

Silver Beach Road Drainage Analysis

for the

Town of Malta

Saratoga County, New York

Prepared for:

Town of Malta

June 1998

CHA Project No. 1510.51.82

Prepared by:

**CLOUGH, HARBOUR & ASSOCIATES LLP
ENGINEERS, SURVEYORS, PLANNERS
& LANDSCAPE ARCHITECTS**

III Winners Circle

Albany, New York 12205

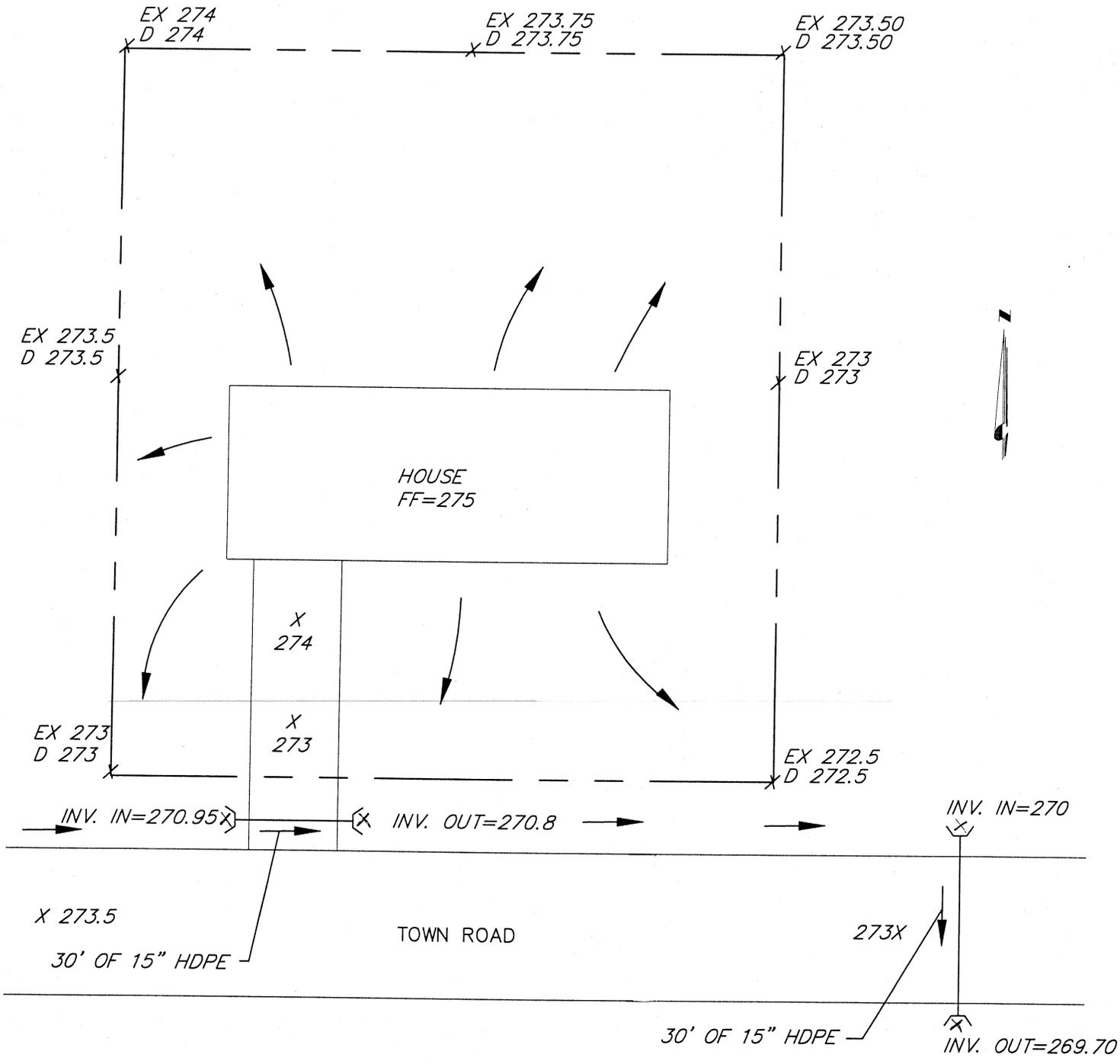
(518) 453-4500

Town of Malta
Drainage/Grading Form

The Drainage/Grading Form should provide the following:

1. A sketch plan of the property prepared to an appropriate scale and including:
 - Property lines.
 - Location and centerline elevations of adjacent town or private roadway.
 - Location of swales and culverts along adjacent roadway.
 - Proposed building and driveway locations with finished floor elevations.
 - Existing drainage patterns and applicable spot elevations.
 - Proposed lot grading with applicable spot elevations.
 - Location, size and invert elevations of on-site culverts.

2. If an existing drainage channel/swale is located on or adjacent to the building lot, the following conditions must be shown on an additional sketch.
 - The path of the existing drainage channel with applicable spot elevations.
 - The path of the relocated channel with proposed spot elevations.
 - Details of the proposed channel must be provided including longitudinal slope and cross-section.
 - An erosion control plan must be provided.
 - The outfall of the drainage swale must be detailed.

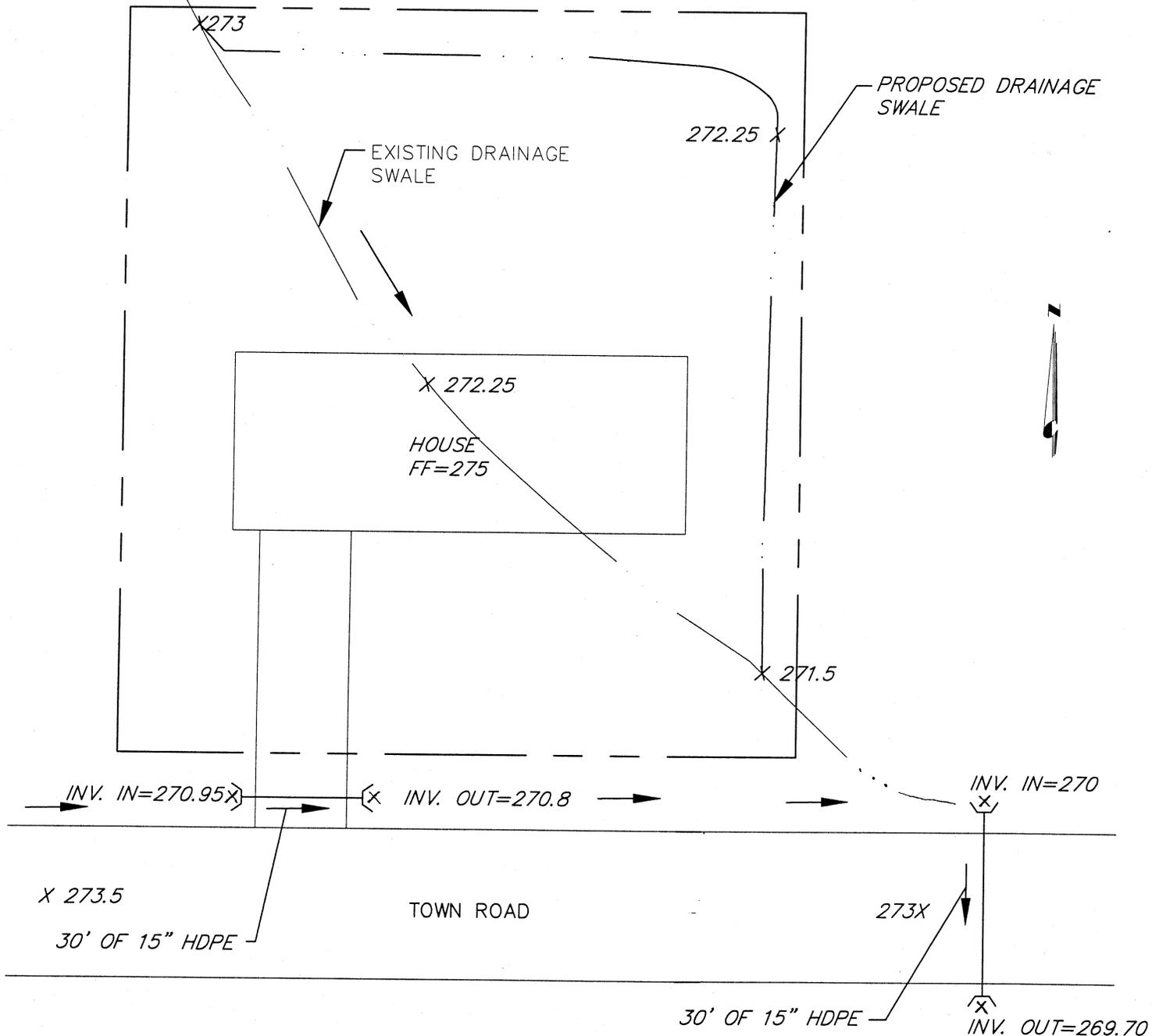
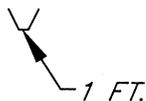


SCALE 1=20

FORM 1-SKETCH PLAN

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 III WINNERS CIRCLE ALBANY, NEW YORK 12205

PROPOSED DRAINAGE SWALE
@1% SLOPE TYP.



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FORM 2-DRAINAGE CHANNEL RELOCATION

FILE NAME XXXXXXXX



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ALBANY, NEW YORK

12205

Motion by: Councilman Winters

August 3, 1998

Seconded by: Councilman Lange

ORDINANCE NO. 5 OF 1998
TOWN OF MALTA
COUNTY OF SARATOGA

An Ordinance Amending an Ordinance of the Town of
Malta entitled "Town of Malta Zoning Ordinance"

BE IT ORDAINED, by the Town Board of the Town of Malta
as follows:

SECTION I

The first sentence of Section 167-37 B of the Town of
Malta Zoning Ordinance shall be amended to read as follows:
"There shall be submitted with each application for a
Building Permit two (2) complete sets of all information
necessary to enable the Building Inspector to determine
whether the proposed building and use of the premises
comply with the provisions of this Chapter, including two
(2) sets of a Grading and Drainage Plan for the subject
premises, which shall be reviewed by the Town Building
Inspector, and, in the sole discretion of the Town Building
Inspector, if the Grading and Drainage Plan must be
reviewed by the Town Engineer, and/or the advice of the
Town Engineer obtained concerning the said Grading and
Drainage Plan, the cost of such review and such advice
shall be paid for by the applicant."

ADOPTED: VOTE - AYES-5 NAYS-0

RESOLUTION NO. 144

Motion by: *Winters*

Seconded by: *Lange*

WHEREAS, the Town Board of the Town of Malta is considering amending its Zoning Ordinance to provide that a Grading and Drainage Plan must be submitted with each application for a Building Permit, and

WHEREAS, the Town's Engineers, Clough, Harbour & Associates, have reviewed this proposed amendment, and prepared a Notice of Determination of Non-Significance concerning this proposed amendment, and have recommended the adoption thereof by the Town Board of the Town of Malta, now, therefore, be it

RESOLVED, that the Town Board of the Town of Malta does hereby declare itself lead agency concerning the said proposed amendment to the Town of Malta Zoning Ordinance, and be it further

RESOLVED, that the Town Board of the Town of Malta does hereby adopt a Negative Declaration and Notice of Determination of Non-Significance for this project, a copy of which is annexed hereto and made a part hereof.

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associated access roads. The natural topography of the watershed exhibits little variation and consists of relatively flat slopes. As a result, the watershed currently provides a substantial amount of storage, with most water leaving the site through a network of well-established drainage paths. Based on a review of the Preliminary USDA Soil Survey for Saratoga County, New York, soils in the area consist of the following.

<u>Soil Symbol</u>	<u>Name</u>	<u>HSG</u>
<i>As</i>	<i>Allis silt loam</i>	<i>D</i>
<i>MxB</i>	<i>Mosherville-Hornell complex</i>	<i>D</i>

Using SCS methodology, each soil series is placed in a group according to their hydrologic properties known as the Hydrologic Soil Group (HSG). The HSG is a four-letter index that is intended to show the relative potential for a soil to generate runoff. Soils in HSG "A" possess a low potential for runoff while soils in HSG "D" possess a high potential for runoff. All of the soils in the watershed are from HSG "D".

C. FEMA Study

According to the Flood Insurance Rate Map (FIRM) prepared for the Town of Malta effective August 16, 1995, the majority of the local watershed falls within unshaded Zone X (Areas determined to be outside the 500-year floodplain). The southern and eastern side of this boundary follows the 210-ft. contour along the edge of Saratoga Lake, while the western border represents a local highpoint between the lake and Drummond Creek. A small section of the watershed, the area between Collamer Road and Oak Avenue, is designated Zone AE (Areas of the 100-year flood; base flood elevations determined). The flood boundaries described above are illustrated in Figure 3 - 100-Year Floodplain Map.

IV. HYDROLOGIC & HYDRAULIC ASSESSMENT

A. Methodology

The peak flows resulting from the 1-, 2-, 5- and 10-year 24-hour storm events were evaluated as part of this study. Based on SCS TR-55 documentation, a type II rainfall distribution was used in computing runoff hydrographs. Rainfall amounts were taken from "Technical Paper No.40, Rainfall Frequency Atlas of the United States", published by the U.S. Department of Commerce, dated May 1961. The 24-hour rainfall amounts for the 1-, 2-, 5- and 10-year design storms are 2.30", 2.60", 3.40" and 3.90", respectively.

Runoff curve numbers were developed for the watershed using a combination of wooded area, impervious area and one-half acre residential lots. For the purposes of this analysis all acreage adjacent to Silver Beach Road, as well as that located along private access roads, was assumed to be residential property. Based on this design parameter, peak stormwater flows and hydrographs were computed using the USDA SCS TR-55 Urban Hydrology program. The capacity of the network of drainage ditches and culvert pipes located along Silver Beach Road was evaluated using the Dodson & Associates Hydrocalc Hydraulics computer program. This program uses standard HEC-5 inlet/outlet equations to evaluate flow conditions in pipe culverts and Manning's Equation to evaluate normal depth in open channels.

B. Drainage System

In order to evaluate the drainage system, the watershed was divided into three areas, each corresponding to an outlet crossing Silver Beach Road (See Figure 2 – Watershed Map). The first area (Area I) consists of $8.5 \pm$ acres which drain to a 35" x 24" pipe-arch culvert near the northern end of the watershed. This area was further separated into sub-areas (I-A, I-B & I-C) to better estimate the adequacy of individual culverts and ditches. The second area (Area-II) consists of $11.88 \pm$ acres that drain toward a 24" CMP culvert located just north of Schuyler Road near the middle of the watershed. It was further sub-divided into three areas (II-A, II-B & II-C) for the same purposes as Area-I. The final area (Area III) is the largest at $27.21 \pm$ acres. It drains via an ephemeral stream into a closed conveyance system near the southern end of the watershed. Again, as in Area I and II, it was divided into three sub-areas (III-A, III-B & III-C) in order to assess the performance of individual components in the drainage system.

The hydraulic analysis performed for Area-I determined that the drainage network within this area could adequately pass the 10-year 24-hour storm event. A similar conclusion was reached after an evaluation of the northern section of Area-II. After reviewing the southern section of the second area, it was determined that it provided capacity for the 2-year 24-hour event. The factor limiting the volume of flow in this section was the gradual slope, which created a situation where the backwater of a downstream cross-culvert affected the capacity of the system upstream. The outlet pipe for Area-III is controlled in a similar manner. Because the capacity of the 24" RCP outlet pipe is limited to the 2-year 24-hour flow, a backwater effect is created which ultimately limits the rest of the system. A summary of the hydraulic analysis is provided in Table 1 and detailed calculations are located in the Technical Appendix.

Table 1 - Summary of Hydraulic Analysis

Area	Sub-Area	Reach Description	Average slope (%)	Cross-Section	Capacity	
					Flowrate (cfs)	Storm Event
I	I-A, I-B, I-C	Swale Downstream of Outlet I Outlet I	1 0.98	V-Notch Channel 35" X 24" Pipe Arch CMP	7 7	10-Year 10-Year
	I-A	Swales 1, 2 Culvert 1	1.25 0.79	V-Notch Channel 12" CMP	1 1	10-Year 10-Year
	I-C	Swales 1, 2 Culvert 1	0.33 0.2	V-Notch Channel 12" CMP	1 1	10-Year 10-Year
II	II-A, II-B, II-C	Swale Downstream of Outlet II Outlet II	1 0.12	V-Notch Channel 24" CMP	11 11	10-Year 10-Year
	II-A	Swales 1, 2, 3, 4, 5 Culvert 1 Culvert 2 Culvert 3 Culvert 4 Culvert 5	1.25	V-Notch Channel 15" CMP	3	10-Year
			0.82	12" PVC	3	10-Year
			1.1	12" PVC	3	10-Year
			0.95	12" PVC	3	10-Year
			0.43	12" PVC	3	10-Year
			0	12" CMP	3	10-Year
	II-A, IIB	Swale 1	1.5	V-Notch Channel	8	10-Year
			0.35 0.71	V-Notch Channel 12" CMP	2 2	2-Year 2-Year
	III	III-A, III-B, III-C	Outlet III	0.2	24" RCP	10
III-A		Swale 1 Swale 2 Culvert 1	0.96	V-Notch Channel	1	2-Year
			3.2	V-Notch Channel 12" CMP	1 1	2-Year 2-Year
			1.27	24" CMP	10	2-Year
III-A, III-B		Culvert I	0.06	V-Notch Channel 12" CMP 12" CMP	1 0.5 0.5	2-Year 2-Year 2-Year
			1.96 0.18 0.06			

V. RECOMMENDED IMPROVEMENTS

Based on our analysis of the drainage network along Silver Beach Road, hydraulic capacities ranged from the 2-year 24-hour storm to the 10-year 24-hour storm. Interviews with local citizens and Town officials confirmed that this network operates adequately for small to moderate storm events.

In order to ensure that the drainage system continues to operate at current levels, CHA recommends that some minor maintenance be performed on both open swales and culverts. Our recommendations include the following: (1) culverts should be cleaned of debris and sediment that reduce their effective flow area, and (2) ditch lines should be cleaned, removing debris and/or overgrowth that reduce their efficiency.

CHA also recommends that minor modifications be implemented along Dunning Road at its junction with Silver Beach Road. Currently, during some winter storms and spring runoff events, water sheet flows down Dunning Road and overtops Silver Beach Road. This flow pattern leads to a situation where the roadway has the potential to freeze over, thus creating a safety hazard. The junction of these two roads occurs just after a sharp bend, and as such the sight distance for the potential hazard is limited. Because of this fact, CHA recommends that the Town of Malta acquire a construction easement extending another 50 feet west along Dunning Road (this may require the permission from three separate landowners). Upon receipt of this construction easement the Town should regrade Dunning Road to provide a crowned section with well established swales on both sides of the roadway. In addition, it is recommended that additional conveyance be provided beneath Dunning Road at this intersection.

VI. GUIDELINES FOR FUTURE DEVELOPMENT

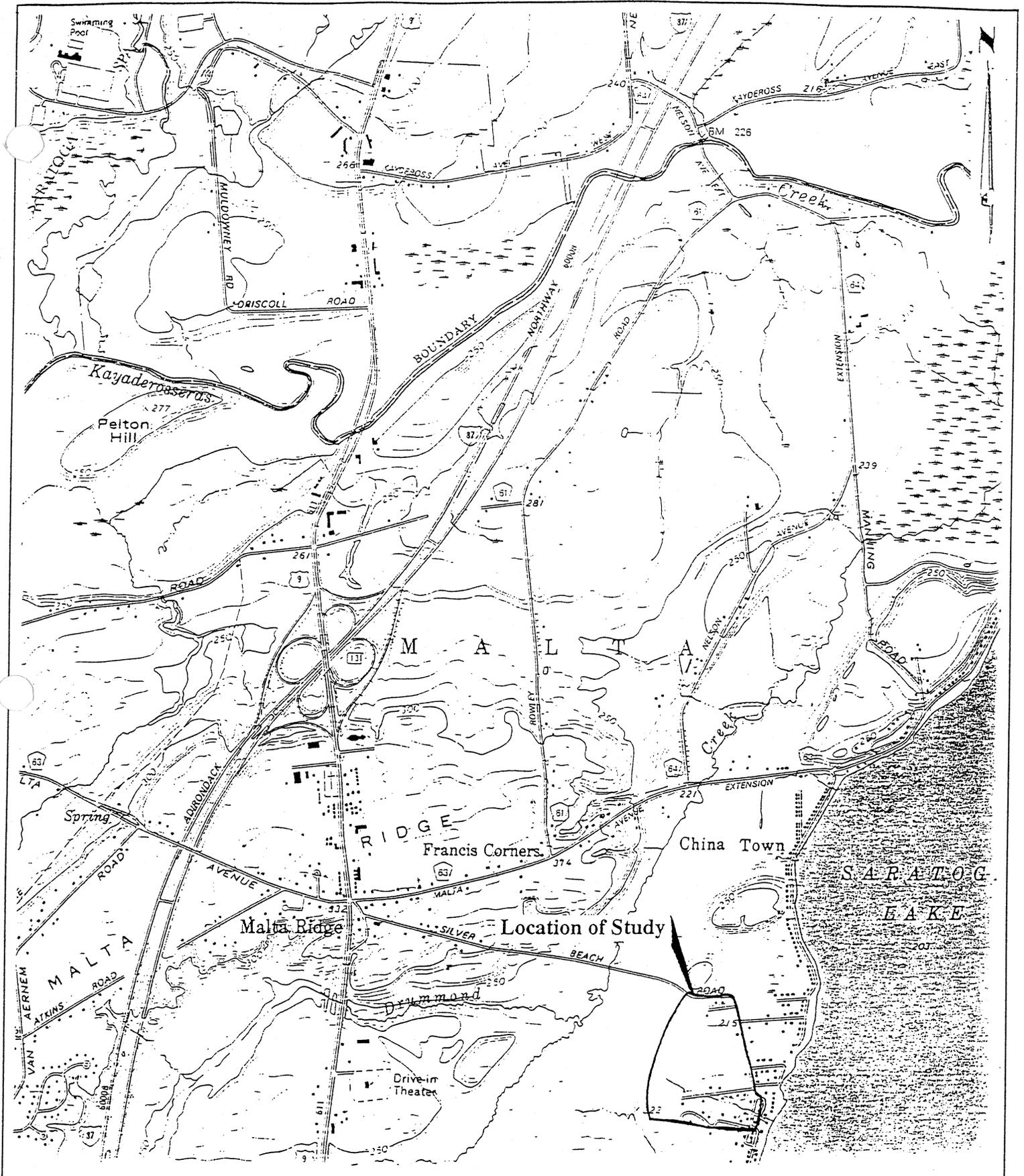
In order to protect the interests of the residents of Silver Beach, as well as those of the Town of Malta, CHA recommends that guidelines be established to regulate future development. The primary problem created by new development within the watershed is the diversion of runoff which results from the placement of fill material. In order to minimize flooding problems, CHA recommends that the process of obtaining a building permit require the applicant to submit a grading and drainage plan (a draft copy is located in the Technical Appendix). It would be left to the Building Inspector's discretion as to whether the submission needs to be reviewed by the Town Engineer. Furthermore, no building permit shall be issued until all grading and drainage considerations have been approved. The following conditions should be considered prior to granting a building permit:

- ◆ Existing drainage patterns should be maintained to the greatest extent possible.
- ◆ Conveyance of upstream drainage should be assessed and addressed adequately.
- ◆ A 10-year design standard should be used to assess drainage conditions.

- ◆ Applicants should be required to maintain pre-development flow rates, unless specifically approved otherwise.

VII. SUMMARY

An analysis of the Silver Beach Watershed has shown that the local drainage system is functioning adequately. In order to maintain its current level of operation, CHA has recommended that some minor maintenance be performed along the network of culverts and swales. In addition, CHA has developed several guidelines that would work to limit future drainage problems. The adoption of these guidelines will provide the Town of Malta with a detailed process for dealing with future development in the Silver Beach Watershed, while protecting the interests of both the Town and local residents.



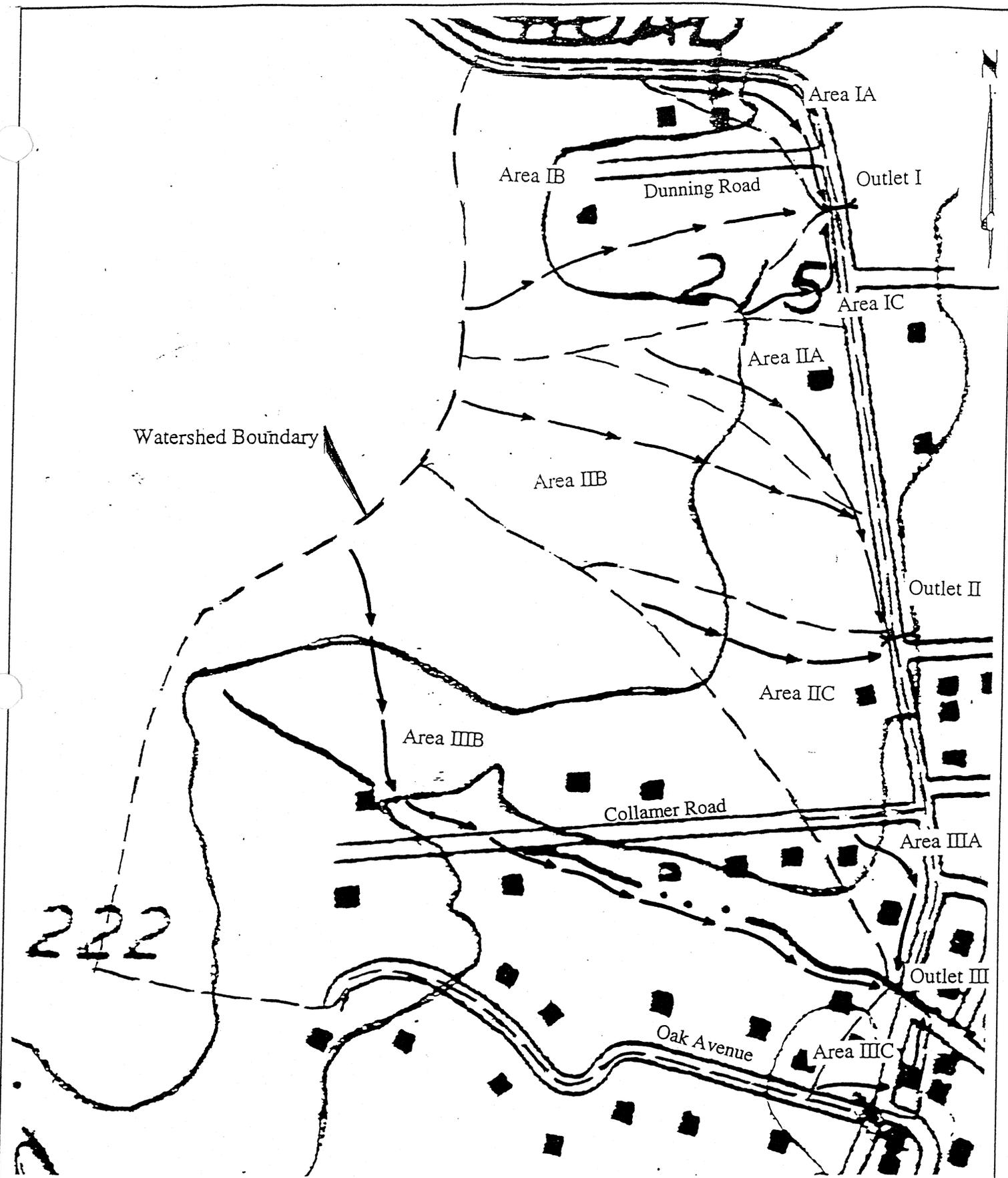
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Figure 1 Location Map

Town of Malta Drainage Study
 Silver Beach Road
 Malta, New York

Scale: 1" = 2000'

June 1998



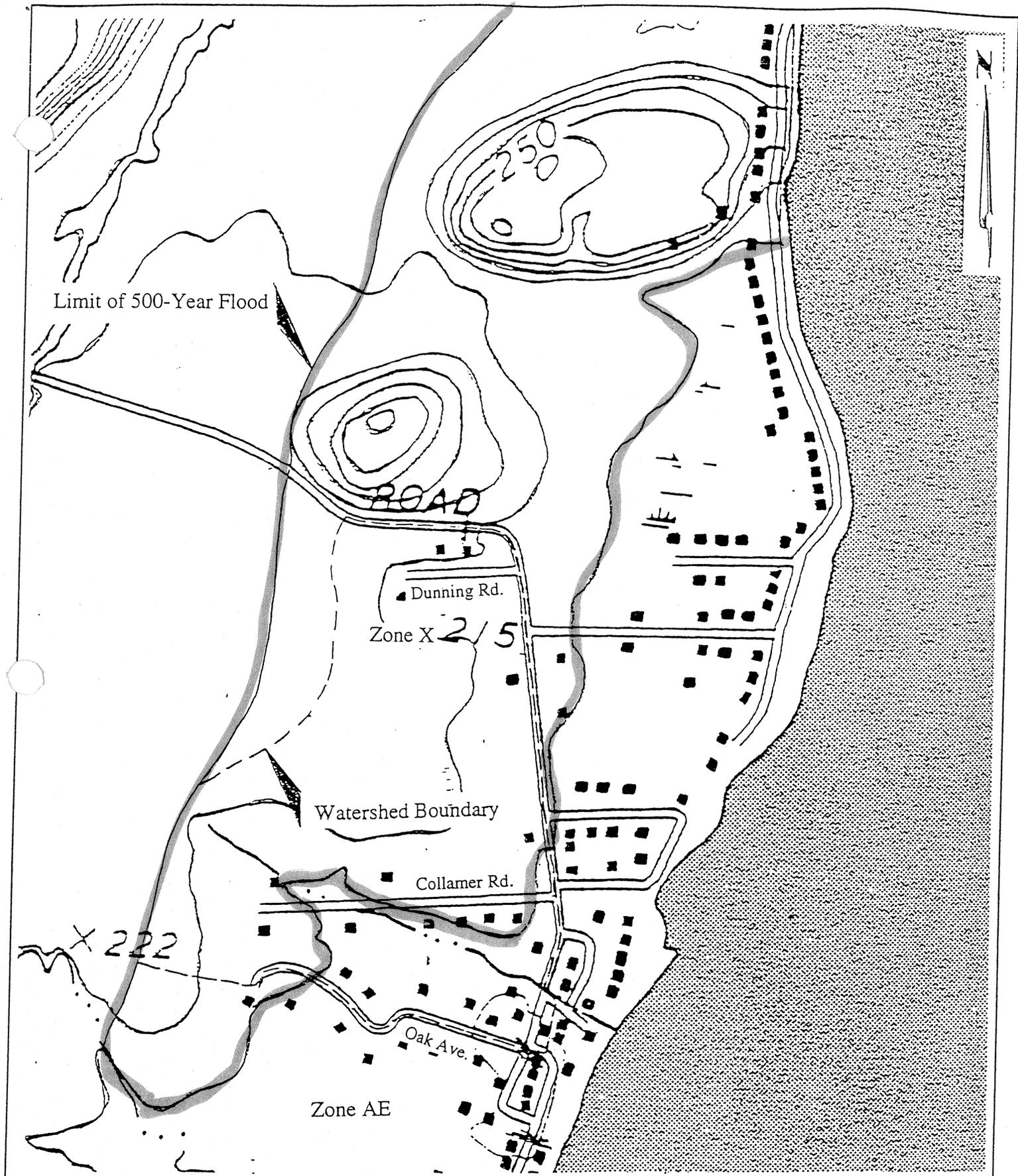
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Figure 2 Watershed Map

Town of Malta Drainage Study
 Silver Beach Road
 Malta, New York

Scale: 1" = 250'

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Figure 3 100-Year Floodplain Map

Town of Malta Drainage Study
Silver Beach Road
Malta, New York

Scale: 1" = 1000'

June 1998