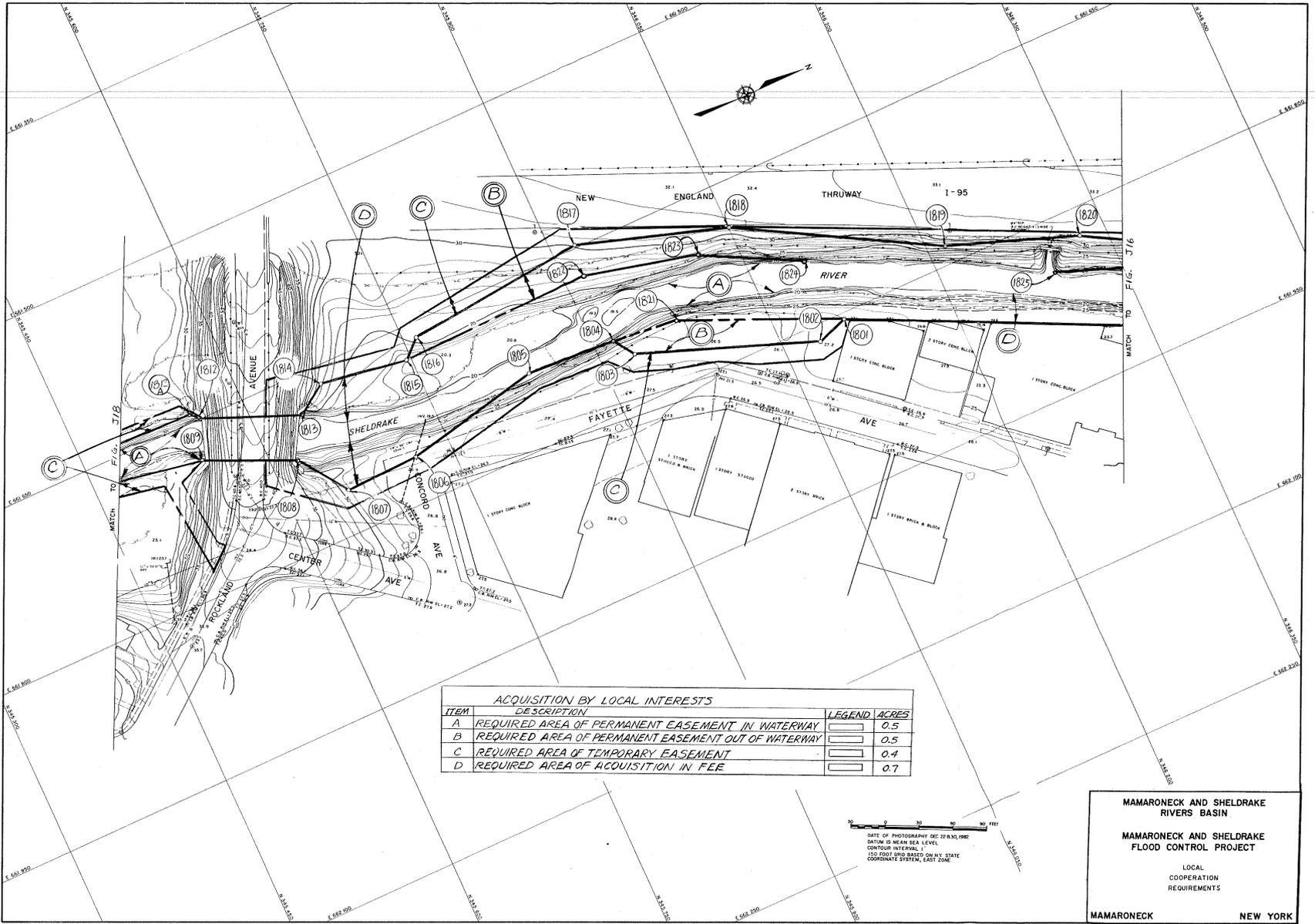


ACQUISITION BY LOCAL INTERESTS		
ITEM	DESCRIPTION	ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY	0.3
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY	0.9
C	REQUIRED AREA OF TEMPORARY EASEMENT	0.6
D	REQUIRED AREA OF ACQUISITION IN FEE	0.7

DATE OF PHOTOGRAPHY: DEC. 22, 1954 (1952)
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL: 1'
 150 FOOT GRID BASED ON N.Y. STATE COORDINATE SYSTEM, EAST ZONE

MAMARONECK AND SHELDRAKE RIVERS BASIN
MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT
 LOCAL COOPERATION REQUIREMENTS
MAMARONECK NEW YORK

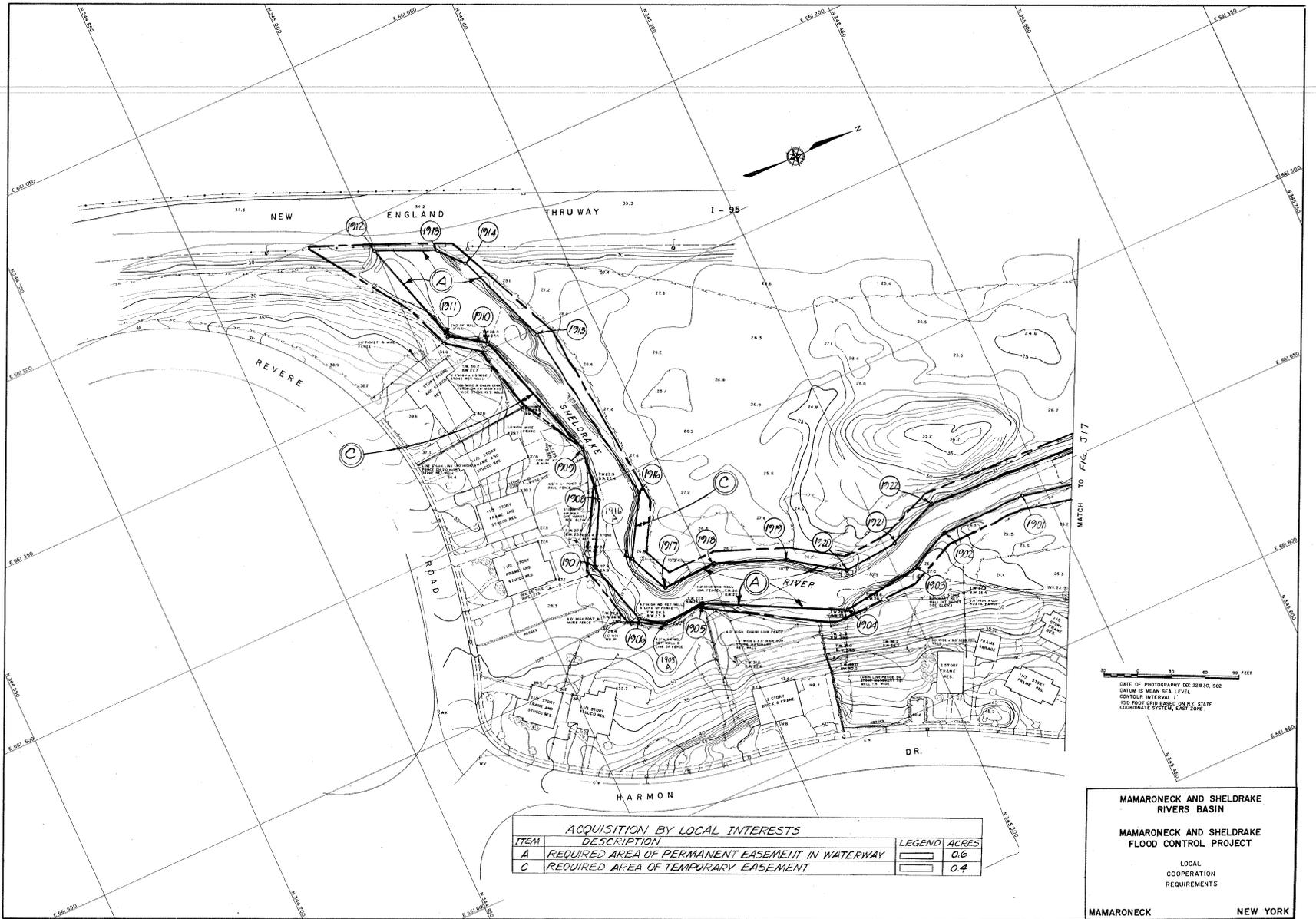
FIGURE J16



ACQUISITION BY LOCAL INTERESTS		LEGEND	ACRES
ITEM	DESCRIPTION		
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY		0.5
B	REQUIRED AREA OF PERMANENT EASEMENT OUT OF WATERWAY		0.5
C	REQUIRED AREA OF TEMPORARY EASEMENT		0.4
D	REQUIRED AREA OF ACQUISITION IN FEE		0.7

DATE OF PHOTOGRAPHY DEC 22 8,30, 1982
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL
 100 FOOT (BVD BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE)

MAMARONECK AND SHELDRAKE
 RIVERS BASIN
 MAMARONECK AND SHELDRAKE
 FLOOD CONTROL PROJECT
 LOCAL
 COOPERATION
 REQUIREMENTS
 MAMARONECK NEW YORK



MATCH TO FIG. J77

DATE OF PHOTOGRAPHY DEC 28, 1950
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL, 1
 100 FOOT GRID BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE



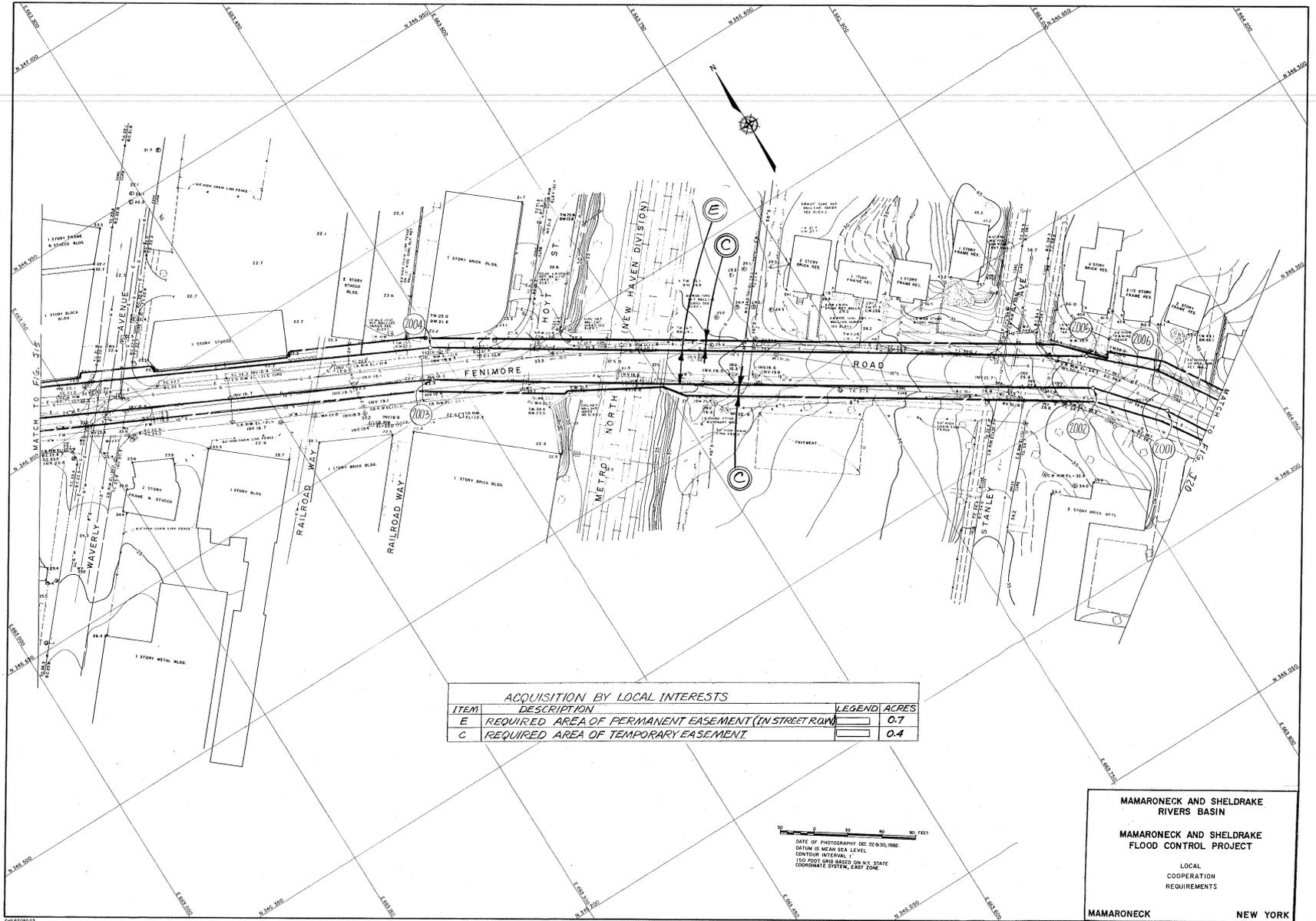
ACQUISITION BY LOCAL INTERESTS		
ITEM	DESCRIPTION	LEGEND ACRES
A	REQUIRED AREA OF PERMANENT EASEMENT IN WATERWAY	0.6
C	REQUIRED AREA OF TEMPORARY EASEMENT	0.4

MAMARONECK AND SHELDRAKE RIVERS BASIN

MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT

LOCAL COOPERATION REQUIREMENTS

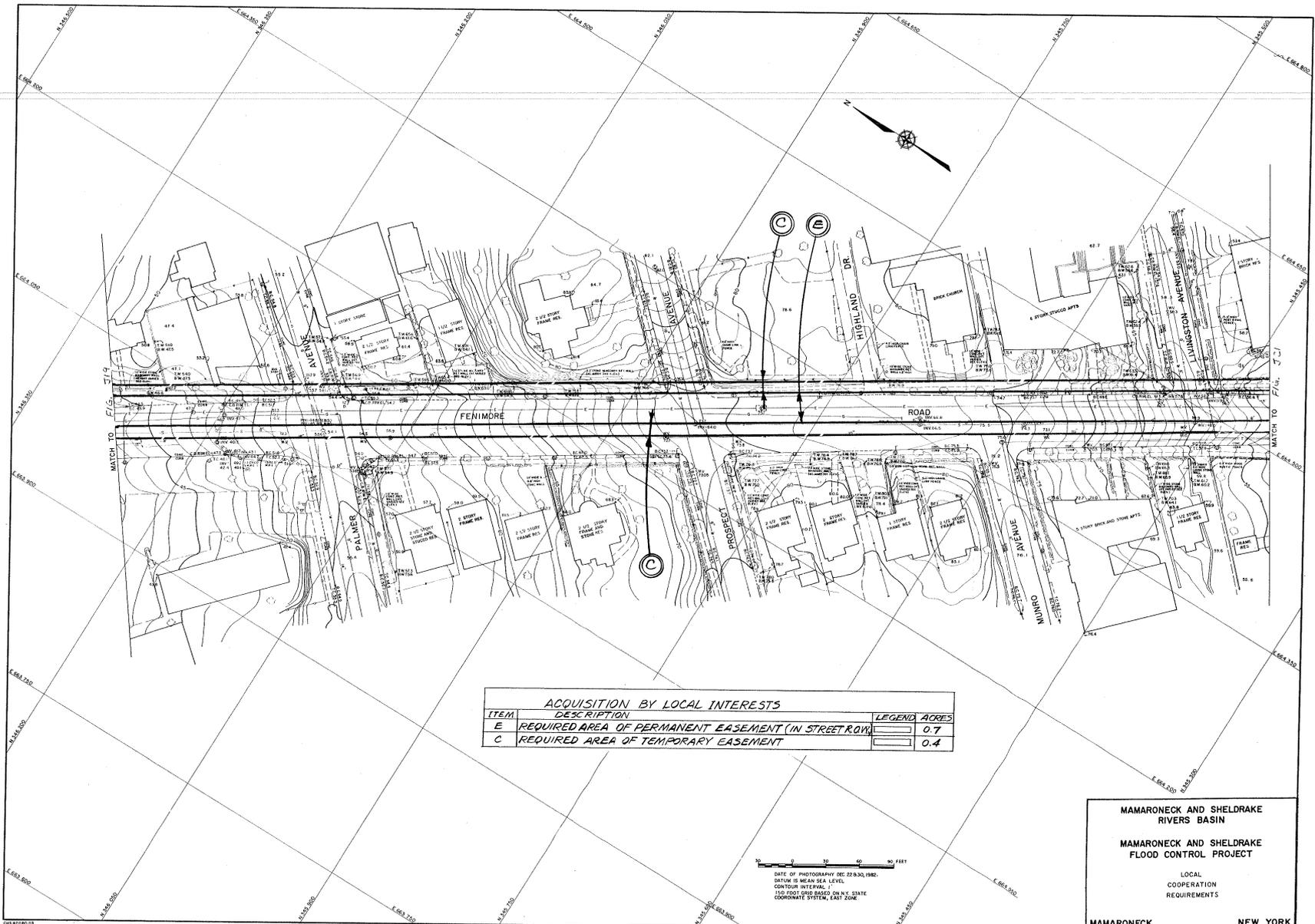
MAMARONECK NEW YORK



ACQUISITION BY LOCAL INTERESTS		
ITEM	DESCRIPTION	LEGEND ACRES
E	REQUIRED AREA OF PERMANENT EASEMENT (IN STREET ROW)	0.7
C	REQUIRED AREA OF TEMPORARY EASEMENT	0.4

0 10 20 30 40 50 60 FEET
 DATE OF PHOTOGRAPHY: DEC. 12, 1950, 1962
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL: 1'
 150 FOOT GRID BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE

**MAMARONECK AND SHELDRAKE
 RIVERS BASIN**
**MAMARONECK AND SHELDRAKE
 FLOOD CONTROL PROJECT**
 LOCAL
 COOPERATION
 REQUIREMENTS
MAMARONECK NEW YORK

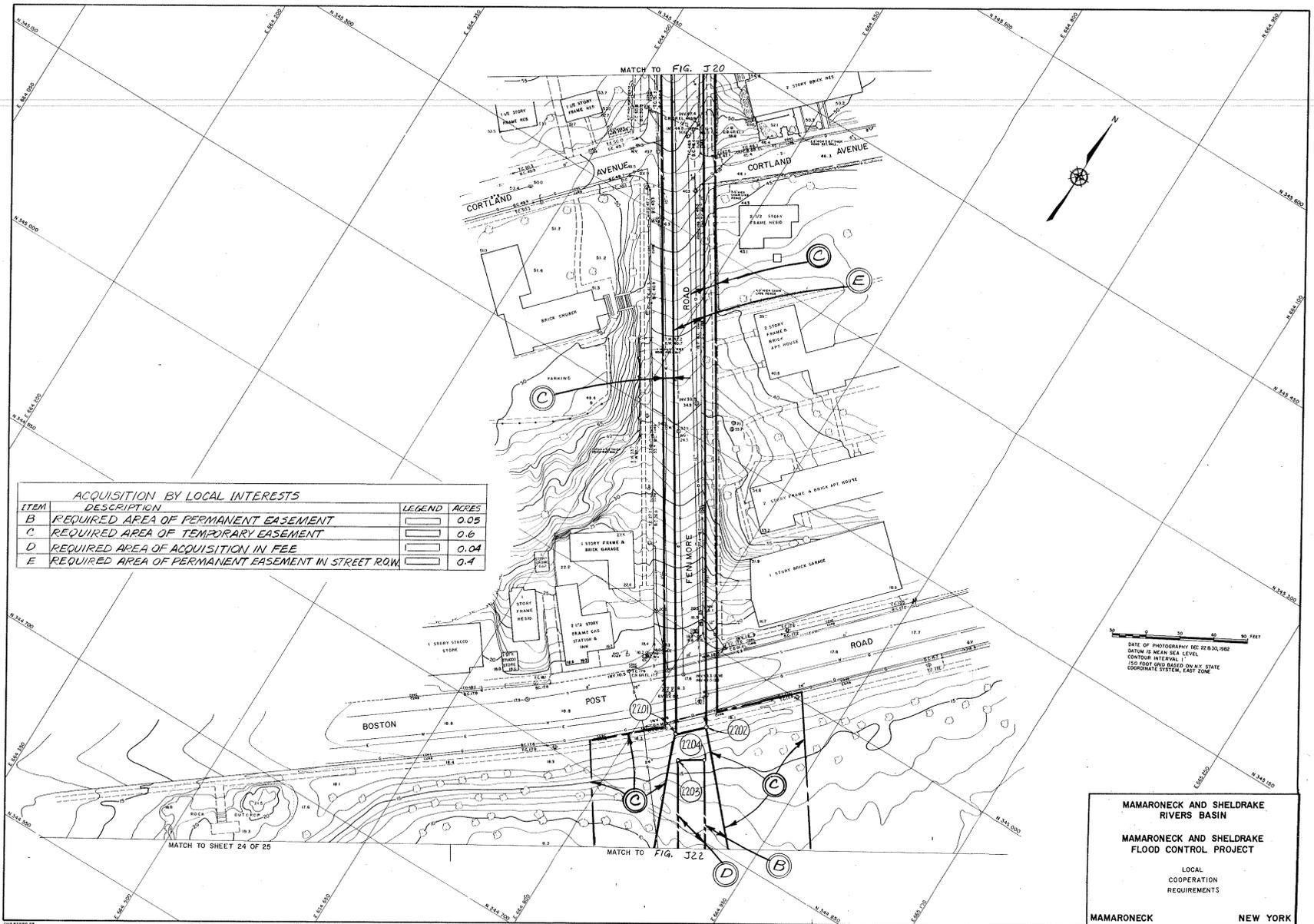


ACQUISITION BY LOCAL INTERESTS		
ITEM	DESCRIPTION	LEGEND ACRES
E	REQUIRED AREA OF PERMANENT EASEMENT (IN STREET ROW)	0.7
C	REQUIRED AREA OF TEMPORARY EASEMENT	0.4



DATE OF PHOTOGRAPHY DEC 22 1930 (1882)
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL, 1'
 TYPED FROM PHOTO BASED ON N.Y. STATE
 COORDINATE SYSTEM, 1880 ZONE.

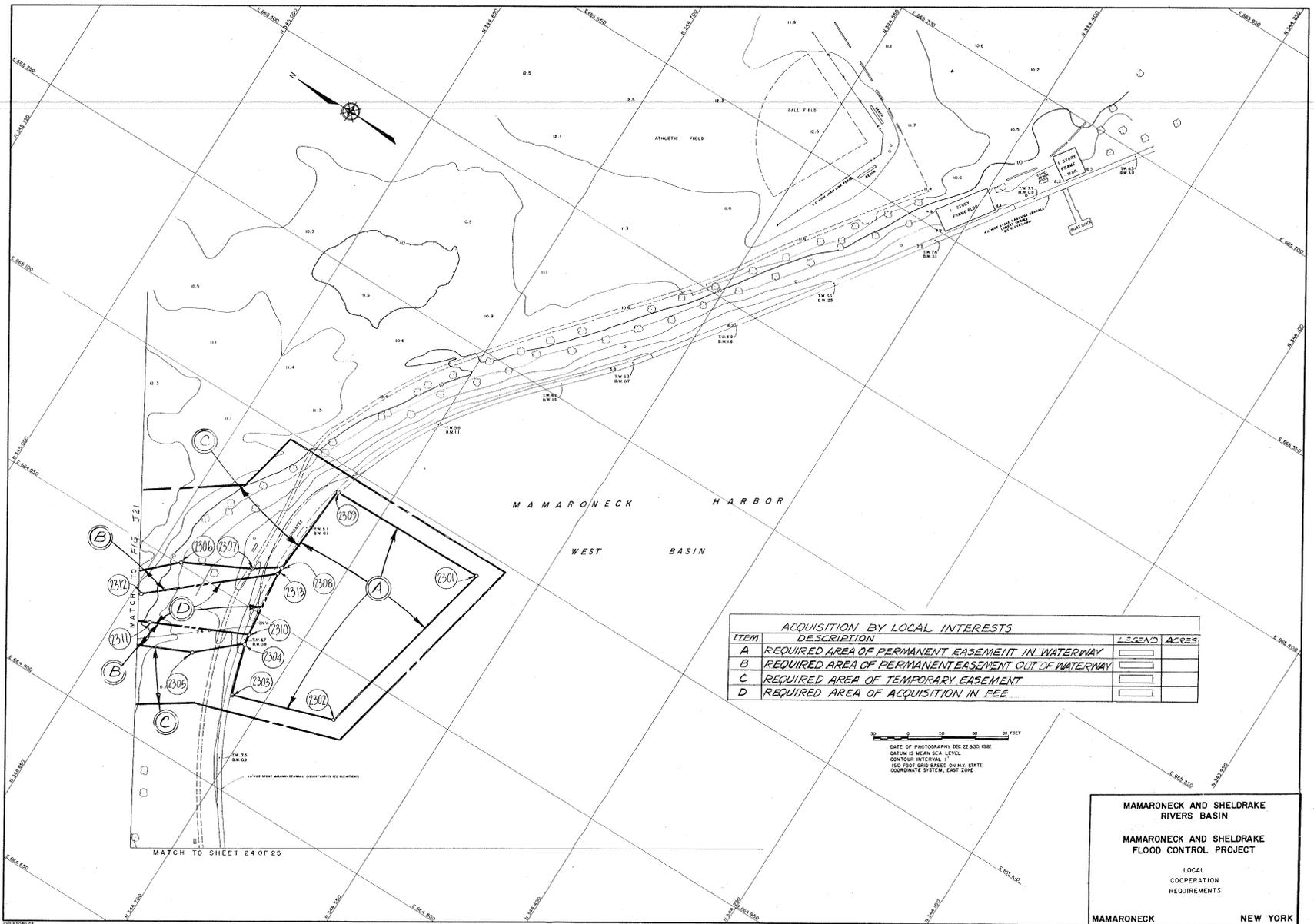
MAMARONECK AND SHELDRAKE
 RIVERS BASIN
 MAMARONECK AND SHELDRAKE
 FLOOD CONTROL PROJECT
 LOCAL
 COOPERATION
 REQUIREMENTS



ACQUISITION BY LOCAL INTERESTS		
ITEM	DESCRIPTION	LEGEND ACRES
B	REQUIRED AREA OF PERMANENT EASEMENT	0.05
C	REQUIRED AREA OF TEMPORARY EASEMENT	0.6
D	REQUIRED AREA OF ACQUISITION IN FEE	0.04
E	REQUIRED AREA OF PERMANENT EASEMENT IN STREET ROW	0.4

DATE OF PHOTOGRAPHY: DEC 22, 1962
 DATUM: MEAN SEA LEVEL
 CONTOUR INTERVAL: 1
 150 FOOT GRID BASED ON N.Y. STATE COORDINATE SYSTEM, EAST ZONE

MAMARONECK AND SHELDRAKE RIVERS BASIN
MAMARONECK AND SHELDRAKE FLOOD CONTROL PROJECT
 LOCAL COOPERATION REQUIREMENTS
MAMARONECK NEW YORK
 FIGURE J.21



0 20 40 60 80 FEET
 DATE OF PHOTOGRAPHY DEC 22 & 30, 1962
 DATUM IS MEAN SEA LEVEL
 CONTOUR INTERVAL 1
 100 FOOT GRID BASED ON N.Y. STATE
 COORDINATE SYSTEM, EAST ZONE

**MAMARONECK AND SHELDRAKE
RIVERS BASIN**

**MAMARONECK AND SHELDRAKE
FLOOD CONTROL PROJECT**

 LOCAL
COOPERATION
REQUIREMENTS

MAMARONECK NEW YORK

FIGURE J.22