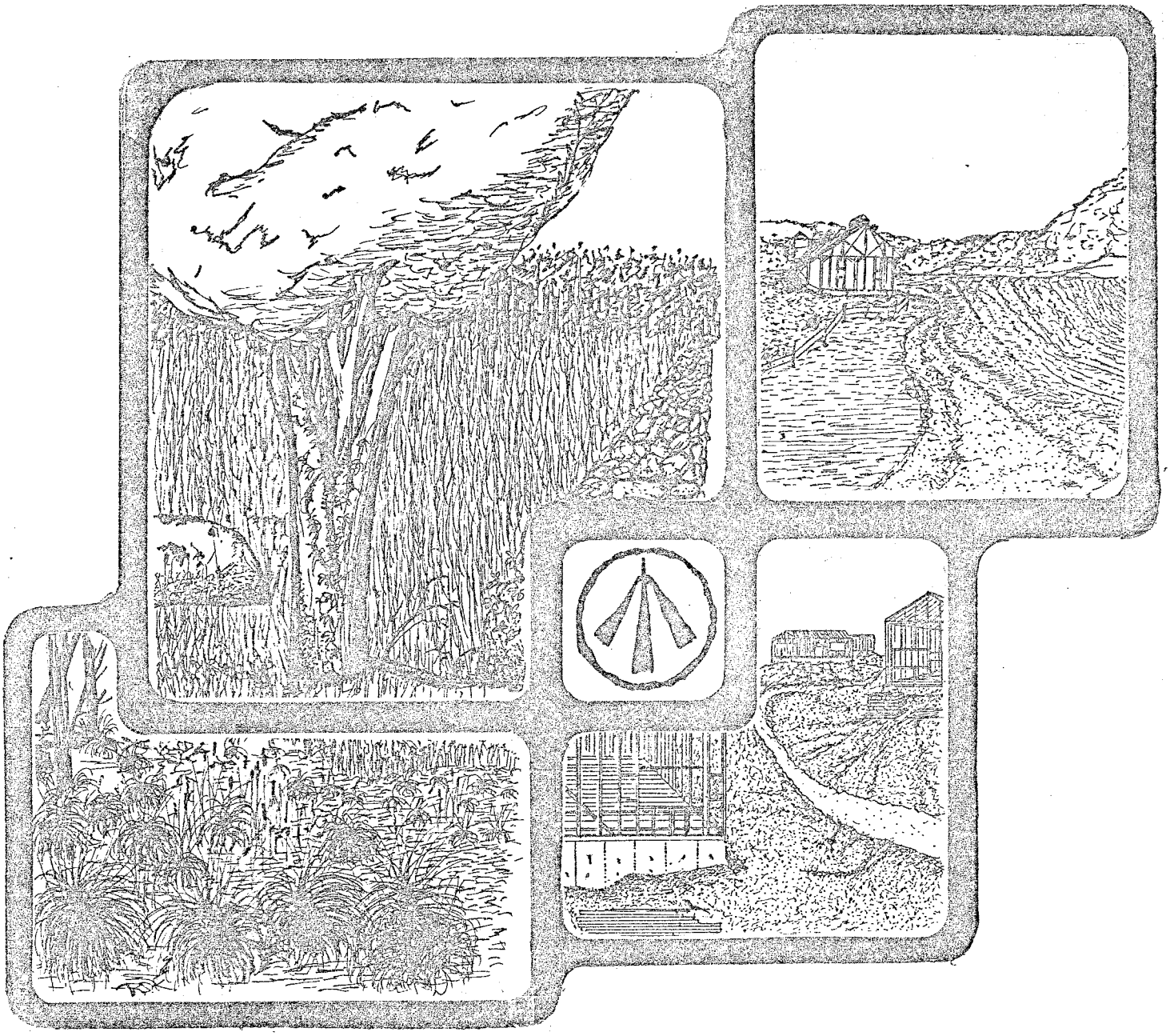
ENVIRONMENTAL REVIEW TEAM REPORT



PROPOSED CARR HOTEL COMPLEX
BRIDGEWATER, CONNECTICUT

KING'S MARK
RESOURCE CONSERVATION & DEVELOPMENT AREA

KING'S MARK
ENVIRONMENTAL REVIEW TEAM REPORT

PROPOSED CARR HOTEL COMPLEX
BRIDGEWATER, CONNECTICUT
APRIL, 1984

King's Mark Resource Conservation and Development Area
Environmental Review Team
Sackett Hill Road
Warren, Connecticut 06754

ACKNOWLEDGMENTS

The King's Mark Environmental Review Team operates through the cooperative effort of a number of agencies and organizations including:

Federal Agencies
U.S.D.A. Soil Conservation Service

State Agencies
Department of Environmental Protection
Department of Health
University of Connecticut Cooperative Extension Service
Department of Transportation

Local Groups and Agencies
Litchfield County Soil and Water Conservation District
New Haven County Soil and Water Conservation District
Hartford County Soil and Water Conservation District
Fairfield County Soil and Water Conservation District
Northwestern Connecticut Regional Planning Agency
Valley Regional Planning Agency
Central Naugatuck Valley Regional Planning Agency
Housatonic Valley Council of Elected Officials
Southwestern Regional Planning Agency
Greater Bridgeport Regional Planning Agency
Regional Planning Agency of South Central Connecticut
Central Connecticut Regional Planning Agency
American Indian Archaeological Institute
Housatonic Valley Association

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FUNDING PROVIDED BY
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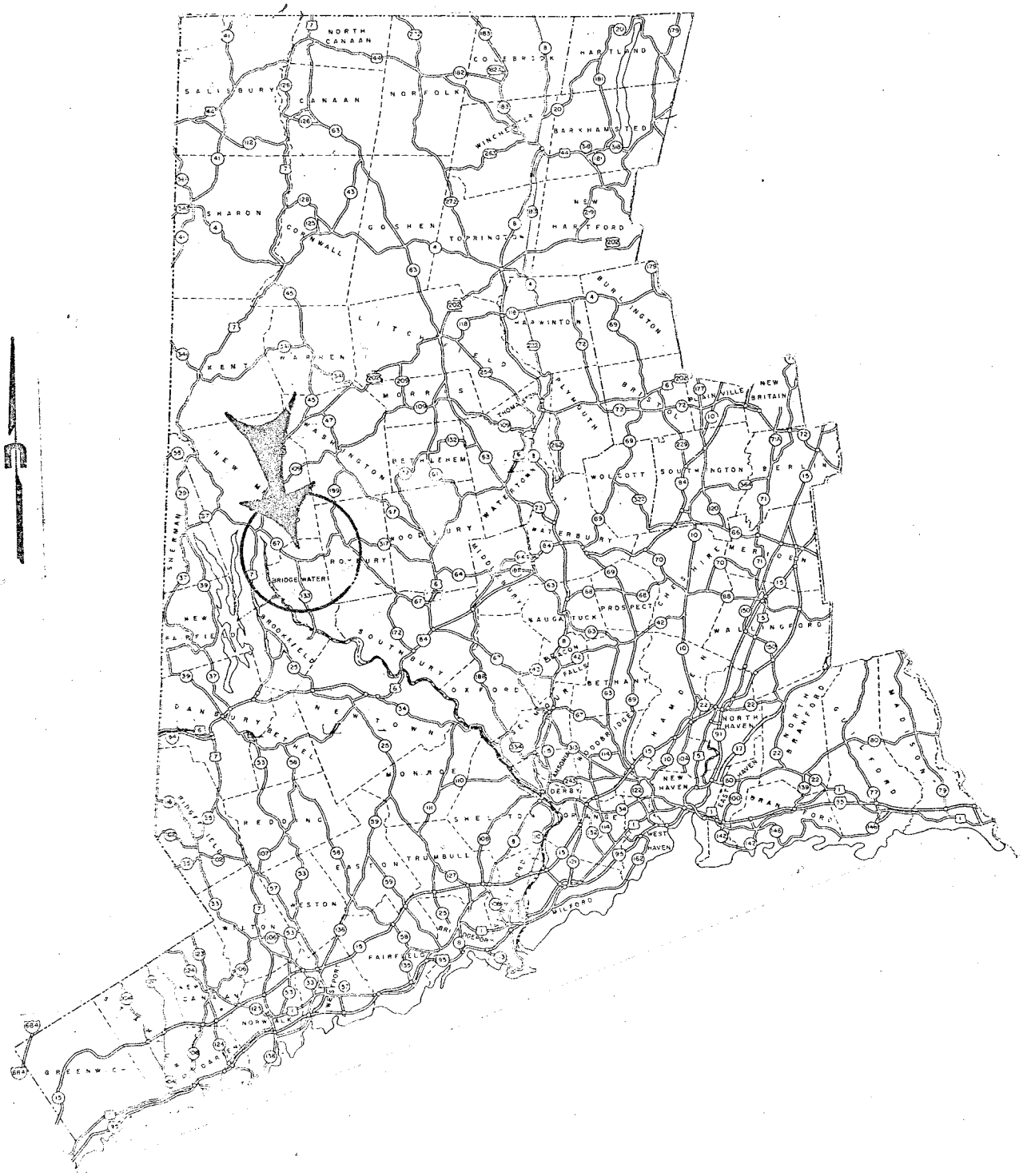


Scale 1" = 10 miles

10 0 5 10 miles

ENVIRONMENTAL REVIEW TEAM REPORT
ON
PROPOSED CARR HOTEL COMPLEX
BRIDGEWATER, CT

I. INTRODUCTION

The Bridgewater Conservation and Inland Wetlands Commission is considering a proposed plan for the construction of a hotel complex within the town.

The subject site is ± 50 acres in size and located in the northern portion of town off Rte. 67 and Eabow Brook Road. Approximately 25 acres of the site is zoned for commercial use with the remaining 25 acres zoned for residential use. As shown in Figure 1, slopes on the site vary from slight to steep. The site consists of wooded land and open land.

The proposed project calls for a 60-unit hotel, a restaurant, meeting rooms, and shops. The complex would be served by an on-site sewage disposal system and water supply well. Access to the complex is proposed off Eabow Brook Road. The project would be constructed in three separate buildings with each building served by an associated parking lot (see Figure 2).

The Bridgewater Conservation and Inland Wetlands Commission requested this environmental review to become more aware of the environmental implications of the project. Specifically, the Town requested the ERT to: 1) provide a natural resource inventory of the site, 2) discuss the suitability of the site for the proposed project, 3) discuss the probable environmental impact of the project, and 4) identify techniques which could be implemented to mitigate adverse environmental effects. Of major concern to the Commission is the probable impact of the project on stormwater drainage, inland wetlands, traffic, water quality, and neighboring properties.

The King's Mark Executive Committee considered the Town of Bridgewater's request for an ERT study, and approved the project for review by the Team.

The ERT met and field reviewed the site on February 15, 1984. Team members participating on this project included:

Brian Curtis.....	Sanitary Engineer.....	CT Department of Environmental Protection
Kathy Hanford.....	Soil Conservationist.....	U.S.D.A. Soil Conservation Service
Jerry Juretus.....	Planner.....	Housatonic Valley Council of Elected Officials
Kip Kolesinskas.....	Soil Scientist.....	U.S.D.A. Soil Conservation Service
William Warzecha.....	Geohydrologist.....	CT Department of Environmental Protection

FIGURE 1
TOPOGRAPHIC MAP

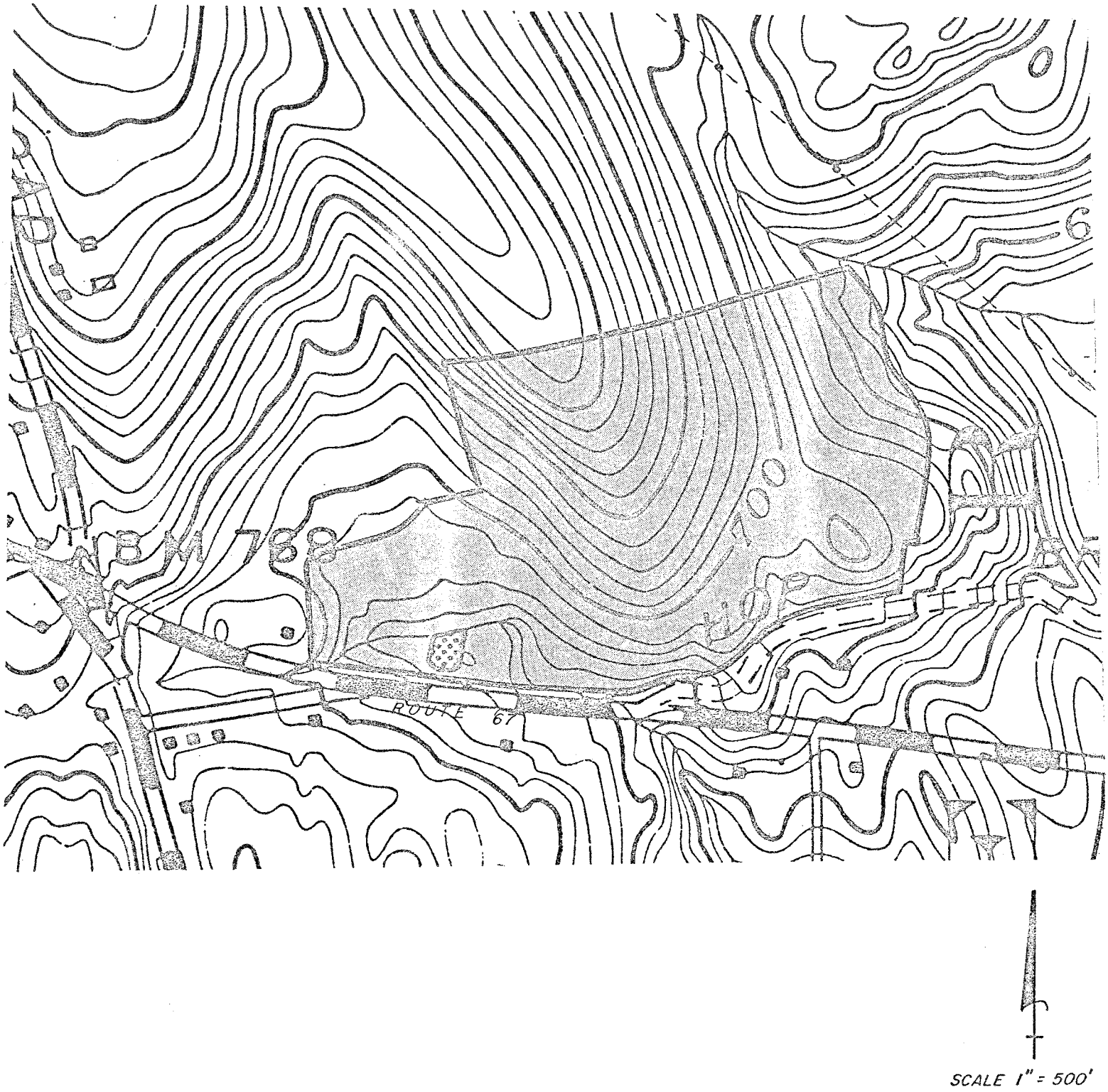
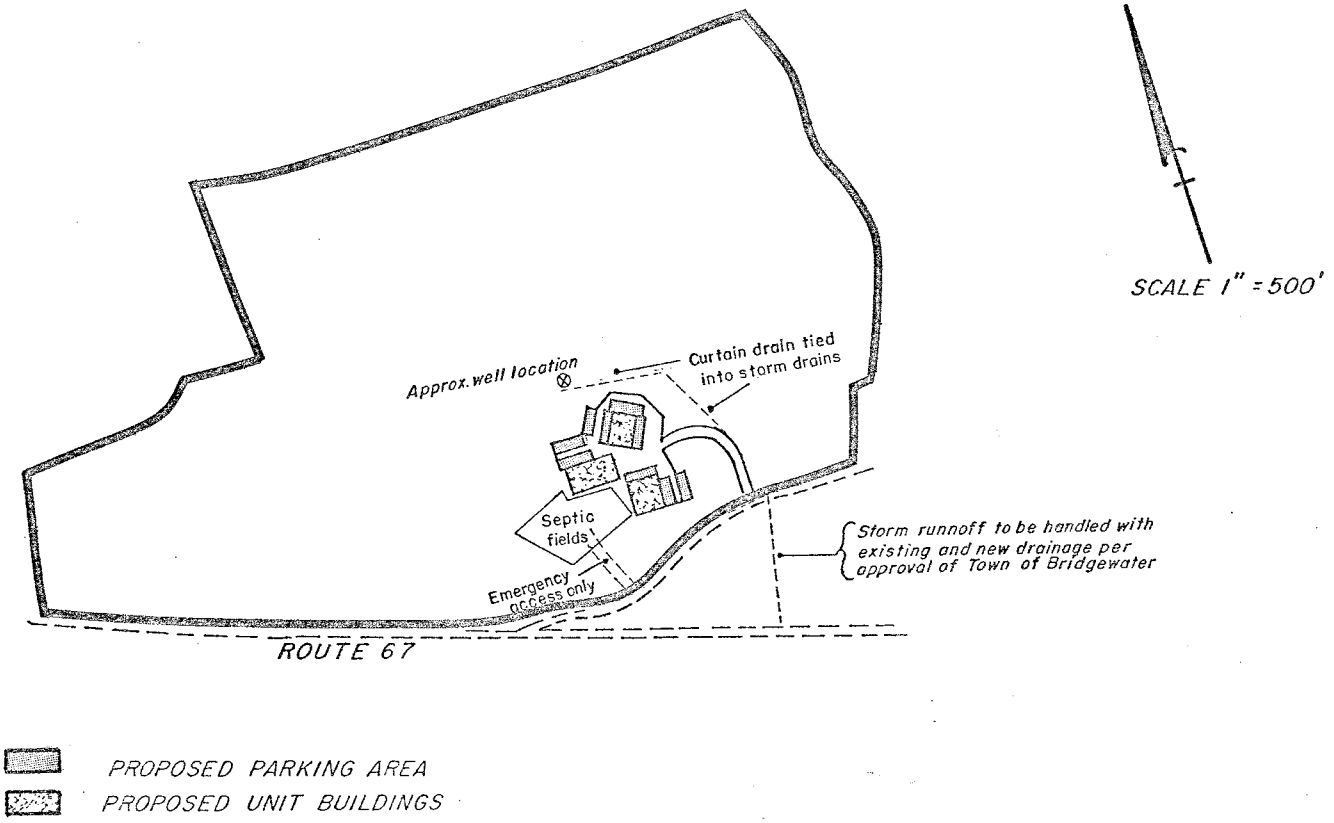


FIGURE 2
SIMPLIFIED SITE PLAN



Prior to the review day, each team member was provided with a summary of the proposed project, a checklist of concerns to address, a topographic map, a soils map, and a soils limitation chart. During the ERT's field review, team members met with representatives from the Town of Bridgewater and the landowner/developer and walked the property. Following the field review, individual reports were prepared by each team member and forwarded to the ERT Coordinator for compilation and editing into this final report.

This report presents the Team's findings. The report identifies the natural resource base of the subject site and discusses opportunities and limitations for the proposed project. It is hoped the information contained in this report will assist the Town of Bridgewater and the landowner/developer in making environmentally sound decisions.

If any additional information is required, please contact Richard Lynn (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, Sackett Hill Road, Warren, Connecticut, 06754.

* * * * *

II. TOPOGRAPHY AND GEOLOGY

Slopes on the site range from gentle to steep. The steepest slopes occur in the central portion of the site, which is a part of Second Hill (see Figure 1). The land surface on the site rises from the southern boundary line northward to the northern boundary line. Maximum and minimum elevations on the site are 860 and 630 feet above mean sea level, respectively. Hop Brook, which traverses the southwest corner of the site appears to be the only major watercourse on the parcel. Several intermittent drainage channels flowing off the steep slopes on the central parts of the site were visible on the review day.

The subject site is located within the Roxbury topographic quadrangle. A bedrock geologic map (GQ-121) prepared by Robert M. Gates and a surficial geologic map (GQ-611) prepared by Harold E. Malde for the quadrangle have been published by the U.S. Geological Survey. Both maps are available for purchase or review at the Department of Environmental Protection's Natural Resource Center in Hartford.

Bedrock Geology

Bedrock is exposed in the southern parts of the site near Hop Brook and on a small knob near the eastern limits. The bedrock underlying or cropping out on the site has been interpreted as Mine Hill granite gneiss. It consists of lustrous bluish-white rock that is composed of the minerals microcline, albite, quartz, muscovite and biotite. Minor minerals include zircon, apatite, and chlorite. The term "gneiss" refers to a crystalline, metamorphic (geologically altered by great heat and pressure deep within the earth's crust) rock which has a streaked or banded appearance. The banding occurs when thin bands of elongate or flaky minerals alternate with layers of granular minerals. Bedrock is closest to the ground surface in areas designated as HxC (Hollis soils) and HrC (Hollis soils) on the Litchfield County Soil Survey (see Appendix).

Because of its attractive bluish-white color and its workability, the Mine Hill granite gneiss has been quarried in the past for building stone and other structural purposes. In fact, the rock is still quarried on a small scale to date at the Mine Hill Preserve north of Roxbury Station. As the mica content and foliation increases in the rock, its usefulness as building stone decreases.

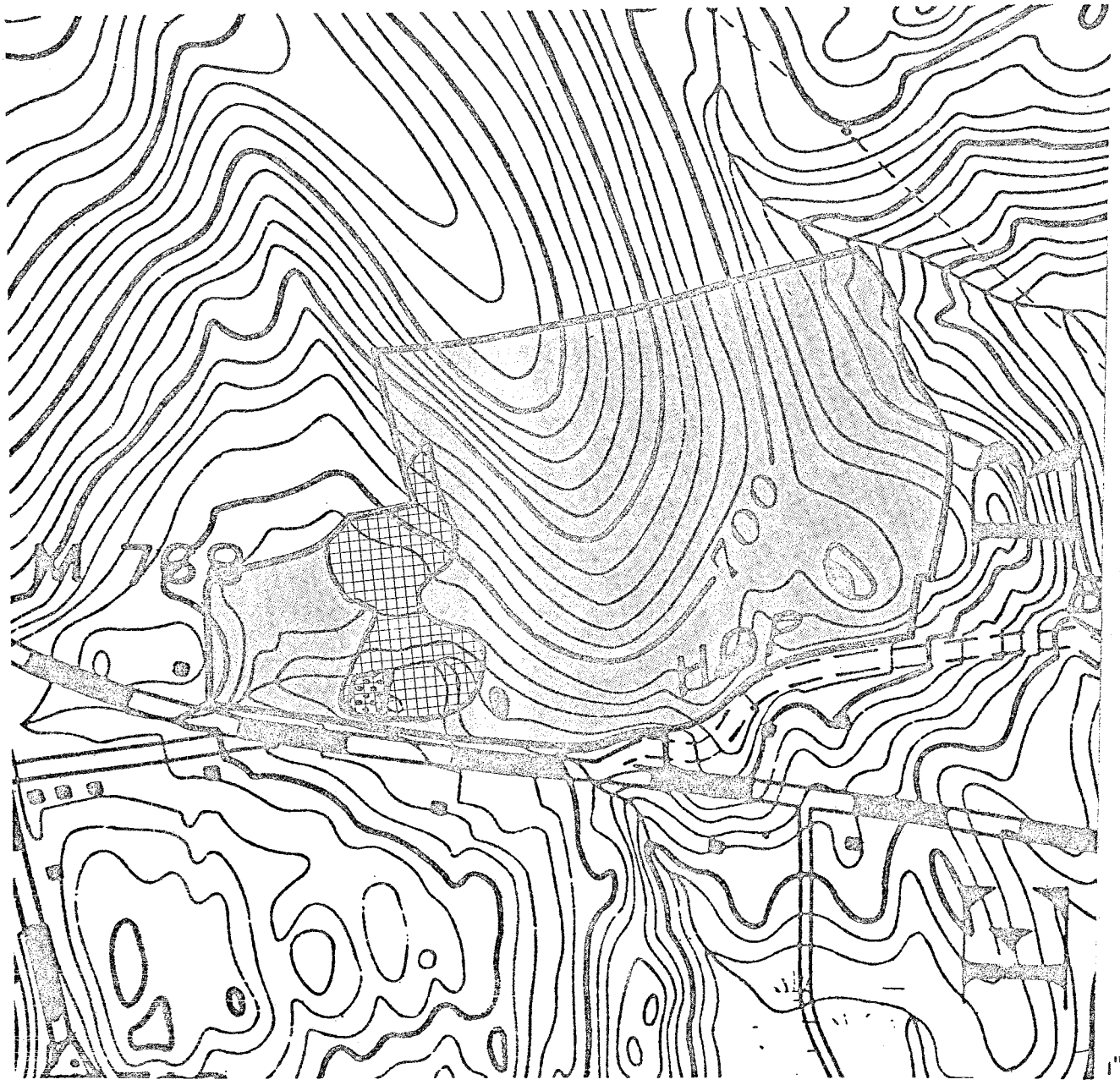
The rock unit in the vicinity of the site dips westward between 15 and 55 degrees.

Surficial Geology

The unconsolidated material overlying bedrock throughout the site consists of till. Till, which is derived largely from schist and gneiss rocks, is a complex mixture of rock particles that vary in size from clay to boulders and in shape from flat to angular to round. The texture of till generally varies from sandy and loose in the upper few feet to clayey, hard, and compact at depth.

As glacial ice flowed over and abraided the pre-existing landscape, material was incorporated into the ice sheet. This material was subse-

FIGURE 3
SURFICIAL GEOLOGY



- Till
- Inland wetland soils
- Observed areas of rock outcrop

quently deposited onto the ground directly by the ice sheet.

Thicknesses of the till found on the site probably range from zero where outcrops occur to not much more than 10 feet at various points throughout the remainder of the site. North of the site, thicknesses of till may be as much as 40 feet.

The area designated as Rd (Ridgebury) on the Litchfield County Soil Survey (see Appendix) is an area of seasonal wetness. During the wet time of year, the water table is at or near the surface of the ground. Since Ridgebury soils are designated as inland-wetland soils, development in this area should be avoided if possible. This wetland area is located in the west central part of the site and is shown in Figure 3.

Development Concerns

In terms of the proposed development, the major geological limitations found on the site include: 1) the steep slopes in the central portion of the site, 2) the compact nature of most of the till soils (Paxton) found on the site, and 3) shallow to bedrock areas. These limitations will weigh heavily on the ability to provide adequate subsurface sewage disposal systems. However, there is a possibility that these limitations could be surmounted with properly engineered septic systems.

If the proposed access road leading to the complex passes through the HxC or HrC areas delineated on the accompanying soils map, there is a chance that blasting may be required. Also, based on visual inspection of the site, bedrock outcrops were observed in the area of the southernmost building. As a result, it may be necessary to blast in order to place the building foundation.

III. WATER SUPPLY

Since there are no public water supply lines accessible to the site, the proposed complex would be supplied with water by an individual on-site well or wells. The only suitable aquifer on the site appears to be bedrock. An aquifer is defined as a geologic formation that is capable of yielding a usable amount of water to a well. Yields from bedrock wells depend upon the number and size of water-bearing fractures that are intersected by the wells. Density and size of fractures in different bedrock zones vary widely but they generally occur within the first 100 to 150 feet of the surface. Since the yield of a given well depends upon the number and size of water bearing fractures that it intersects, and since the distribution of fractures in bedrock is irregular, there is no practical way, outside of expensive geophysical testing, of predicting the yield of a well drilled in a specific location. However, it has been shown that the probability of increasing the yield of a well decreases with depth below 250 feet.

According to present plans the proposed complex includes a 60 unit hotel, a restaurant, a meeting room and shops. By making some assumptions, it is possible to estimate the total water demand of the proposed complex. Assuming an average occupancy of 2 persons and an average per capita water use of 75 gallons per day, the total water demand of the hotel, excluding the restaurant would be about 9,000 gallons per day. Based on an 18-hour pumping period, a total yield of about 8 gallons per minute (gpm) would therefore be required

from the well. The developer gave no information (i.e., seating capacity, turnover of meals expected, etc.) which would enable the Team Geologist to estimate the water demand for the restaurant. If, for example, we assume an average of 10 gallons of water per meal served (includes dishwashing and toilet facilities) with 4 turnovers a day for a restaurant with a seating capacity of 100 seats,(moderately large restaurant) the total water demand of the restaurant would be about 4,000 gallons per day. Based on an 18-hour pumping period, a total yield of about 4 gallons per minute (gpm) would therefore be required from a well for the restaurant. Therefore, under the conditions mentioned above, a yield of about 12 gallons per minute would be necessary from a well in order to supply the developments needs.

In a survey of 734 wells in the upper Housatonic River basin, it was found that about 80 percent of bedrock-based wells tapping a rock similar to that underlying the proposed site provided 3 gallons per minute or more; 50 percent yielded 7 gallons per minute or more; and only 10 percent yielded 30 gallons per minute or more. Based on this information, it may be necessary to drill several wells in order to supply the developments needs. As a precautionary measure it might be safer to drill the well or wells first to determine what the potential yields would be.

As this well(s) would be classified as a public water supply, necessary approval for any well locations would have to be obtained from the State Department of Health Services, Public Water Supply Section. It is recommended that they be contacted as soon as possible to discuss the proposal. Water quality, yield, along with plans for pumpage, storage and distributions would need to be reviewed and approved by the Public Water Supply section.

If more than one well is required, they should be spaced at least 250-300 feet apart, if possible, to avoid the risks of mutual interference (i.e., the yield of one well detracting from the yield of another).

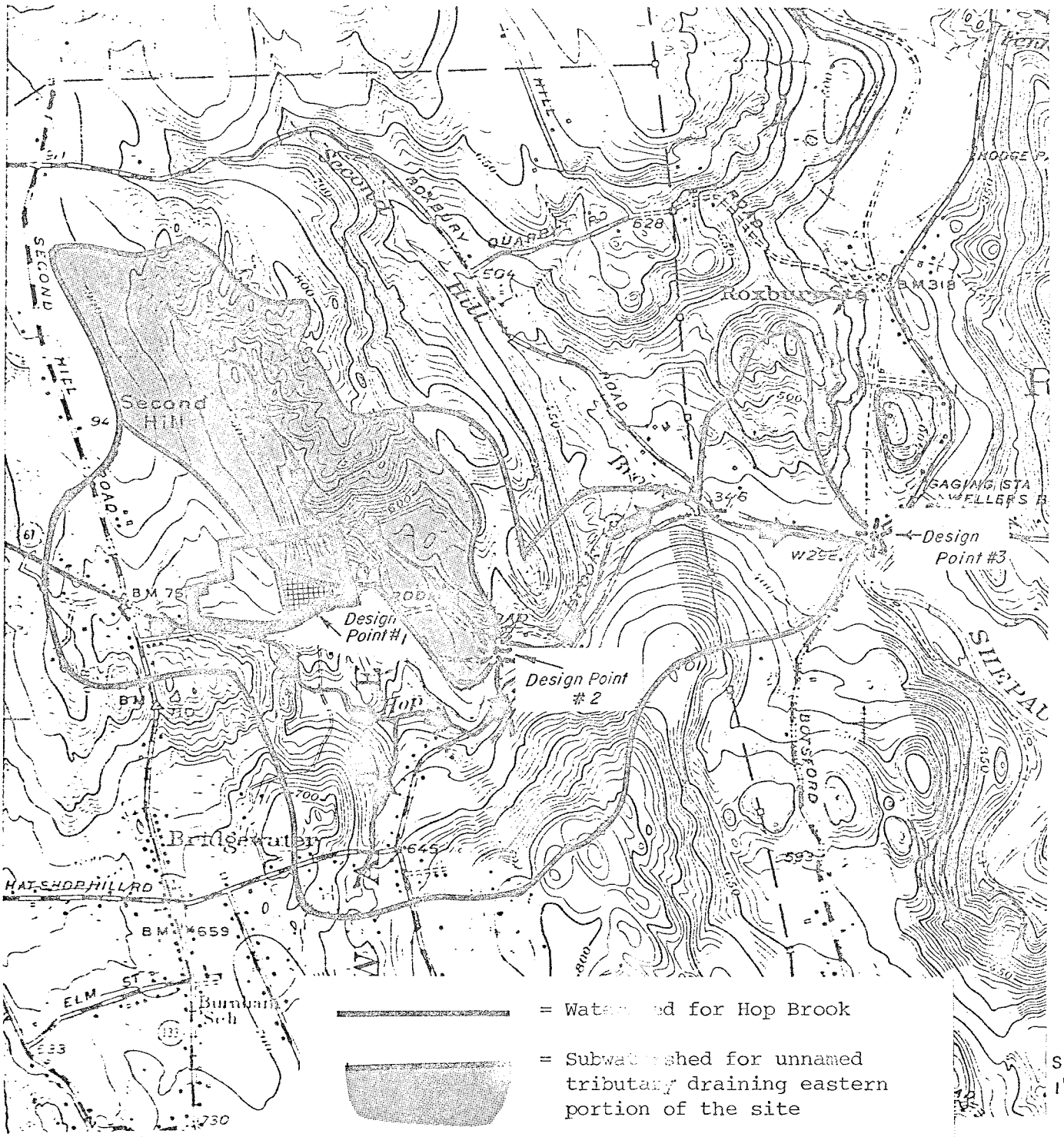
The quality of natural groundwater in the vicinity of the development should be good. There may be a possibility that an elevated mineral content, particularly iron and/or manganese, will exist in the water. If well water proves to be high in mineral content, there are several filtration methods available to surmount any problems.

IV. HYDROLOGY AND STORM WATER MANAGEMENT

Approximately 60 percent of the site in the southern and western portions (which includes the proposed hotel/restaurant complex) lies within the watershed of Hop Brook. Surface runoff flows generally southward by sheet flow and/or by intermittent drainage swales into Hop Brook. Hop Brook, which traverses the southwest corner of the site for about 825 feet is a tributary to the Shepaug River. Surface runoff in the northeastern part of the property flows mainly by sheet flow and/or intermittent drainage swales into an unnamed tributary of Hop Brook (see Figure 4).

Development of the property for the hotel/restaurant complex will increase the percentage of runoff from the site for a given rainfall amount. This difference would result mostly from the construction of impermeable surfaces, such as roof tops and paved driveways/roads, over formerly permeable areas; the compaction of soils; and the removal of trees and other natural vegetation.

FIGURE 4
WATERSHED BOUNDARY MAP



Peak flows for storms of various magnitudes (e.g., 10-year, 24-hour storm, etc) may be estimated by a method outlined in Technical Release No. 55. TR-55 is published by the Soil Conservation Service of the Department of Agriculture. The method involves the determination of runoff curve numbers for a given watershed. These numbers relate runoff to rainfall in the watershed on the basis of soil types and current and proposed land usage. Applying the numbers to rainfall data for given storm events, average slope of the watershed, as well as several other factors, an estimate of peak flow in a stream can be made. For the purposes of analyzing the peak flows likely to occur under the proposal, a d e s i g n point and its corresponding watershed was chosen. (Design point #1 in Figure 4). It was assumed that the project engineer for the proposed development would break the drainage area down similarly when addressing pre- and post runoff charges. It should be pointed out that the project engineer may address it altogether differently, however. The drainage area shown is based upon a particular design point and delineates all the land from which surface runoff ultimately reaches that point.

The results of the Team geologist's calculations, shown below for the design point chosen, should be considered as ballpark figures with regard to the estimated peak flows and runoff volumes. The calculated percentages of increase should be fairly close, however,

TABLE 1

Peak flows for before-development and after-development conditions at design point #1 shown on the Watershed Boundary Map. All flows given in cubic feet per second.

	10-year, 24 hr. storm	25-year, 24 hr. storm	50-year, 24 hr. storm	100-year, 24 hr. storm
Before development *Curve number (72)	22	29	35	42
After development *Curve number (76)	26	34	41	48
Percent Increase	18%	17%	17%	14%

TABLE 2

Runoff volume increases estimated under the present proposal. Estimates are recorded in inches.

	10-year, 24 hr. storm	25-year, 24 hr. storm	50-year, 24 hr. storm	100-year, 24 hr. storm
Before development	1.97	2.59	3.16	3.75
After development	2.29	2.95	3.55	4.17
Percent Increase	16%	14%	12%	11%

The moderate level increases shown in the tables above are significant enough to merit the careful consideration of stormwater management on the site. It should be noted that the peak flows listed after development conditions do not take into account possible piping or other channeling. Stormwater routing would increase these flows to some extent.

It is, therefore, suggested that the applicant be required to submit detailed hydrological information prior to approval of the proposed complex. This information should include pre- and post development runoff estimates from the site for the 10, 25, 50 and 100 year storm events. Because the Town would like to see off-site flows following the development maintained at present levels, a possible method for controlling runoff on the site might be to establish a detention basin or basins which would alleviate peak flows. Detailed design specifications for all stormwater detention basins should be submitted and reviewed by appropriate town officials.

Because much of the runoff from the site takes the form of sheet flow and because slopes are moderate to steep, the potential for erosion and gullying should also be a concern. For this reason, it is recommended that a conscientious erosion and sediment control plan be designed and incorporated into the stormwater management plan. A detention pond may also serve a sediment retention function. If so, measures should be taken to remove the sediment periodically since a build up of the material can diminish the runoff storage capacity of the pond.

It is further suggested that the project engineer take a close look at downstream culverts to determine if they can handle post development flows from the site.

The existing intermittent stream which flows between the Pietras and Gordon and Nelson properties appears to be under sized at the top of the slope to handle existing flows. Additional storm water added to the existing channel is likely to flood yard areas and erode the steep stream channel.

Either a rip-rapped stream channel or a pipe system could be designed to handle this water flow. This conduit should be sized to handle the expected flow from a minimum 25 year, 24 hour storm event plus the expected full pipe flow from the proposed subsurface drainage system.

This drainage system does not provide for any storm water retention, however. If increased storm flows will be a concern to downstream landowners a storm water retention system should be designed.

An area southwest of the proposed complex will probably be the easiest in which to construct a storm water retention basin. The basin should be sized so that there will be no increase in peak flow from a 2, 10 and 100 year, 24 hour storm event. From this area the basin would have to discharge into the stream on the property.

It would not be possible to pipe all the driveway drainage system to this retention basin location. Runoff from this paved driveway area alone may cause slight flooding and/or erosion problems in the existing intermittent stream channel below. To mitigate this effect, a diversion could be constructed uphill from the driveway outletting into the retention basin system. This diversion could reduce the watershed entering the intermittent

stream compensating for additional water from the driveway. The diversion would also help prevent driveway erosion and icing problems.

The possible future increase in runoff due to parking area extensions or recreational facilities should be considered when designing the drainage system.

A water-related concern expressed mainly by town residents on Eabow Brook Road is the possibility that blasting on the site may have an impact on nearby wells. As mentioned earlier, there may be a chance that blasting will be necessary whether for foundation placement or for the construction of the access road. However, it does not appear that extensive blasting would be required and may not be necessary at all.

It is extremely difficult to assess the risks of blasting in any given area. One area of concern with regard to blasting is that changes in well yields would be experienced. Again, it is difficult to predict this, but it should be noted that the probability that the yield of any given well would increase seems at least as good as the possibility of a decrease. It should be further noted that wells which tap the unconsolidated materials above bedrock (e.g., dug wells) should not be affected by blasting since they depend upon local water table levels.

V. SOILS

Soil Descriptions

Figure 5 of this report shows the soil types identified on this site by the Team's soil scientist. The mapping in Figure 5 is more specific than the mapping in the Soil Survey of Litchfield County, 1970. The Soil Survey, at a scale of 1:15840 is for general planning purposes only, and is not intended to be used to show the detail necessary for the actual siting of buildings, septic systems, and roads. A copy of the Litchfield County Soil Survey mapping of the site is presented in the Appendix of this report for review purposes.

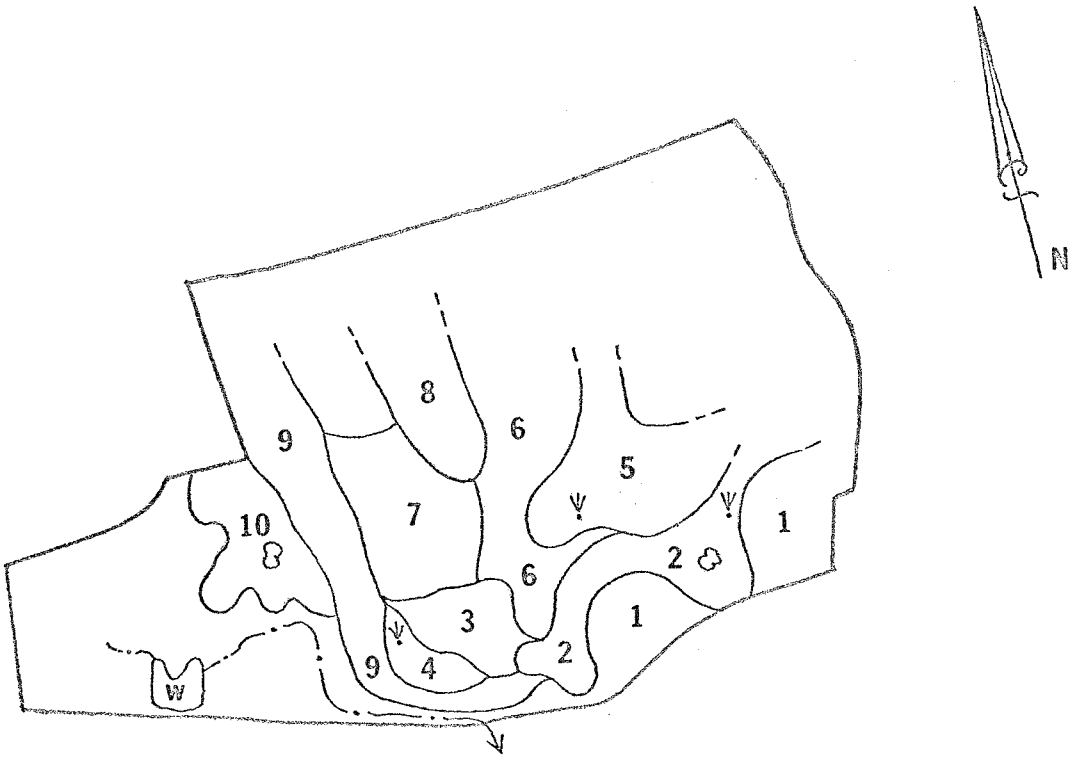
To gain more specific soils information for portions of the site, on February 21, 1984, the Team's soil scientist walked over the property, examined the soils and delineated additional map units of soils that are important to describe the site's limitations. All of the map units on the property were not extensively examined, only those necessary for the planning of buildings, roads, and septic systems.

Below is a list and description of the map units delineated by the Team's soil scientist. The number symbol can be referred to on Figure 5.

1. Charlton-Hollis complex, 3 to 15 percent slopes, very rocky.

   This complex of deep, well drained loamy Charlton soils, and shallow, well drained loamy Hollis soils are on bedrock controlled landscapes. These soils are so intermingled on the landscape that it was not practical to map them separately. Exposed bedrock covers up to 10 percent of the surface. Included in mapping are small areas of steeper slopes, moderately deep soils, and small areas of Paxton soils. Important soil limitations for development: variable depth to bedrock; shallowness to bedrock; surface stones and boulders.

FIGURE 5
REVISED SOILS MAP



SCALE: 1" = 500'

NOTES

1) Revised soils map prepared by Kipen Kolesinskas, USDA Soil Conservation Service, based upon field investigation

2) See text for soil descriptions

3) This map is an enlargement of a map prepared at a scale of 1" = 750' on an airphoto base. Soil boundary lines on this map are therefore approximate

2. This unit consists of well drained loamy glacial till soils on 8 to 15 percent slopes. Typically, the soils have a fine sandy loam surface layer over a sandy loam subsoil. The substratum is sandy loam with lenses of loamy sand or gravelly loamy sand. The substratum is mottled, with mottles starting at a depth of 30 inches to 40 inches in the profile. Included in mapping are small areas of gently sloping soils, soils with a very stony surface or substratum, and Paxton soils. Important soil limitations for development: seasonal high watertable of 2.5 to 3.5 feet; slope.

3. Woodbridge fine sandy loam, 3 to 8 percent slopes

This gently sloping, deep, moderately well drained soil is on the concave footslopes of the deep Paxton landscape. Woodbridge soils have a very firm dense substratum, and thus a perched seasonal high water table. Included in mapping are small areas of steeper soils, soils that have been disturbed by excavation, and areas of the poorly drained Ridgebury soils. Important soil limitations for development: seasonal high water table of 1.2 to 2.5 feet; a substratum that percs slowly to very slowly; high potential for frost action.

4. Woodbridge fine sandy loam, 8 to 15 percent slopes

This unit is very similar to Unit 3 except it is on steeper slopes and may contain inclusions of Paxton soils.

5. Paxton fine sandy loam, 8 to 15 percent slopes.

This sloping, deep, well drained soil is on the side slopes of the landform. Paxton soils have a very firm dense substratum, and thus a perched seasonal high water table. Included in mapping are areas of steeper soils, small concave areas of moderately well drained Woodbridge soils, and areas with a stony surface. Important soil limitations for development: seasonal high water table of 1.5 to 2.5 feet; a substratum that percs slowly to very slowly; slope; moderate potential for frost action.

6. Paxton fine sandy loam, 15 to 25 percent slopes

This unit is very similar to Unit 5 except they are moderately steep and may contain inclusions of less sloping soils. Slope is a greater limitation to development than on Unit 5.

7. This unit consists of moderately well drained glacial till soils on 15 to 25 percent slopes. Originally Paxton soils, the surface and subsoil layers were excavated and removed over much of the unit. Typically the soils have a thin surface layer, and 2 to 20 inches of loamy soil material over the very firm dense substratum. Large inclusions of poorly drained soils, and some small areas of natural soils are included in this unit. Important soil limitations for development: seasonal high water table of .5 to 2 feet; a shallow substratum that percs slowly or very slowly; seasonal droughtiness or wetness for lawns and landscaping; slope; high potential for frost action.

8. Paxton fine sandy loam, 3 to 8 percent slopes

This unit is very similar to Unit 5 except these soils are gently sloping. Slope is less of a limitation than on Unit 5.

9. Paxton fine sandy loam, 15 to 35 percent slopes

This unit is very similar to Unit 6 except that the slopes may be steeper. The unit contains inclusions of soils with very stony surfaces, and small areas of soils that have the firm dense substratum below 40 inches. Slope is more of a limitation than on Unit 6.

10. This unit consists of well drained loamy glacial till soils on 8 to 15 percent slopes. This unit is a complex of well drained soils with a firm dense substratum at or below 40 inches, and stony or bouldery soils that lack the firm dense substratum. Typically the substratum is mottled, with mottles starting at a depth of 30 inches to 40 inches in the profile. Included in mapping are small areas of moderately well drained soils, Paxton soils, and areas of less sloping soils. Important soil limitations for buildings and septic systems: seasonal high water table of 2.5 to 4 feet; slope.

Also shown on Figure 5 are two "spot symbols". These include:

= Area of poorly drained soils too small in size to be shown as a map unit.

= Area of bouldery or extremely stony soils.

Discussion

The proposed layout of the complex appears to have the buildings located on portions of map units 1, 2, 6, 7. The proposed septic system for this complex appears to be located on Units 2 &3.

The area designated for the on-site septic system has the limitation of a seasonal high water table. The seasonal high water table in map Unit 2 is probably greatly influenced by the subsurface flow of water into this area from the dense basal till hillside north of the site. Portions of the proposed system that fall into map Unit 3 are also limited by a perched seasonal high water table and a dense, slowly permeable substratum.

It appears the next most suitable area for subsurface sewage disposal on the property (after map Unit 2) is map Unit #10. However, map Unit #10 has many of the same soil limitations that are found in map Unit 2. This map unit (#10) has the advantage of being larger in size, but the disadvantage of bordering an area of wetlands, and is farther from the proposed buildings complex. In the event either of these areas are developed, they would benefit from a tiled diversion upslope to reduce the amount of subsurface water entering the map units from the hillside.

It should be noted once again that the designated map units are not homogenous in nature; they contain inclusions of soils that are too small in size to be shown at the scale mapped.

Additional information for some of the soils on the site can be found in the Soil Survey of Litchfield County, CT issued 1970.

VI. EROSION AND SEDIMENT CONTROLS

An erosion and sediment control plan should be prepared for this site. The plan should include:

1. The timing of all work to be done
2. The area to be disturbed by equipment
3. A final grading plan showing all cut and fill slopes
4. Seeding specifications for temporary and permanent vegetation including lime, fertilizer and mulch
5. Structural slope stabilization for any banks exceeding a 2:1 slope
6. Sediment traps such as hay bales or filter fabric downslope from exposed soil areas
7. Rock energy dissipaters at any storm drain pipe outlets.

One of the critical erosion control areas in the proposal is the driveway into the hotel complex. The grade is steep and water is currently flowing down this access during storms. This driveway should be paved as soon as possible after road grading is completed. Water should be diverted off the road. Sediment traps should be used at the driveway-road junction during road construction.

The proposed alignment of the hotel buildings will create an extensive cut slope on the northwest side of the buildings. This slope will be difficult to stabilize. A realignment of the buildings along the existing contours of the land will reduce necessary land grading, reduce necessary erosion controls, provide for possible solar heating of buildings and generally be more cost effective.

The planned subsurface drainage will be necessary to control seepage in cut slopes. The drain should be installed on a slight grade upslope from all buildings and all cut slopes. If the drains are installed as shown, with steep slopes on the pipe, they will not be working to their fullest capacity and will not pick up all the seepage.

The wetland area is complex. It consists of a hummocky area with many intermittent streams and intermingled soils with a high water table. The construction of the hotel complex as planned will not significantly affect the wetland on the property. Changes in the existing plan or future development plans may affect this wetland. The Litchfield County Conservation District is available to review these changes if needed. They can also review the erosion control plan if requested by the Town of Bridgewater.

VII. SUBSURFACE SEWAGE DISPOSAL

A hotel and restaurant development of this magnitude would generate wastewater flows in the range of 7500 gallons per day. Any subsurface sewage disposal system of this size must be permitted by the Department of Environmental Protection pursuant to section 22a-430 of the Connecticut General Statutes. The Department's design requirements for any large scale septic system would include the following items:

a. the leachfield area must be sized large enough to accept maximum sewage flows on a long term basis. The factors which govern

leachfield sizing are soil permeability and the biological growth layer which will develop in those soils in contact with crushed stone in the leaching trenches or galleries.

b. the soils surrounding and downhill of the leachfield system must have sufficient hydraulic capacity to accept maximum sewage flows during the spring months without surface breakout.

c. the sewage must be adequately renovated by the soil-groundwater system to be purified and considered clean water prior to crossing any property line or entering any surface waters.

The actual process of designing the wastewater treatment system would require the excavation of test pits witnessed by the Department of Environmental Protection and the State and Local Health Departments to observe soil, ledge and groundwater conditions. The testing would also include measurements of soil permeability, perc rates and the installation of observation wells to measure maximum groundwater levels.

Without having actually seen soil test pits it is somewhat difficult to comment on the site capacity, however, the following comments can be offered. A majority of the upper site and open field area is severely limited for subsurface sewage disposal due to groundwater being at or near the ground surface for considerable periods of time. The smaller area shown on the plans as the proposed leachfield system did seem to contain more permeable soils with a deeper groundwater table but the entire area would be required to fit the size leachfield system that would be necessary. Location of a suitable reserve area must be included. It is questionable, based upon preliminary calculations, as to whether or not the proposed leachfield area would have sufficient hydraulic capacity to transmit projected flow rates. One final water quality issue that must be addressed is to ensure that sewage effluent will be renovated at the point of entering any bedrock fractures downgradient of the leachfield system.

In conclusion there are several concerns regarding this proposal including hydraulic capacity, reserve area requirements, and the potential for shallow ledge conditions downhill of the leachfield area. Further testing and calculations, which are the responsibility of the applicant, are needed in order to fully answer these questions.

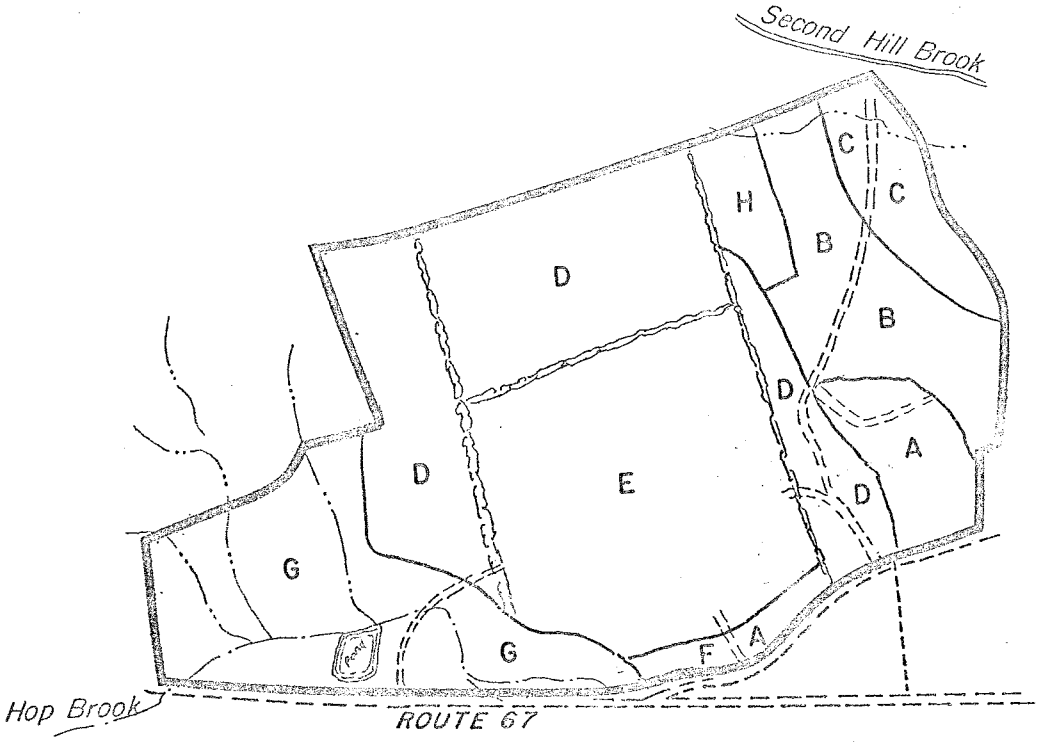
VIII. VEGETATION

The vegetation on this site can be divided into eight cover types. Figure 6 shows where these cover types are found on the property. The vegetation type descriptions, presented below, list the species common to each type.

The central portion of the property is either in grazed or idle pasture-land. The idle pasture is in a transitional stage. It will rapidly grow up to a hardwood forest unless managed.

The forest land has all been logged except for a ± 100 foot border along roads. Most remaining trees are pole sized. Thinning is still needed in some areas. A few large seed producing trees have been left. Most of the remaining trees are in fair to poor condition for timber. Many areas exist for cavity nesting wildlife.

FIGURE 6
VEGETATION MAP



SCALE 1" = 500'

LEGEND

- Perennial stream
- Intermittent stream
- Hedgerow and vegetation boundary
- Vegetation boundary (refer to text for descriptions)
- Access road

The forest floor is scattered with tree tops from the logging operation. This is valuable as cordwood, especially where it lies in close proximity to wood access roads. Any cordwood or thinning cut should follow a foresters recommendations.

The planned hotel complex will be situated on the pastureland. Approximately one-third of the pasture will be converted to the hotel usage. The soils on this site are not rated as prime or important farmland. However, loss of this pastureland may affect local farm activities to some extent.

If trees are included in the landscaping plan for the project, they could be designed to greatly reduce energy usage for heat and air conditioning. Conifers could be planted on the north and west side of the complex for a windbreak. Deciduous trees would be useful for shade on the southern and eastern sides of the buildings.

The soils in the planned hotel complex area provide a good landscaping base. The steep slopes of the area can be easily incorporated into the landscaping plan.

Vegetation Type Descriptions (refer to Figure 6)

A. Mixed Hardwood Forest - The overstory is mainly northern red oak and white oak mixed with ash and hickory. A few black birch and sugar maple are also present. The understory is mainly mountain laurel with some red cedar. The ground cover mainly consists of mosses and lycopodium.

B. Mixed Hardwood Forest - The overstory is similar to area A. The under story consists mainly of barberry and green briar. There are few herbaceous plants as a ground cover.

C. Ash, Beech, Birch Forest - White ash, American beech and white birch are the predominant tree species. White and red oak are also growing. The ground cover is similar to type B.

D. Idle Pasture - This area consists of an overstory of predominantly red cedar with a few hawthorn, and red maples mixed in. Along the field/forest interface grey birch saplings are common. The understudy consists largely of barberry, multiflora rose, blackberries and green briars. The ground cover is mainly moss with some golden red and native grasses. The hedgerows between pastures consist mainly of oaks with an occasional apple tree.

E. Unmanaged Pasture - Succession has not proceeded as far in this group as in the idle pasture. Red cedar are sparse and small but occur throughout the field. Predominant ground cover is Kentucky blue grass with some occasional native bunch grasses.

F. Grazed Woodland - Overstory is similar to area A. No understory or ground cover vegetation is present.

G. Mixed Hardwoods - Overstory consists largely of red maple and red oak. Some birch, beech and hickory are also present. The hummocky nature of the landscape, mainly intermittent stream courses, and scattered swampy areas provide for a wide variation in vegetation. The understory consists

of barberry, multiflora rose, blackberries and some red cedar. Native grasses and sedges provide most of the ground cover with many other types of herbaceous weeds such as thistle, golden rod and ragweed intermixed.

The pond area is extremely shallow ranging from 1-2 feet in depth. Deltas of sediment have formed at stream inlets. Cattails and sedges are predominant on the deltas.

H. Unmanaged Orchard - Overstory consists of apple trees. Understory consists of grape vines, barberry and multiflora rose.

VIII. WILDLIFE

The variation in plant communities existing on the property, proximity to water, and rural atmosphere of the site provide excellent upland wildlife habitat. Nearly all aspects of vegetation (i.e., herbaceous, shrub, hardwood, conifer and wetland) are present on site. The only vegetation type missing is grain. This, however, is located on the adjacent farm well within the travelling radius of most wildlife species.

Areas of special attraction to wildlife are the borders between openland and forest, the hedgerows, the wetland/open water areas, and the old apple orchard.

Deer and grouse as well as many song birds were sighted on the property. Other animals expected to inhabit this property are fox, raccoons, opossums, skunks, squirrels and mice.

The planned hotel complex will have a negative impact on local wildlife. The extent of this impact will depend on: erosion and sediment control measures used, extent and type of landscaping, and extent of future extensions to the development such as recreational facilities, increased parking or residential development.

The primary impact of the project on wildlife will be through the direct loss of the natural habitat due to buildings, parking areas, and driveways. Another impact on wildlife will be caused by human presence and vehicular traffic. This will drive the less tolerant wildlife species from the site, even in areas where it has not been physically changed. A third impact will be caused by reduced water quality from silt unless a proper erosion and sediment control plan is followed.

A number of measures can be implemented to minimize the adverse impacts of the project on wildlife. These include:

1. Follow an erosion and sediment control plan.
2. Keep the disturbed area to a minimum.
3. Maintain and encourage the existing food and cover vegetation on site, especially that in idle pasture and old apple orchard.
4. Incorporate vegetation with a high wildlife value into the landscaping plan.
5. Maintain at least five den trees per acre in forested areas after any type of harvesting.
6. In this and future development plans, keep all stream corridors (minimum 150 feet from stream) and wetland areas in their natural state.

IX. PLANNING CONSIDERATIONS

A. Relationship to Existing Plans

1. Bridgewater Plan of Development

According to Bridgewater's 1967 Plan of Development the proposed study site is recommended for commercial development, with an open space buffer north of the commercial area and along Hop Brook. The commercially designated area on this site corresponds to the area zoned commercial in the Bridgewater Zoning Regulations.

The Plan states that: "space suggested for commercial and light industry has been increased in depth to allow for a "planned development" with the necessary traffic controls and a wide landscaped buffer strip". Recommended implementation strategies suggest "prepare design control plans for a more attractive commercial development on Route 67 to serve area shoppers".

Route 67 is designated as an arterial street under the 1967 Plan. Eabow Brook Road is proposed to continue as a residential street.

One interesting recommendation in the Plan concerns proposed public sewerage systems. It states, "In areas with more concentration of populations, the Town Green, the commercial and industrial area, the inefficiency of the existing systems is already apparent. Provision for public sewerage system should be made as soon as possible".

Although the 1967 Plan is outdated in many respects, and clearly unrealistic in areas such as public sewerage, it should be noted that its basic land use and transportation assumptions remain valid. The present zoning is an outgrowth of the Plan and it has remained virtually unchanged since 1967.

2. Regional Plan

Bridgewater is included in a regional plan entitled, A Growth Management Option for the Housatonic Valley Region, adopted in 1981. The plan encourages an energy efficient development pattern by recommending the concentration of new public facilities at the edge of existing urban areas.

The regional plan shows recommendations for overall intensity and environmental sensitivity, not specific land uses. As Bridgewater is not an urban area, nor adjacent to one, the basic designation for the town is rural, with a rural community center located at the Town Green. The eastern portion of Bridgewater has a conservation designation. This designation implies that, "the lands within this category are irreplacable environmental, historic or aesthetic resources and their intensive development would seriously jeopardize the quality of life for future generations... Uses incompatible with conservation purposes should be discouraged by local regulations". The proposed study area falls within the conservation designation.

The regional plan identifies four potential water supply watersheds for the purpose of meeting future public water system demand. The proposed watershed delineations are based upon preliminary water supply studies and policies published in the State's Conservation and Development Policies Plan. A diversion of water from the Shepaug River in Roxbury is seen as a promising water

supply. Accordingly, the regional plan recognizes portions of Bridgewater and New Milford that drain toward the Shepaug as potential water supply watersheds, thus the above mentioned conservation designation.

3. Water Pollution Control Plan

In 1978, the State of Connecticut formalized a "Sewer Avoidance Program" in an attempt to control the expansion of sewer systems into rural and suburban areas. The Town of Bridgewater elected to participate in that program. In that regard, the Town of Bridgewater requested the Housatonic Valley Council of Elected Officials to commission on its behalf a consultant, The Center for the Environment and Man, Inc. to prepare a report entitled Water Pollution Control Plan for the Town of Bridgewater, Connecticut. This report was finalized in July, 1980.

In order for Bridgewater to achieve its goal of avoiding sewers within the town, a strategy would have to be developed and implemented using both structural and non-structural alternatives through which leaching system failures could be prevented, or abated, should they occur. It was in this vain that the report outlined a series of alternatives for the Town.

The most pertinent recommendation, related to the study area, was as follows: "The following permitted uses within the commercial and industrial zones be deleted due to high wastewater flows and wastewater charactertistics ... Section 2.2.3.1g, Hotels, motels and restaurants be removed as permitted establishments".

In October, 1983, the Bridgewater Planning and Zoning Commission voted to delete this section from the Commercial zone in the Bridgewater Zoning Regulations. That action is currently being appealed.

B. Accessibility of Site

As proposed, traffic generated by the proposed project would travel on Route 67 and Eabow Brook Road. Route 67 is classified as an arterial street in the 1967 Bridgewater Plan of Development. The regional transportation plan, A Transportation Management Plan for the Housatonic Valley Region, adopted in June 1982, classifies Route 67 as a minor arterial. The minor arterial "should interconnect with and augment the urban principal arterial system and provide service to trips of moderate length at a somewhat lower level of traffic mobility than major arterials. This system also distributes travel to geographic areas smaller than those identified with the higher system...and contains facilities that place more emphasis on land access than the higher system".

Eabow Brook Road is classified as a residential street in the 1967 Plan of Development and is not addressed in the regional plan. Eabow Brook Road is primarily used, at the present time, to serve the residential population in the area.

The area on Route 67 between Route 133 and Clapboard Road has an average daily traffic count of 2,600 vehicles, according to the Connecticut Department of Transportation 1982 Traffic Log. Estimates of trip generation for the proposed project are based upon the anticipated construction of 60 hotel units and the application of trip generation rates provided in the document, How to

Limit Traffic Congestion in Your Community, prepared for HVCEO, February 1984. According to the document, average weekday vehicle trips (in and out) amount to 10.5 trips per room for a hotel. For 60 rooms, the total trips generated during maximum occupancy per day are 630. The additional 630 trips would increase traffic on Route 67 by 24%.

If the proposed project is utilized for senior citizen housing (as was previously proposed for this site), and not a hotel in the conventional sense, it can be argued that the 10.5 trip figure is too high. This is probably true. However, also proposed for the project are restaurant facilities, meeting rooms and shops for which trip generation rates have not been projected due to the lack of information concerning the square footage of these operations. These facilities will certainly add to the traffic volumes. Therefore, given the current nebulous nature of the project, the projected traffic volumes should provide only a preliminary estimate of anticipated impacts.

Traffic count data is currently unavailable for Eabow Brook Road. On-site inspection of the road points to limitations on the ability of the road to handle those volumes. Even with improvements, the traffic volumes would severely impact the residences in the area. A more reasonable approach would be to access onto the property from Route 67. An area approximately 500 feet west of Eabow Brook Road appears adequate from the standpoint of adequate sight distance and environmental accessibility on the property. Site specific investigation would be necessary for actual access location. An access permit from Conn DOT would also be required.

C. Site Development Issues

The Bridgewater Planning and Zoning Commission has refused to consider this plan, citing non-compliance with the Bridgewater Zoning Regulations as their reason. This action by the Commission is currently being appealed. Thus the discussion of site development issues may be entirely academic. But in the event that the project does proceed, the following general issues appear relevant:

A. Site Development Plan

Section 2.2.3.0.g of the Bridgewater Zoning Regulations states (with regard to application submitted to the Planning and Zoning Commission), "A Site Development Plan shall be submitted in four copies for its approval which Site Plan shall show all applicable data required". The "applicable data" should include:

1. A map of the entire parcel showing locations of proposed public roads and private access driveways. Existing and proposed roadways should depict, to scale, widths of road surfaces and rights-of-way. The map should be at a scale no smaller than 1" = 100'.

2. Location of proposed buildings and uses, together with roads and driveways within 500 feet of property lines, including rights-of-way.

3. Specific proposals and plans for water supply and sanitary and storm water disposal.

4. A traffic analysis of future volumes, the condition of the town roads servicing the proposed use, and the capacity of such roads, with or without improvements, to carry anticipated volumes.

5. A statement or plans showing any changes proposed in the natural environment, and the effects of such changes on the balance of the ecology of the site and the neighborhood.

6. Contour intervals of 2 feet should be depicted on the map covering, at least, all areas on the property where any site alterations will occur.

B. Layout of Buildings

The layout of the proposed buildings and parking areas should be compatible with the site's topography. Excavation and slope disturbance should be kept to a minimum.

C. Route 67 Access

If an access off Route 67 is pursued, as suggested, then the following issues should be addressed:

1. A bridge would be required to span Hop Brook. This should be the only disturbance permitted in this area. The Bridgewater Plan of Development recommends an area of open space along this stream. No other disturbance should be allowed.

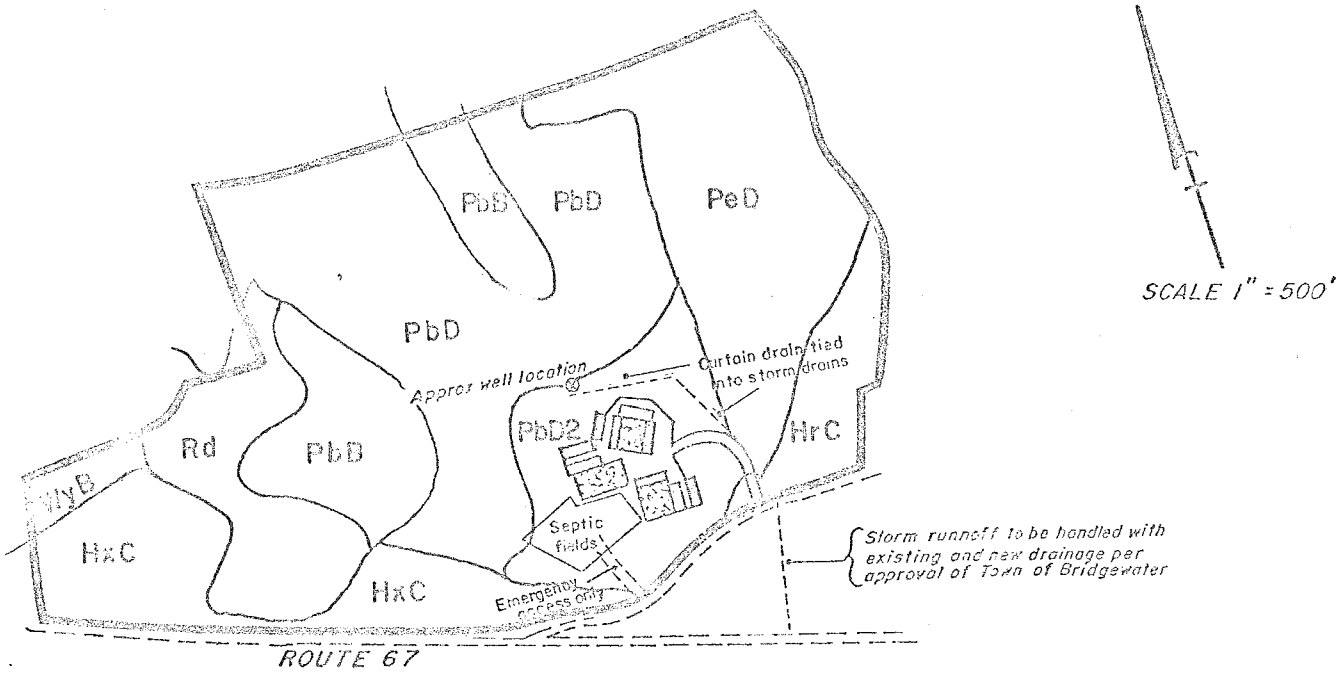
2. The access road from Route 67 to the parking lots will traverse a vertical climb of approximately 40-50 feet. The grade of the road should not exceed 8 percent.

3. In the event of a fire or other catastrophe, an emergency access should be provided to the hotel. This access would be most feasible from Babow Brook Road. However, it should be firmly stated that this access would only be used for emergencies.

* * * * *

APPENDIX

SOILS MAP



NOTE: This map is an enlargement of the Litchfield County Soil Survey mapping in this area. A more precise soils map of the actual portions of this property is presented as Figure 5 of this report.

SOILS LIMITATION CHART - CARR HOTEL/RESTAURANT PROPOSAL, BRIDGEWATER, CT

Soil Symbol	Limitation/Ratings for: Houses With Basements	Houses Without Basements	Septic System Installation	Lawns and Landscaping	Local Roads and Streets
HrC	Sev.-Depth to Rock	Sev. Depth to Rock	Sev. Depth to Rock	Sev.-Thin layer	Sev. Depth to Rock
HxC	Sev.-Depth to Rock	Sev. Depth to Rock	Sev. Depth to Rock	Sev.-Thin layer	Sev. Depth to Rock
PbB	Mod.-Wetness	Mod. Wetness	Sev.-Percs slowly	Slight	Mod. Wetness Frost Action
PbD	Sev.-Slope	Sev. Slope	Sev.-Percs slowly, Slope	Sev. Slope	Sev. Slope
PbD2	Sev.-Slope	Sev. Slope	Sev.-Percs Slowly, Slope	Sev. Slope	Sev. Slope
PeD	Sev.-Slope	Sev. Slope	Sev.-Percs Slowly, Slope	Sev. Slope	Sev. Slope
Rd	Sev.-Wetness	Sev. Wetness	Sev. Percs Slowly, Wetness	Sev. Wetness	Sev. Wetness Frost Action

NOTES:

1) Limitation ratings from USDA Soil Conservation Service criteria

EXPLANATION OF RATING SYSTEM:

SLIGHT LIMITATION: indicates that any property of the soil affecting use of the soil is relatively unimportant and can be overcome at little expense.

MODERATE LIMITATION: indicates that any property of the soil affecting use can be overcome at a somewhat higher expense.

SEVERE LIMITATION: indicates that the use of the soil is seriously limited by hazards or restrictions that require extensive and costly measures to overcome.

ABOUT THE TEAM

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state, and regional agencies. Specialists on the team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, recreation specialists, engineers, and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC&D) Area - a 47 town area in western Connecticut.

As a public service activity, the team is available to serve towns and developers within the King's Mark Area --- free of charge.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in the review of a wide range of significant activities including subdivisions, sanitary landfills, commercial and industrical developments, and recreation/open space projects.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

Environmental Reviews may be requested by the chief elected official of a municipality or the chairman of an administration agency such as planning and zoning, conservation, or inland wetlands. Requests for reviews should be directed to the Chairman of your local Soil and Water Conservation District. This request letter must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer allowing the team to enter the property for purposes of review, and a statement identifying the specific areas of concern the team should address. When this request is approved by the local Soil and Water Conservation District and the King's Mark RC&D Executive Committee, the team will undertake the review. At present, the ERT can undertake two reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil Conservation District Office or Richard Lynn (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, P.O. Box 30, Warren, Connecticut 06754.