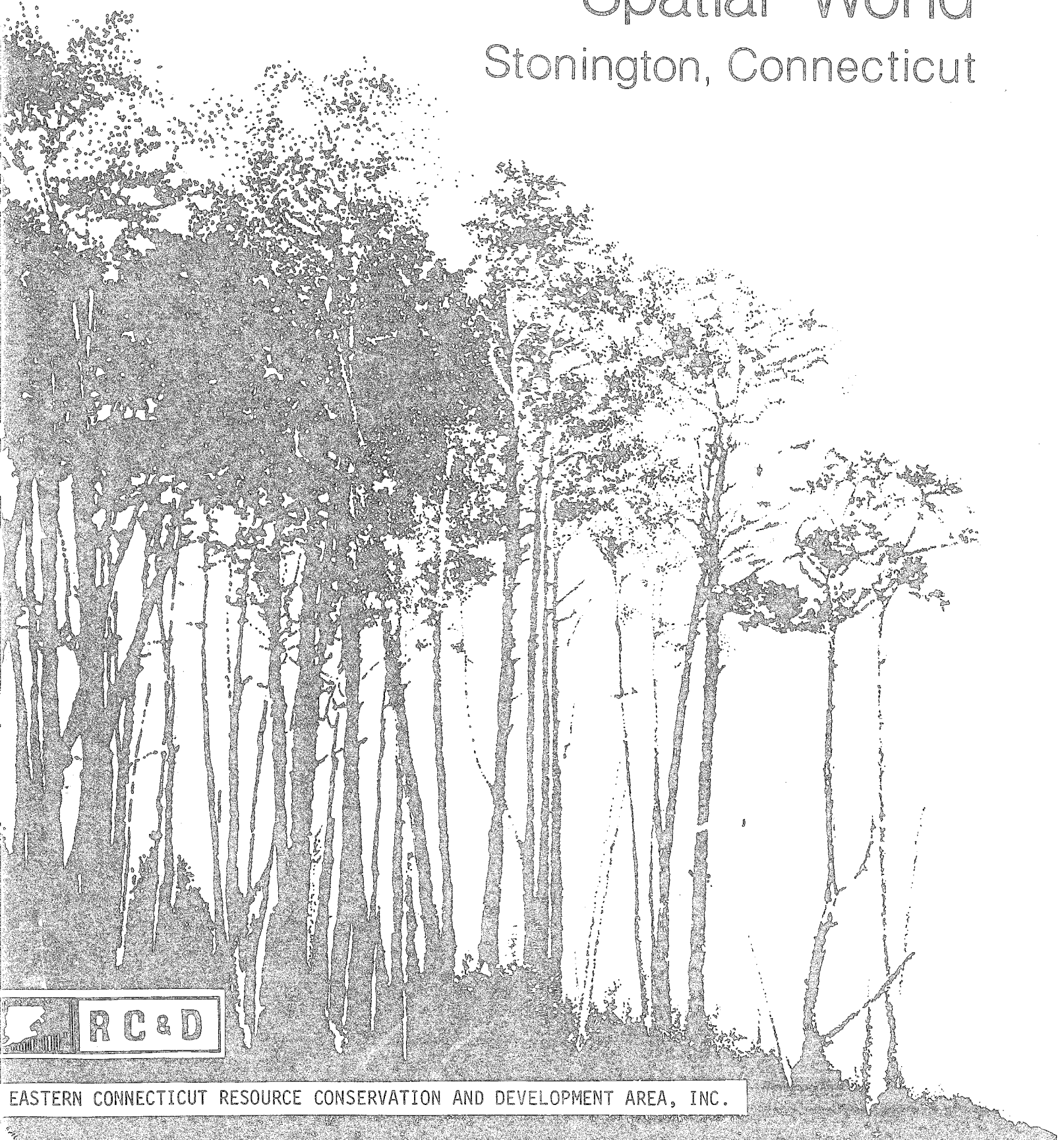


Environmental Review Team Report

Spatial World

Stonington, Connecticut

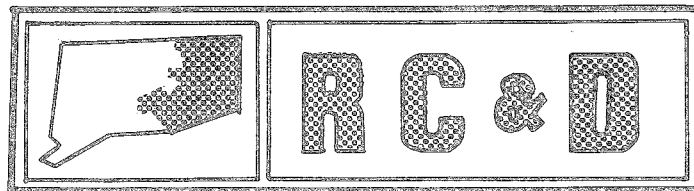


EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

Environmental Review Team
Report
on

Spatial World
Stonington, Connecticut

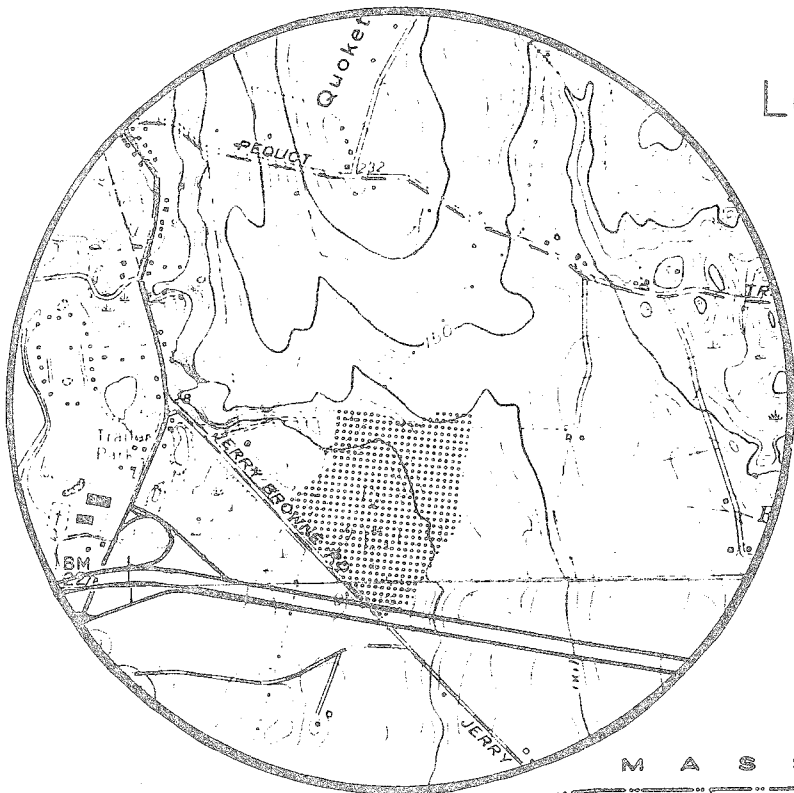
March 1982



eastern connecticut resource conservation & development area

environmental review team
139 boswell avenue
norwich, connecticut 06360

Location of Study Site



SPATIAL WORLD
STONINGTON, CONNECTICUT



ENVIRONMENTAL REVIEW TEAM REPORT
ON
SPATIAL WORLD
STONINGTON, CONNECTICUT

This report is an outgrowth of a request from the Stonington Planning and Zoning Commission to the New London County Soil and Water Conservation District (S&WCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) Area Executive Committee for their consideration and approval as a project measure. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The soils of the site were mapped by a soil scientist of the United States Department of Agriculture (USDA), Soil Conservation Service (SCS). Reproductions of the soil survey map as well as a topographic map of the site were distributed to all ERT participants prior to their field review of the site.

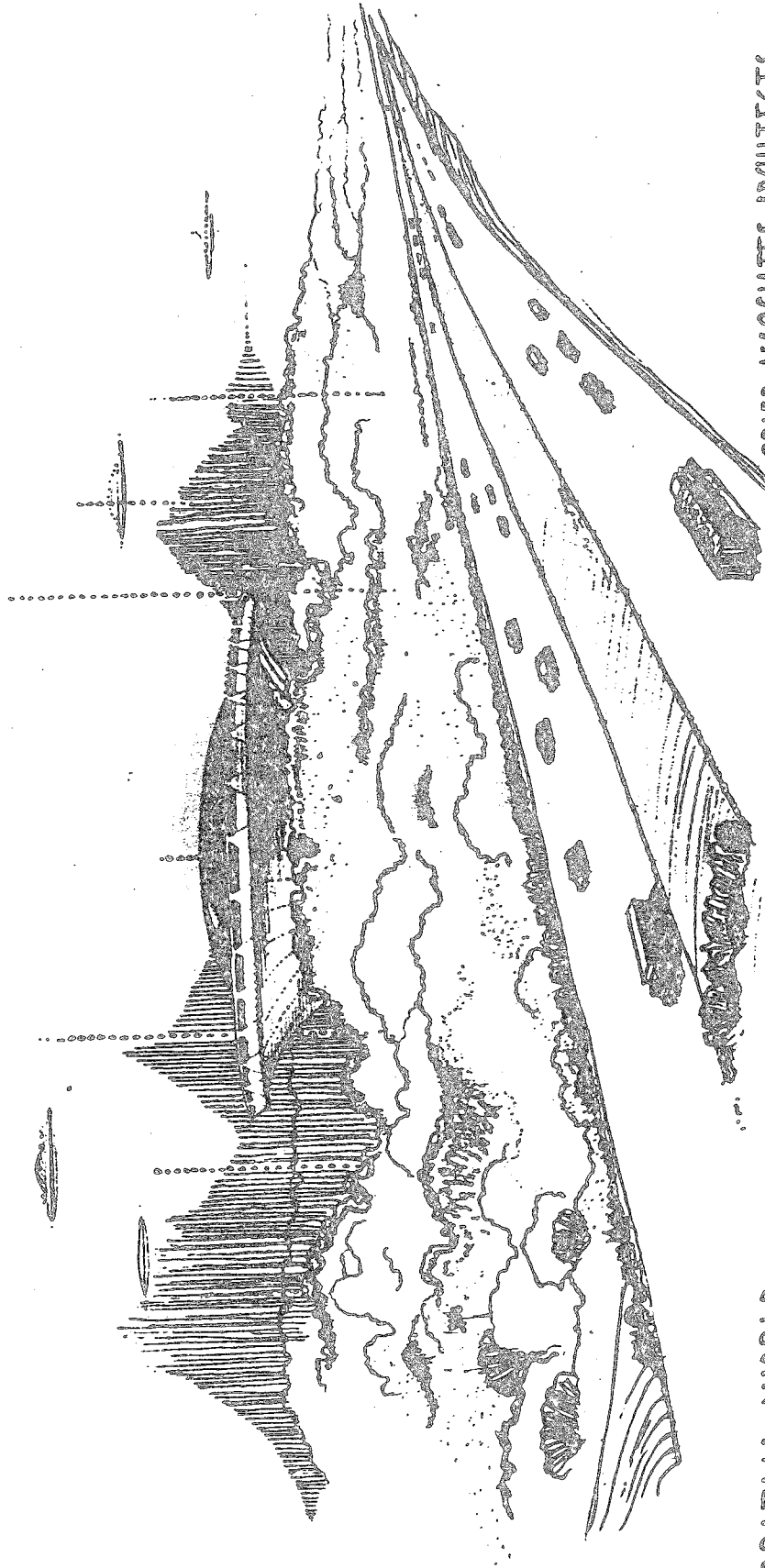
The ERT that field checked the site consisted of the following personnel: Gary Domian, District Conservationist, Soil Conservation Service (SCS); Mike Zizka, Geologist, Department of Environmental Protection (DEP); Rob Rocks, Forester, (DEP); Jim Butler, Regional Planner, Southeastern Connecticut Regional Planning Agency; Karl Lutz, Wildlife Biologist (DEP); Andy Petracco, Recreation Specialist, (DEP); Don Capellaro, Sanitarian, State Department of Health; and Jeanne Shelburn, ERT Coordinator, Eastern Connecticut RC&D Area.

The Team met and field checked the site on Tuesday, January 12, 1982. Reports from each Team member were sent to the ERT Coordinator for review and summarization for the final report.

This report is not meant to compete with private consultants by supplying site designs or detailed solutions to development problems. This report identifies the existing resource base and evaluates its significance to the proposed development and also suggests considerations that should be of concern to the developer and the Town of Stonington. The results of this Team action are oriented toward the development of a better environmental quality and the long-term economics of the land use.

The Eastern Connecticut RC&D Project Committee hopes you will find this report of value and assistance in making your decisions on this particular site.

If you require any additional information, please contact: Ms. Jeanne Shelburn, Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, 139 Boswell Avenue, Norwich, Connecticut 06360, 889-2324.



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SPATIAL WORLD
MYSTIC CONNECTICUT
SPATIAL WORLD
MYSTIC, CT 06355

INTRODUCTION

The Eastern Connecticut Environmental Review Team was asked to prepare an environmental assessment of a proposed commercial/recreational facility in the Town of Stonington. The developer is currently seeking a use change within the established zone to allow construction of this project. The 145 acre site is located on the north side of Jerry Browne Road, north of Interstate Route 95 (I-95). The project is being developed by Robert Thompson and will be known as Spatial World.

The educational complex will be built in the shape of a spaceship, however, most of the activities offered will be located underground. Programs offered in the complex will be audio-visual in nature. The facility will be located in the north central section of the site. Public water and sewer are not presently available to the site. Access to the site will be provided by Jerry Browne Road. The "spaceship" will be visible from I-95 at certain vantage points. A description of the proposal and use change submitted by Mr. Thompson to the Planning and Zoning Commission is included in the Appendix to this report.

The topography of the site is extremely steep in most areas. A stream and its associated wetlands are located in the southwestern section of the site. Another wetland is found in the eastern central section of the site. A Connecticut Light and Power Right-of-Way crosses the northwestern corner of the property. An abandoned woods road, connecting Jerry Browne Road and Pequot Trail, also crosses the property from east to west. The site is entirely forested at present.

The Team is concerned with the effect of this proposal on the natural resource base of this site. Although many severe limitations to development can be overcome with proper engineering techniques, these measures can become costly, making a project financially unfeasible for a developer. A number of natural restrictions are apparent on this site. These include shallow depth of soil to bedrock, regulated wetland areas, and steep slopes. These restrictions and their impact on the proposal are discussed in detail in the body of this report.

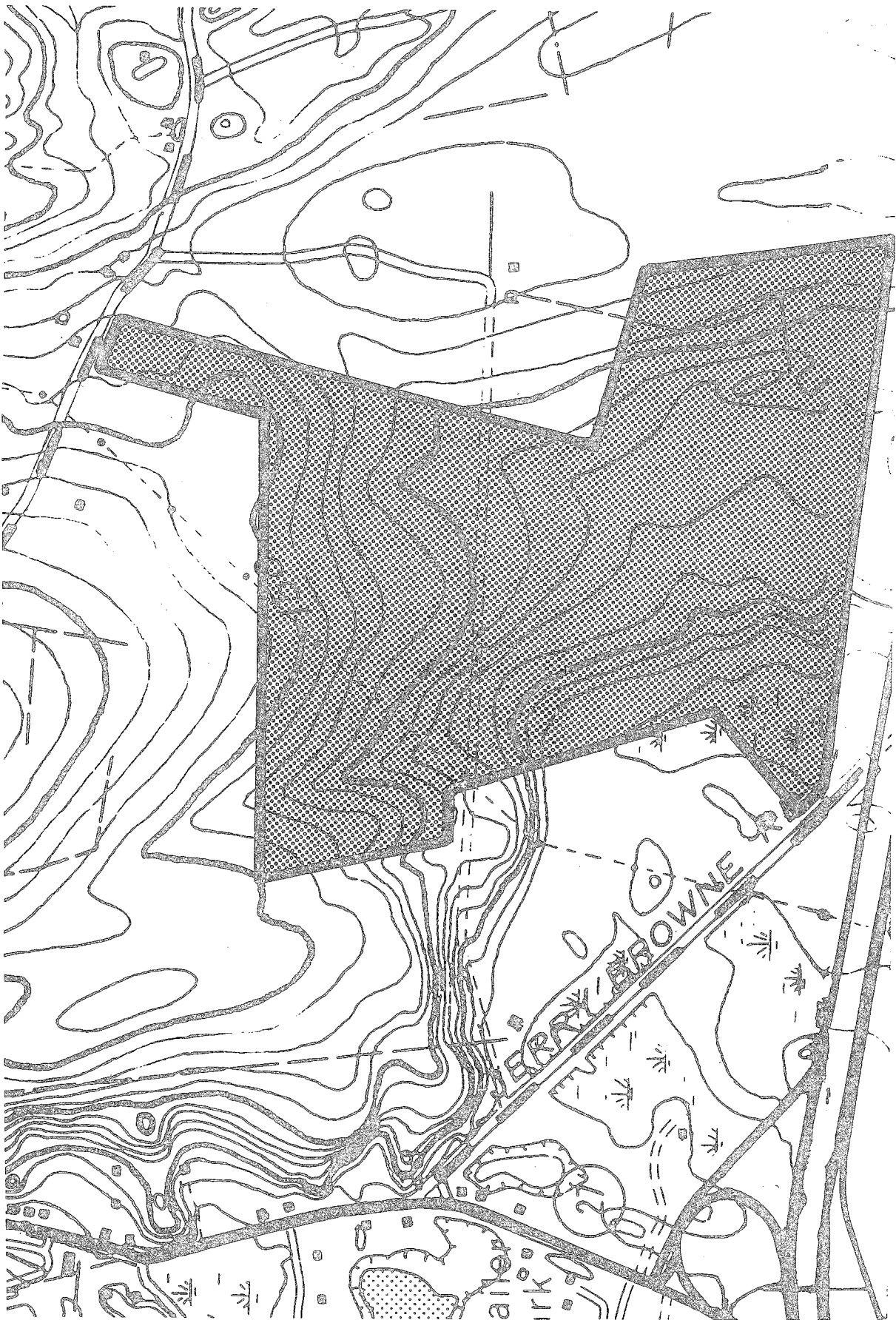
A significant restriction to the proposed use of this site is the current zoning designation (GB, RA-40 and RM-20 - residential/rural). Issues relating to this potential use change are found in the Zoning, Land Use and Traffic Concerns sections of this report.

ENVIRONMENTAL ASSESSMENT

GEOLOGY

The Spatial World site is largely covered by till, a glacial sediment that was deposited directly from an ice sheet. Till consists of rock particles and fragments that range in size from clay to large boulders. The various grain sizes are intimately mixed, and the overall sediment is generally non-layered. The till is often sandy, stony, and loose in the upper two to five feet, but it may become siltier and very compact at greater depths. The transition from

<p>Topography</p>	<p>— Site Boundary</p>	<p>660' scale</p> <p>A</p>
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Loose to compact till is often abrupt. Since groundwater can move only very slowly through the compact till, water is occasionally trapped temporarily in the upper till after a heavy rain or during a thaw.

In the northeastern section of the parcel, boulders and rock outcrops suggest that the till is thin, averaging less than ten feet over bedrock. Over the remainder of the site, the depth to bedrock may be greater than ten feet in most places, but some shallower overburden conditions may exist, as well. If a depth of ten feet is required for the proposed tunnel, it seems likely that the presently proposed circular configuration will require at least some blasting at the western end. If the tunnel configuration were linear, running north to south along the central portion of the site, the chances of avoiding blasting would probably be greater. The developer should have a series of test holes dug or drilled in various places to get a more precise indication of the location of the bedrock surface. The developer should also recognize that the tunnel, in either event, will be partially below the water table throughout its length. The tunnel walls have to be well-sealed to avoid damage from percolating groundwater.

A small excavation in the southeastern section of the property revealed well-rounded cobble gravel. This material may be a localized stratified drift deposit, formed when meltwater plunged through a hole or fissure in the ice sheet, leaving a coarse residue of sand, gravel, and silt. Deposits formed in this manner are called "kames." A cigar-shaped ridge northwest of the excavation may contain similar material. Frozen ground conditions during the field review prevented a more thorough sampling of the material in both the excavated area and the nearby ridge.

Several wetland areas are located on the site. In these areas, decayed organic material mixed with silt, sand, and clay overlies till. The organic-rich sediment is not more than five feet thick in most places, but it may be thicker in the wetland near the access point off Jerry Browne Road.

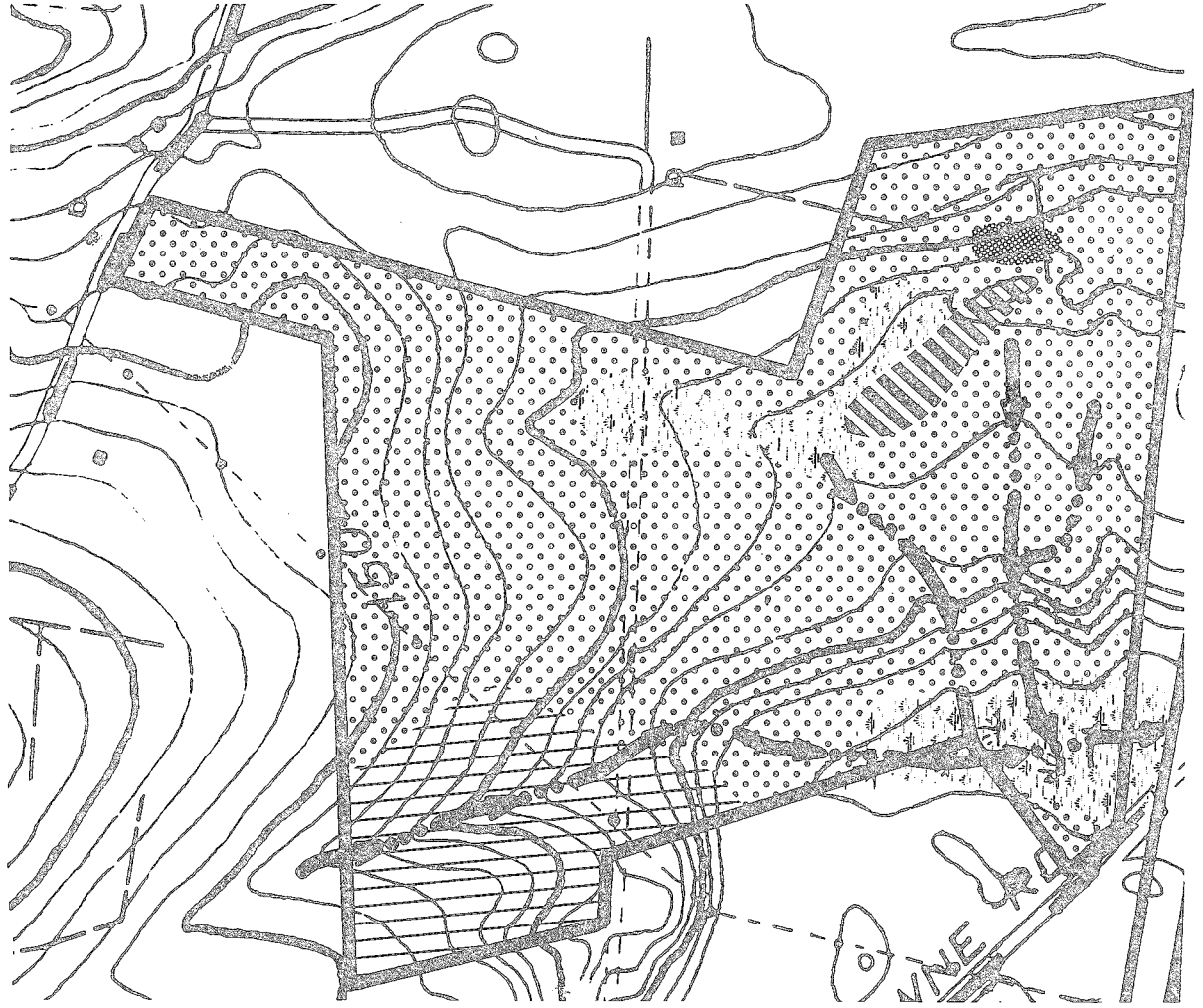
Bedrock outcrops were seen only in the northeastern section of the parcel. The local bedrock is thought to be composed largely of medium-grained, gray, banded gneiss composed of microcline, oligoclase or andesine, quartz, and biotite, with local muscovite, hornblende, garnet, and sillimanite.

HYDROLOGY

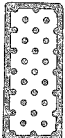
The Spatial World site is crossed by several intermittent streams or wetland corridors. All drainage from the site ultimately flows into the wetland near Jerry Browne Road. The wetland itself drains through culverts under Jerry Browne Road, Interstate Route 95, and Coogan Boulevard. The outlet stream then continues southward through a manmade channel, ultimately discharging into the natural course of Pequotsepos Brook about 2,000 feet south of Coogan Boulevard.


The wetland near Jerry Browne Road is broad and flat. Any access from Jerry Browne Road may therefore require construction activities through a length of several hundred feet of wetlands. The developer has proposed the use of a bridge to cross the wetland. Although a bridge would tend to minimize wetland disruption, there may still be a substantial amount of filling required. The developer should give more specific details about the nature of his proposed access and evaluate the amount of filling that may be required. The access


Surficial Geology





EXPLANATION


- 

Till. Average thickness is estimated to be greater than 10 feet, but areas of thin till may be included.
- 

Till. Average thickness is estimated to be less than 10 feet. Includes several small rock outcrops.
- 

Swampy areas. Thin layers of sand, silt, and clay mixed with decayed organic materials. Overlies till.
- 

Excavation. Contains a very gravelly till or a poorly sorted stratified drift.
- 

Ridge. May contain a gravelly deposit similar to that exposed in the excavation.
- 

Intermittent streamcourses showing flow directions.

road as presently shown on the blueprints would also necessitate the crossings of two intermittent streamcourses. The details of these crossings should also be made clear, but it is unlikely that these crossings will cause any environmental problems as long as they are properly planned (e.g. culvert size).

The developer has stated his intentions to utilize off-site parking areas rather than the two on-site parking areas shown in the blueprints. If the on-site parking areas are eliminated and the "Knowledge Kilometer" is built underground as planned, the percentage of impervious area on the site following development would be lower than the percentage that would exist following a standard residential subdivision. Runoff increase from the site as a whole would be expected to be low or moderate, and peak-flow increases in the outlet stream from the property would be relatively small. Since the plans are preliminary, however, it is not possible to make a practical estimate of the changes in surface flow patterns. The developer should provide, in conjunction with his updated plans, a proposal for drainage controls, as well as estimates of anticipated storm-flow increases. If flow increases are estimated to be substantial, some form of runoff detention may need to be considered. However, the course of the outlet stream south of the site passes through largely undeveloped land including several additional wetlands. Even if peak flows from the site increased by a significant amount, there probably would be little detriment to the downstream areas in terms of flooding problems. Sediment control, on the other hand, would be very important.

SOILS

A detailed soils map of this site and detailed soils descriptions are included in the Appendix to this report, accompanied by a chart which indicates soil limitations for various urban uses. As the soil map is an enlargement from the original 1,320 feet/inch scale to 660 feet/inch, the soil boundary lines should not be viewed as absolute boundaries, but as guidelines to the distribution of soil types on the site. The soil limitation chart indicates the probable limitations of each of the soils for on-site sewage disposal, buildings with basements, streets and parking, and landscaping. However, limitations, even though severe, do not preclude the use of the land for development. If economics permit large expenditures for land development and the intended objective is consistent with the objectives of local and regional development, many soils and sites with difficult problems can be used. The soils map, with the publication, New London County Interim Soil Survey Report, can aid in the identification and interpretation of soils and their uses on this site. "Know Your Land: Natural Soil Groups for Connecticut" can also give insight to the development potentials of the soils and their relationship to the surficial geology of the site.

The gently sloping to sloping land forms adjacent to the highest elevations in the landscape are occupied by Charlton-Hollis fine sandy loams, very rocky. The soil mapping unit symbol is 17LC. The letter "L" denotes very rocky, and "C" denotes a slope range of 3 to 15 percent. Both these soils are well drained. Charlton soils formed in deep, friable glacial till and the Hollis soils formed in shallow glacial till less than twenty inches deep over bedrock. Charlton soils have moderate to moderately rapid permeability and Hollis soils have moderate permeability. Surface runoff is medium to very rapid for Hollis soils and medium to rapid for Charlton soils.

The nearly level drumlins and rounded or elongated hills on the uplands are occupied by Woodbridge fine sandy loam. The mapping unit symbol is 31A, the letter "A" denotes a 0 to 3 percent slope. The Woodbridge soils formed in compact glacial till. The soils are moderately well drained. They have moderate permeability in the surface layer and subsoil, slow to very slow permeability in the substratum (fragipan). The soils have a seasonal high water table at 18 to 24 inches. Woodbridge soils have slow to rapid surface runoff. This soil qualifies as Prime Farmland soil in Connecticut.

The nearly level to gently sloping landforms are occupied by Woodbridge very stony fine sandy loam. The soils are designated by the symbol 31XB. The symbol "X" denotes very stony surface conditions. The symbol "B" denotes a 0 to 8 percent slope. The Woodbridge soils formed in compact glacial till. The soils are moderately well drained. These soils have moderate permeability in the surface layer and subsoil, slow to very slow permeability in the substratum (fragipan). The soils have a seasonal high water table at 18 to 24 inches. Woodbridge soils have slow to rapid surface runoff.

The sloping well drained areas on drumlins or elongated hills of uplands are occupied by Paxton and Montauk fine sandy loam. This soil is designated by soil mapping unit symbol 35C. The letter "C" denotes slopes as 8 to 15 percent. Paxton and Montauk soils formed in compact glacial till. Permeability is moderate in the surface layer and subsoil and slow in the substratum (fragipan). Surface runoff is medium to rapid.

The gently sloping well drained areas on drumlins or elongated hills of uplands are occupied by Paxton and Montauk very stony fine sandy loam. This soil is designated by soil mapping unit symbol 35XB. The letter "X" denotes a very stony surface condition. The letter "B" denotes slopes as 3 to 8 percent. Paxton and Montauk soils formed in compact glacial till. Permeability is moderate in the surface layer and subsoil and slow in the substratum (fragipan). Surface runoff is medium to rapid.

The sloping, well drained areas on drumlins or elongated hills of uplands are occupied by Paxton and Montauk very stony fine sandy loam. This soil is designated by soil mapping unit symbol 35XC. The letter "X" denotes a very stony surface condition. The letter "C" denotes slopes as 8 to 15 percent. Paxton and Montauk soils formed in compact glacial till. Permeability is moderate in the surface layer and subsoil and slow in the substratum (fragipan). Surface runoff is medium to rapid.

The moderately steep to steep well drained areas on drumlins or elongated hills of uplands are occupied by Paxton and Montauk extremely stony fine sandy loam. This soil is designated by soil mapping unit symbol 35MD. The letter "M" denotes an extremely stony surface condition. The letter "D" denotes slopes as 15 to 35 percent. Paxton and Montauk soils formed in compact glacial till. Permeability is moderate in the surface layer and subsoil and slow to very slow in the substratum (fragipan).

The nearly level to gently sloping, very stony, moderately well drained areas on uplands are occupied by Sutton very stony fine sandy loam. This soil is designated by soil mapping unit 41XB. The letter "X" denotes a very

stony surface condition. The letter "B" denotes slopes as being 0 to 8 percent. Sutton soils formed in friable glacial till. Permeability is moderate to moderately rapid. A seasonal high water table exists at 18 to 24 inches. Surface runoff is slow to medium.

The low lying, nearly level areas along drainageways in the uplands are occupied by Ridgebury, Leicester and Whitman extremely stony fine sandy loams. The soils are designated by the mapping unit symbol 43M. The letter "M" denotes extremely stony. The Ridgebury and Whitman soils formed in compact glacial till; the Leicester soils formed in friable glacial till. The Ridgebury and Leicester soils have moderate to moderately rapid permeability in the surface layer and subsoil and slow or very slow permeability in the substratum (fragipan). The Leicester soils have moderately rapid permeability throughout. The seasonal high water table for Ridgebury and Leicester soils is at or near the surface 7 to 9 months of the year. The Whitman soils have high runoff potential. Runoff is slow to medium in Ridgebury soils and slow in Leicester soils. This soil is designated as a wetland soil and is regulated under Public Act 155.

The nearly level, very poorly drained depressional areas within outwash plains, lake plains, till plains, and moraines are occupied by Adrian and Palms mucks. This soil is designated by the soil mapping unit symbol 91. Adrian soils formed in mucky organic deposits, 16 to 51 inches thick, over sandy mineral deposits. The soils have rapid permeability and a high water table at or near the surface 9 to 10 months of the year. Surface runoff is very slow to ponded. Palms soils formed in mucky organic deposits, 16 to 51 inches thick over loamy mineral deposits. The soils have moderately slow permeability and a high water table at or near the surface 9 to 10 months of the year. Surface runoff is very slow. This soil is designated as a regulated wetland under Public Act 155.

Construction of Spatial World is proposed on Paxton and Montauk very stony fine sandy loams, 3 to 8 percent slopes (35XB) and Woodbridge very stony fine sandy loam, 3 to 8 percent slopes (31XB).

Paxton and Montauk soils have moderate limitations for building site development due to a dense, compact soil layer and wetness. Limitations may be overcome by the use of subsurface drainage. Moderate limitations exist for construction of local roads and streets due to wetness and frost action. These limitations may be overcome by installation of subsurface drainage and preparation of a gravel road base. In Paxton and Montauk soils, the thickness of the solum ranges from 15 to 38 inches and corresponds to the depth to the firm or very firm substratum. Depth to bedrock is commonly more than six feet. Woodbridge soils have severe limitations for building site development due to wetness. This limitation may be overcome by installation of subsurface drainage. Limitations for local roads and streets are also severe due to wetness and frost action. This may be overcome by the use of subsurface drainage and by preparation of a gravel road base. In Woodbridge soils, thickness of the solum ranges from 15 to 38 inches and corresponds to the depth to the firm or very firm substratum. Depth to bedrock is commonly more than six feet.

Charlton-Hollis fine sandy loams, very rocky occupy the northwest portion of the property. Limitations for building site development are severe due to steepness of slope and a shallow depth to bedrock. Depth to bedrock may be less than twenty inches in areas.

Two types of wetland soils are mapped on the property. Ridgebury, Leicester and Whitman extremely stony fine sandy loams (43M) and Adrian and Palms mucks 91.

Ridgebury, Leicester and Whitman soils occupy poorly and very poorly drained nearly level, on lying areas along drainageways in uplands. Limitations for building site development due to wetness, frost action, and surface stones.

Adrian and Palms mucks occupy very poorly drained depressional areas within till plains. They have severe limitations for building site development due to excess humus, cut banks that cave, low strength, ponding and frost action.

Both of these wetland soils should be left in their natural state to allow unrestricted flow and natural stormwater storage.

VEGETATION

The property proposed for development into "Spatial World" may be divided into five vegetation types. These include three mixed hardwood areas which total approximately 80 acres; old field/brush areas which total 42± acres; hardwood swamp, 12± acres; open swamp, 1± acre and open field/gravel pit, 1± acre.

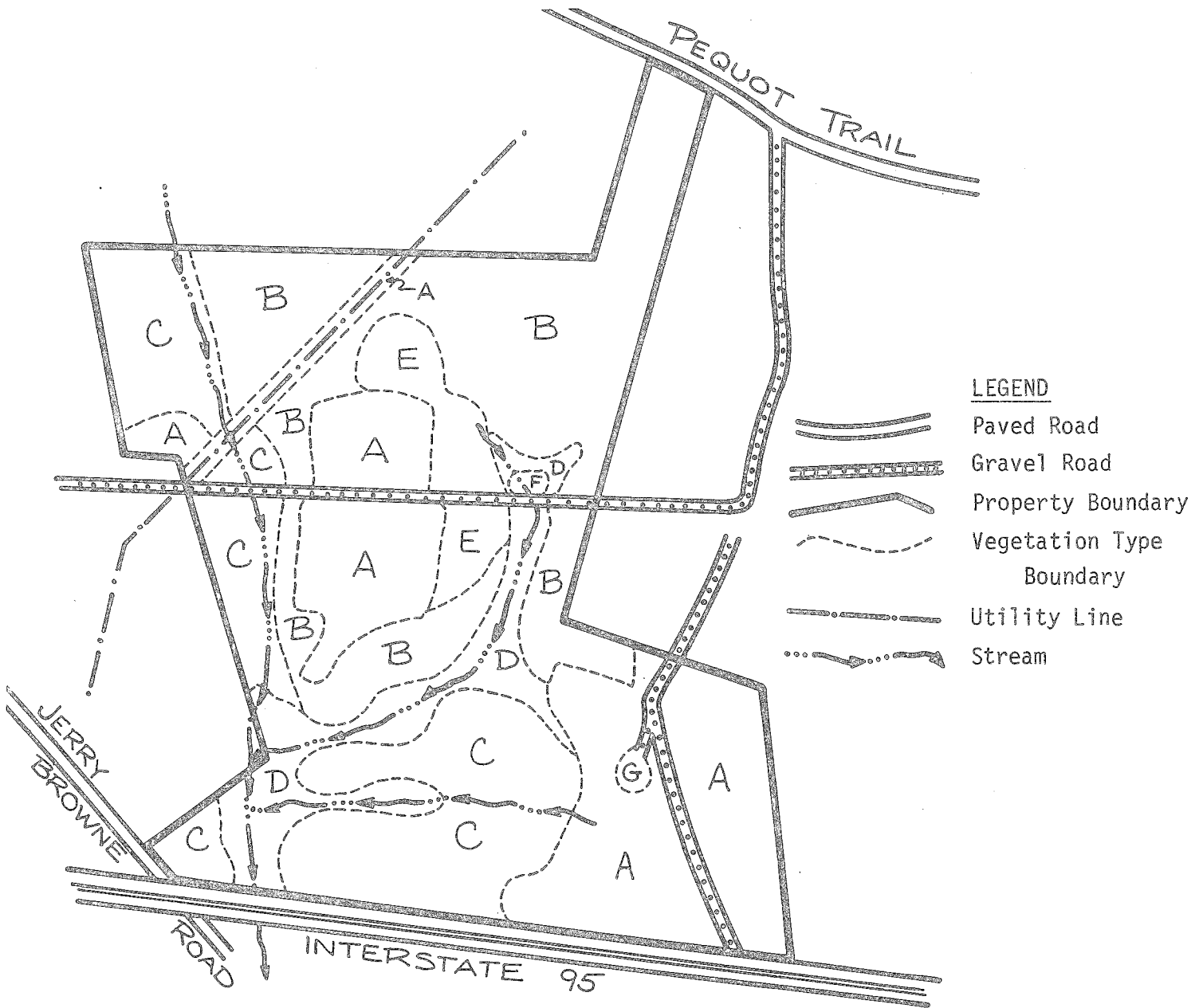
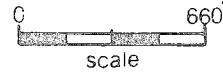
Vegetation Type Descriptions:

Type A. (Old Field/Brush Area) Approximately 42 acres of old fields in various stages of succession are present within this tract. These areas are generally understocked with seedling to sapling-size eastern red cedar, black cherry, big-tooth aspen, red oak, black oak, red maple and apple trees. Shrub species which include highbush blueberry, male berry, bayberry, flowering dogwood, barberry, multiflora rose, staghorn sumac and graystemmed dogwood dominate this vegetation type. The vine species which are present include green brier, oriental bitter-sweet, Japanese honeysuckle, poison ivy and fox grape. Ground cover is made up of grasses, goldenrod, milkweed, black-eyed Susan, ox-eye-daisy, Queen Anne's lace, spirea, huckleberry, dewberry and raspberry. Pole-size eastern red cedar, red maple, apple trees, white ash and black cherry are located along the fence rows and stone walls which pass through these old field areas.

Type B. (Mixed Hardwoods) Sapling to pole-size black birch, red maple, pignut hickory, white ash, American beech and occasional sugar maple are present in this fully stocked stand which totals 38± acres. Many of the trees in this area are beginning to decline in health and vigor, because they are starting to become crowded. Flowering dogwood, maple-leaved viburnum, witch hazel and blue beech form the understory in this stand. Ground cover consists of club moss, Christmas fern, green brier and poison ivy.

Type C. (Mixed Hardwoods) This 35± acre over-stocked stand is made up of pole to sawtimber-size scarlet oak, red oak, pignut hickory, shagbark hickory, yellow birch, black birch, red maple and well scattered sugar maple. Many of the trees in this area are unhealthy and growing slowly due to their crowded condition. However, occasional extremely high quality specimen trees are present. Blue beech, spice bush, highbush blueberry, hop hornbeam and occasional mountain laurel are present in this area's understory. Ground cover vegetation is dominated by hayscented fern, Christmas fern, evergreen wood fern, club moss, poison ivy and green brier.

Vegetation



LEGEND

- Paved Road
- Gravel Road
- Property Boundary
- Vegetation Type Boundary
- Utility Line
- Stream

VEGETATION TYPE DESCRIPTIONS*

- TYPE A. Old field/brush area, 42 \pm acres, under-stocked, seedling to sapling-size.
- TYPE B. Mixed hardwoods, 38 \pm acres, fully-stocked, sapling to pole-size.
- TYPE C. Mixed hardwoods, 35 \pm acres, over-stocked, pole to sawtimber-size.
- TYPE D. Hardwood swamp, 12 \pm acres, variably-stocked, sapling to pole-size.
- TYPE E. Mixed hardwoods, 7 \pm acres, under-stocked, pole to sawtimber-size.
- TYPE F. Open swamp.
- TYPE G. Gravel pit/open field, 1 \pm acre.

- * Seedling-size = Trees less than 1 inch in diameter at 4 1/2 feet above the ground (d.b.h.)
- Sapling-size = Trees 1 to 5 inches in d.b.h.
- Pole-size = Trees 5 to 11 inches in d.b.h.
- Sawtimber-size = Trees 11 inches and greater in d.b.h.

Type D. (Hardwood Swamp) This variably-stocked stand which totals approximately 12 acres is made up of sapling to pole-size red maple, black gum, yellow birch and occasional white ash with widely scattered sawtimber size scarlet oak of very poor quality. A very dense understory which is dominated by sweet pepper-bush, highbush blueberry, spice bush, swamp azalea, winter berry and swamp rose is present. Ground cover vegetation consists of cinnamon fern, sensitive fern, club moss, skunk cabbage, false hellbore, poison ivy, green brier, touch-me-not, sphagnum moss and isolated clumps of tussock sedge.

Type E. (Mixed Hardwoods) Poor quality pole-to-sawtimber-size red maple, white ash and red oak were left in this 7 \pm acre area which is at present under-stocked. Blue beech, hop hornbeam, highbush blueberry, witch hazel, flowering dogwood and hardwood tree seedlings are present in this understory. Club moss, green brier, poison ivy and hayscented fern form the ground cover in this stand. A heavy fuelwood harvest was recently made in this area, unfortunately a predominance of poor quality trees were left in the residual stand.

Type F. (Open Swamp) This 1 \pm acre open swamp is vegetated with swamp loose-strife, highbush blueberry, buttonbush, and common cattail with skunk cabbage and tussock present around its perimeter.

Type G. (Open Field/Gravel Pit) This area which totals approximately 1 acre has been excavated. It supports a sparse cover of grasses, sweet fern, bayberry and occasional gray birch and aspen seedlings.

Management Considerations

Trees which are unhealthy and not growing vigorously due to crowded conditions are most susceptible to further degradation from environmental stresses brought about by development, disease, insect infestation and adverse weather conditions. Improvement thinnings, which remove undesirable trees and reduce competition for space, sunlight, nutrients and water between the high quality residual trees will, over time, allow trees to improve in health, vigor and stability. These thinnings when implemented properly can improve the aesthetic value of an area, improve tree health and vigor, improve wildlife conditions and provide wood products.

The trees which are present in Vegetation Types B and C (Mixed Hardwoods) are declining or beginning to decline in health and vigor as a result of their crowded condition. Fuelwood thinnings which reduce this crowded condition would result in a healthier more stable forest over time. The fuelwood thinnings in these stands should remove approximately one-third of the trees which are present in the overstory. They should be focused on the removal of unhealthy trees, damaged trees, undesirable species such as red maple and trees which are directly competing with healthy, high vigor trees. A thinning of this nature in Vegetation Type B will provide between four and five cords of fuelwood per acre, while the thinning in Vegetation Type C will provide between six and eight cords of fuelwood per acre. A commercial sawtimber harvest is not feasible at this time in Vegetation Type C without reducing tree stocking well below optimum levels. A public service forester or private forester should be contacted to develop a more in depth management plan for this property.

Although vegetation clearing is proposed to be kept to a minimum, trees removed for the development of this parcel should be utilized as fuelwood.

The areas to be cleared to provide a vista from Interstate 95 should be landscaped with shrub species that will not grow tall enough to block the view. The natural encroachment of hardwood tree species will have to be controlled by periodic mowing or the judicious application of the proper herbicides.

As proposed, a major portion of this complex will be constructed underground. The berms which are to cover these structures should be vegetated with grasses that are easily maintained. Small shallow-rooted shrubs could also be utilized, however, they may demand more intensive maintenance.

The more open portion of the Old Field areas (Vegetation Type A) could be planted with a combination of eastern hemlock, eastern white pine and larch, should the establishment of conifer trees be desired. These trees should be planted at a spacing of 8' x 8' to 10' x 10'.

The proposed road crossings of the wetlands off Jerry Browne Road may restrict natural drainage and stream flows, which may eventually have a negative impact on the vegetation in these areas. Raising the water table may drown roots causing widespread mortality of the trees, shrubs and herbaceous vegetation which are now present. The impact on vegetation created by construction of the proposed road crossing of the wetland area will be minimal providing that adequately sized culverts are properly placed.

WILDLIFE

The majority of this 145[±] acre tract consists of a mature hardwood forest. The upland sites within this stand have a sparse understory and the dominant trees are somewhat overcrowded. A selective thinning would reduce this overcrowding and allow the remaining trees more room to grow. They would be healthier and would probably produce a better seed crop which is utilized by many wildlife species as food. A selective thinning would also allow more sunlight to reach the forest floor. This would increase understory growth which supplies added food and cover for wildlife.

Wet areas within the mature hardwood forest have a good shrubby understory which includes many plant species beneficial to wildlife for food and cover. The dominant trees are of low quality and there are many snags (dead or dying trees) present. These snags are very valuable for many wildlife species, as feeding, perching, or nesting sites. A selective thinning may benefit wildlife, but should be done in the winter months when the ground is frozen to protect the soil and water from too much disturbance. Also, any berry or nut producing vegetation should be protected from damage.

There are several old field openings located on this tract which are made up mostly of various grasses, cedar, small oaks, blueberry shrubs, a few old apple trees, and various other woody vegetation. These areas should be maintained by cutting out the invading woody vegetation with the exception of the cedar, some oak trees, and the old apple trees. These are excellent wildlife areas if they are maintained.

The powerline right-of-way also provides a good wildlife opening and offers some good food and cover.

During the field inspection evidence of rabbit, deer, squirrel, grouse, small mammals and songbirds was observed.

A boundary fence is not recommended since it will restrict wildlife movement.

Minimum disturbance of the wetland sites is recommended since these areas receive heavy wildlife use.

Landscape any developed areas with berry or producing shrubs and/or evergreens.

Most wildlife in the immediate area will be eliminated during the construction process, but if human disturbance is minimized upon completion of the project, as planned, the wildlife resource should not be hurt badly.

Further wildlife assistance is available from the Wildlife Unit, Department of Environmental Protection.

WATER SUPPLY

Unless public water becomes available to this site, water supply may be a problem. The principal aquifer on the property is bedrock. Bedrock wells are rarely capable of supplying large quantities of water on a sustainable basis. On the other hand, most bedrock wells can supply small quantities of groundwater. An analysis of selected bedrock wells in Southeastern Connecticut indicated that 90 percent of those wells yielded at least three gallons per minute, or 4,320 gallons per day (source: Connecticut Water Resources Bulletin No. 15).

Bedrock transmits water by means of interconnected fractures, which tend to be concentrated in the upper 150-200 feet of the rock. The yield of a given well, therefore, depends upon the number and size of water-bearing fractures that it intersects. Some wells may be drilled several hundred feet without encountering a significant fracture, while a well drilled only a few tens of feet away may intersect several large fractures. Because the fractures are unevenly and unpredictably distributed through the bedrock, there is no practical way to select a specific site for a bedrock well. For the same reason, the average yield of a group of wells drilled on the property cannot be predicted.

The study of Southeastern Connecticut wells mentioned above stated that the average yield of the bedrock wells was fourteen gallons per minute. If a more conservative average of ten gpm is predicted for the site, then an average of 14,400 gallons per day per well would be achieved. The developer should compare this to his estimated demand to determine the number of wells that may be needed. Wells should be spaced at least 300 feet apart, if possible, to prevent mutual interference (i.e., a situation in which pumping from one well results in draw-down in a nearby well).

WASTE DISPOSAL

No doubt there are many important planning considerations for such a complex, but perhaps none more important than for the services of water supply and sewage disposal. At the present time, parts of the Mystic section of Stonington have the availability of municipal sewers and public water from the Mystic Valley District (Connecticut American Water Company). In particular, these facilities are located along Route 27 serving industrial, commercial and residential users. The extension of such facilities in order to serve the proposed complex has apparently not been adequately addressed or studied by the developer. From the junction of Jerry Browne Road and Route 27 in a straight, easterly direction to the proposed complex site is a distance of approximately 3,000 feet. However, because of intervening site conditions and the need for easements, any actual route(s) taken and distance(s) involved would probably be considerably greater in length.

Regardless of the possible difficulties in securing these utilities, they would seem essential for the proposed operation. Although there has been no engineering study done on projected water use and/or waste water flow for the proposed complex, it would seem reasonable to expect a sizable volume based on known attendance figures for comparable attractions (Seaport - Aquarium) within the Mystic area. It is understood that from 500,000 to 1,000,000 people visit these attractions yearly with over half coming during the summer season. Heavy or varying weekend visitor use will also occur. In addition to visitors, daily employees of the spatial complex would need and use sanitary facilities. There no doubt would also be large water requirements other than for human consumption. Although two operations, food service and lodging are apparently not part of the proposal as being presented, the overall scope and use of the complex would make both a likely future consideration. Also, such operations would place even greater demands on water supply and sewage disposal facilities.

In terms of on-site alternative means of subsurface sewage disposal, one would have serious reservations concerning the possibility of utilizing facilities of this type for such a large project, which would be available to the public throughout the year. In addition, it is noted that soil service mapping data indicates most of the land area has severe limitations for on-site disposal purposes. It may be possible to incorporate certain water-saving fixtures or devices to help conserve on water usage. However, at the present time, due to a lack of data and experience, they are not recognized as a means for reducing the overall waste water flow and seepage area that would be required for a design. This is particularly the case for any new building construction where the only available long-term means of disposal would be through the use of conventional on-site disposal facilities.

The developer needs to engage the services of a consulting engineering firm to study and evaluate the property and prepare plans for means of providing water supply and sewage (waste water) disposal to the site. The local water pollution control authority, health official and water company should be contacted for information and assistance relative to these matters.

ZONING CONCERNS

The developer of Spatial World has proposed that the Town's Zoning Regulations be amended to allow by special use permit a "futuristic, adult-oriented, computerized, information cynosure for regional space awareness recreation communicated through a high technology, educationally entertaining, cultural enhancement facility for profit" in RA-40 and RM-20 zones. The developer further proposes that the special use requirements be amended to add certain restrictions applicable to such facilities, including one that would only allow such a facility where GB, RA-40, and RM-20 zones exist in tandem for one property owner. Since it is doubtful that the Regulations would be amended to allow by special use permit a use defined by such specific language, the proposed amendment will be considered here as a special permit category for commercial, recreational/educational facilities.

Permitted uses now allowed in the two zones in question are: single family residences, produce stands, duplexes, utility substations, and daycare centers. Special permitted uses in one or both of these residential zones include a number of municipal facilities, lumber mills, non-profit associations and institutions, parks, boating facilities, trailer parks, excavation operations, cemeteries, hospitals, public-private recreation facilities, wineries, and certain multiple-family residential uses. None of these presently allowed special permitted uses (with the exception of hospitals, which are unlikely to be located all over town) are of such a scale, or have the potential to generate significant amounts of traffic, as a large commercial facility, such as the one being proposed. The Town does now allow commercial recreation and other commercial activity not specifically named in the Regulations by special use permit in general commercial (GC-60) and tourist commercial (TC-80) zones.

The potential impact of amending the Regulations to allow uses similar to the one being proposed, could result in the location of other commercial recreation/educational uses, such as an amusement park, zoo, or use like the one being proposed, in residential zones throughout the Town. One of the purposes of establishing zoning districts is to preserve the character of neighborhoods. Uses allowed under the proposed amendment might be totally incompatible with character of the residential zones in question. The Connecticut Supreme Court has ruled that an amendment to the zoning regulations must be reasonable and not arbitrary, and must have "a reasonable relation to the health, safety, welfare, or prosperity of the community, and not permit a use which is hostile to the general plan of zoning for the community." Furthermore, "the determination of when the public interest does require an amendment is within the discretion of the legislative agency."* It is questionable whether the proposed amendment is compatible with the intent of the Town's Zoning Regulations, specifically, the establishment of residential zones to preserve the residential character of the district. The Planning and Zoning Commission must decide on this question and determine whether such a change would be in the public interest. An alternative approach which would be less town-wide in scope, only impacting the immediate area, would be for the developer to seek a zone change to a zone (GC-60 or TC-80) which would allow a use such as the one proposed.

* Excerpted from cases cited in Planning and Zoning In Connecticut, by Thomas P. Byrne, p. 111.

LAND USE CONCERNS

Scattered residential development of low density now exists along Jerry Browne Road, north of I-95. On the Town's Proposed Land Use Map, the site on which Spatial World is proposed to be located, is designated for low and moderate density residential, and green belt. According to the Town Plan of Development, none of these land use designations were intended for large commercial uses of the type being proposed. The low density residential designation is applied in non-sewered areas where some development has occurred. The moderate density designation is for use in non-sewered unrestricted areas where substantial residential development is desirable. The environmental green belt designation is planned for large lot sizes, reflecting the fragile nature of existing natural features.

The location of a use such as Spatial World on the east side of Jerry Browne Road might possibly result in other commercial uses leapfrogging out of the commercial zone now confined to the interchange area. Although the developer proposes to make his use as unobtrusive as possible, by maintaining existing terrain and underground location of the Knowledge Kilometer, the proposed location of Spatial World may result in the unplanned extension of the existing commercial area, with the potential to attract other ancillary commercial uses. The Town Plan of Development recognized the importance of limiting the scattering of such use when it cited as an important locational element for future commercial development the: "centrality and agglomeration of complementing uses at points that are convenient to settled areas and that configured as 'modes' or central and contained areas."*

TRAFFIC CONCERNS

A major planning concern for this site is the adequacy of the existing road system to handle any increased amount of traffic which would be generated by Spatial World. Access to the site is planned via Jerry Browne Road and Coogan Boulevard. Jerry Browne Road has relatively good sight lines at this location (however, it should be noted that the sight line of traffic stopped at Coogan Boulevard looking to the left on Jerry Browne Road is partially obstructed by the I-95 bridge abutments). Interstate Route 95 is located to the south and Route 27 to the west of the site. Coogan Boulevard parallels I-95 to the southwest of the site, and provides access to Old Mystick Village and the Mystic Aquarium, as well as functioning as a connector between Route 27 and Jerry Browne Road.

Connecticut Department of Transportation (CONNDOT) figures indicate that I-95 carried 26,400 cars per day between Route 27 and Taugwank Road in 1980. Figures for Route 27 between I-95 and Pequot Trail were 5,800 cars per day in 1980. Coogan Boulevard, at its intersection with Route 27, carried 5,600 cars per day in 1977. No traffic counts were available for Jerry Browne Road, but it can be assumed that it carried considerably less daily traffic than either Route 27 or Coogan Boulevard. Based on the rate of accidents per daily traffic, Route 27 from Coogan Boulevard to the I-95 ramp has been defined as a high frequency accident location by CONNDOT. Between 1977 and 1979, there were twenty-four accidents at this location. Due to the number of accidents, volume of

* Town of Stonington, Plan of Development, July 1978, p. 38.

traffic, and turning movements involved, intersection improvements on Route 27 at Coogan Boulevard were indicated as a critical local need in SCRPA's F.Y. 1981 Regional Transportation Plan Update. This project is presently under design by COMNDOT.

It is extremely difficult to estimate the number of trips per day that would be generated by Spatial World. This is due in part to the preliminary nature of the proposal (for instance, the developer is not certain at this time where parking for the use will be located), and also because of the uncertainty of projecting traffic volumes for such a large and previously untried land use as a "cynosure."

The developer expects Spatial World to employ forty to sixty employees, and to be open seven days a week. During the off-season, it is expected that the facility would attract seminar groups for several days duration. The developer feels that visitor flow accommodated would be equal to the Seaport and the Aquarium during their peak periods. While visitor figures for the Aquarium are unavailable, a survey conducted over the course of a one-year period revealed that the Seaport attracted 517,373 visitors to the Seaport in 1976-77.* Of this figure, 60% or 310,424 visited during the summer, and 80% traveled to the Seaport by automobile. Assuming these patterns do not vary greatly from year to year, some very rough estimates for current traffic volumes generated by the Seaport can be developed. Assuming an auto occupancy rate of three persons per vehicle, then 2,046 automobile trips per day are generated by the Seaport during the summer. (89% of 310,424 summer visitors = 276,277 travelling by automobile; $276,277 \div 3$ persons per auto = 92,092 one-way trips; $92,092 \times 2 = 184,185$ round trips; $184,185 \div 90$ summer days = 2,046 trips per day). These figures are not presented here as projected volumes for Spatial World; rather they are presented here to provide a basis for traffic volumes which might occur.

The developer maintains that much of the traffic generated by the Seaport and the Aquarium will then choose to visit Spatial World. However, at some point in time, such an unique attraction would begin to generate its own clientele. The developer also suggests the possibility of linking the three sites with a shuttle bus system, thus eliminating some of the auto traffic on local roads. Because the location of the parking lot has not been ascertained, it cannot be determined at this time which local roads motorists destined for Spatial World would use, even if the shuttle service is established. In any event, if over 2,000 cars per day were to travel on Route 27, Coogan Boulevard, and Jerry Browne Road bound for the Spatial World parking lot, this would constitute a significant increase in existing traffic volumes.

RECREATION POTENTIAL

The theme and concept of Spatial World is directed toward trying to provide the visitor an awareness of his place in the modern world by exposure to some of the tools of modern technology. The use of such tools as computers and holograms is proposed to provide the experiences that are intended to make this possible.

* Mystic Seaport Museum Visitor Survey, Eleanor Hilsman, Survey Director, November, 1978.

The theme is conceptually different enough to have the potential for a high attendance facility with related ramifications on local traffic and sewage disposal. The nearby Mystick Village and Seaport, with its current tourist-based commerce, experiences a seasonal population explosion. This facility could add to that influx. The ability of the town to provide the services necessary for meeting the potential added demands on the area should be addressed by the town.

For Spatial World to be a successful venture, the displays, exhibits, and related features should be understandable. When explanations and descriptions are necessary, they should be in readily understood layman's terms. Technical terminology in large doses will frustrate the general public's attempts to understand complex technology and its capabilities. When technical terms are unavoidable, explanations of these terms should be provided. With the large number of exhibits being proposed, it is possible that visitors may experience an "information overload" and not have the completely enjoyable experience that is hoped for them. Compartmentalized displays, which have some common basis, may allow the visitor to choose a particular aspect of the total offering rather than being overwhelmed by the diversity offered them with all the displays. Interrelated displays may thereby more easily convey the information. Some "hands-on" exhibits, as provided at Frank Oppenheimer's Exploratorium* in San Francisco would undoubtedly be well received. Since design capacity has not been established, it is important that once this is determined, adequate provision is made for such items as parking, toilets and sewerage, emergency vehicle access and egress and traffic control. Public health and safety are of paramount importance in designing a facility having high attendance potential.

The site plan offered is a conceptual design and, therefore, subject to change. If the premise may be accepted that the structure to be built is a large one (the Knowledge Kilometer on the site plan is, for example, approximately 1,125 feet in diameter and 3,500+ feet in circumference) then it becomes obvious that there will be a large scale earthmoving operation posing severe erosion potential during construction. The tract is not level (steep slopes to the south and west) and would be very expensive to build and properly control erosion during the construction phase and during revegetation.

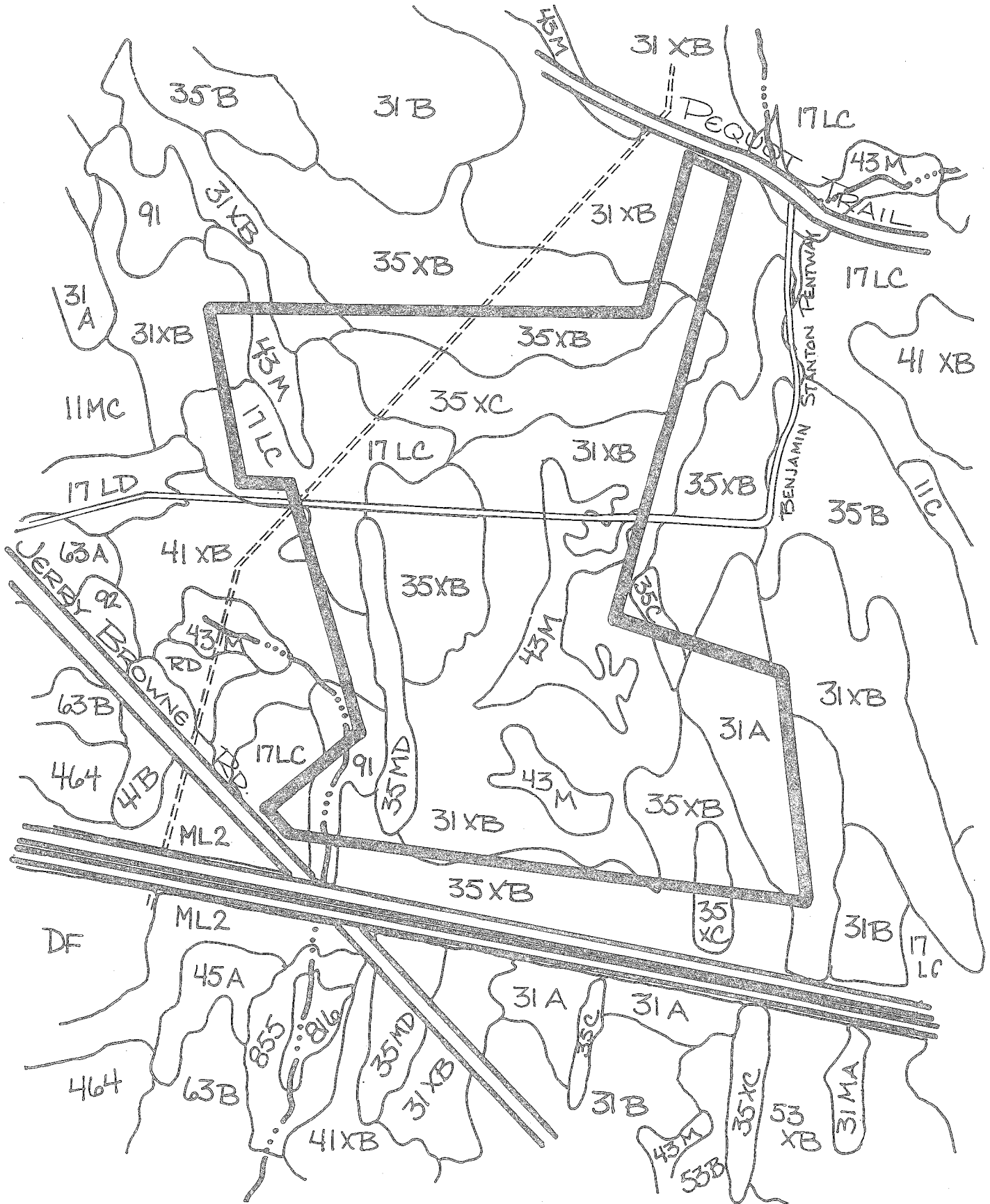
The concept of Spatial World is interesting. Its economic viability and degree of success in conveying concepts and basic information while intertaining will depend, in large part, on the adequacy of the planning and layout.

* Exploratorium is an aggregation of devices exhibited which make the laws of physics more understandable through their use.

Appendix

Soils

— Site Boundary



SPACIAL WORLD

STONINGTON, CONNECTICUT

PROPORTIONAL EXTENT OF SOILS AND THEIR LIMITATIONS FOR CERTAIN LAND USES

Soil Series	Soil Symbol	Approx. Acres	Percent of Acres	Principal Limiting Factor	Urban Use Limitations*			
					On-Site Sewage	Buildings with Basements	Streets & Parking	Land-Scaping
Adrian-Palms	91	3	2	Wetness	3	3	3	3
Charlton-Hollis	17LC	13	9	Slope, large stones				
Charlton Part Hollis Part					2	2	2	2
					3	3	3	3
Paxton	35C	2	2	Percs, slowly	3	1	2	1
Paxton	35XB	29	20	Percs, slowly	3	2	2	2
Paxton	35XC	17	12	Percs, slowly	3	2	2	2
Paxton	35MD	5	4	Percs, slowly	3	3	3	3
Ridgebury, Leicester and Whitman	43M	14	10	Large stones, Percs slowly	3	3	3	3
Sutton	41XB	2	2	Wetness	3	3	2	2
Woodbridge	31A	10	7	Percs slowly	3	3	3	1
Woodbridge	31XB	45 140	32 100%	Percs slowly	3	3	3	2

LIMITATIONS: 1 = slight, 2 = moderate, 3 = severe

SOIL INTERPRETATIONS FOR URBAN USES

The ratings of the soils for elements of community and recreational development uses consist of three degrees of "limitations:" slight or no limitations; moderate limitations; and severe limitations. In the interpretive scheme various physical properties are weighed before judging their relative severity of limitations.

The user is cautioned that the suitability ratings, degree of limitations and other interpretations are based on the typical soil in each mapping unit. At any given point the actual conditions may differ from the information presented here because of the inclusion of other soils which were impractical to map separately at the scale of mapping used. On-site investigations are suggested where the proposed soil use involves heavy loads, deep excavations, or high cost. Limitations, even though severe, do not always preclude the use of land for development. If economics permit greater expenditures for land development and the intended land use is consistent with the objectives of local or regional development, many soils and sites with difficult problems can be used.

Slight Limitations

Areas rated as slight have relatively few limitations in terms of soil suitability for a particular use. The degree of suitability is such that a minimum of time or cost would be needed to overcome relatively minor soil limitations.

Moderate Limitations

In areas rated moderate, it is relatively more difficult and more costly to correct the natural limitations of the soil for certain uses than for soils rated as having slight limitations.

Severe Limitations

Areas designated as having severe limitations would require more extensive and more costly measures than soils rated with moderate limitations in order to overcome natural soil limitations. The soil may have more than one limiting characteristic causing it to be rated severe.

Draft with optional site plan filed November 3, 1981; this amendment submitted November 16, 1981.

Application items #1 and #2 below prepared by Robert A. Thompson, Ph.D., P.E. for Valintin P. Klymenko, M.D.

DESCRIPTION OF AREA AND
NATURE OF CHANGE BEING PROPOSED

submitted

to

THE STONINGTON PLANNING AND ZONING COMMISSION

The Property Location

The property in question extends approximately six-tenths of a mile east of Jerry Browne Road along the north side of Interstate 95; it has a northern boundary near Pequot Trail with a minor access/egress to that road; and a two hundred foot frontage on Jerry Browne Road exists next to I-95 for a main entrance/exit to the property. (See accompanying site plan.)

The Three Zones

Three zones are embraced in the total property area:

- I) GB, housing the bridged wetlands area, would be used only as a deeply hidden entrance/exit to the facility;
- II) RM-20, located north of the Benjamin Stanton pentway, has the necessary land elevation for the "spaceship"; for a mirage effect, however, the "spaceship" would be seen only from three basic strategic locations. (See map insert on site plan.)
(Note: a linear Knowledge kilometer constructed toward I-95 from the "spaceship" moved slightly south would not require construction in this zone if our height requirement could be met in the southern zone);
- III) RA-40, extending south from the pentway to I-95, would house the above ground wetlands trail and podlike parking; other construction such as the Knowledge Kilometer would be underground.

The Recreation Facility

Being proposed for this site is a futuristic, adult-oriented, computerized, information cynosure for regional space awareness recreation communicated through a high technology, educationally entertaining cultural enhancement facility. The three areas within this facility will use holographics,

electronics, computers, robotics, television tape/disc storage and other conventional media processes to communicate to the visitor:

The Spherical Simulation Chamber will recreate environments from within the atom and the cell to the planet and the cosmos;

The Knowledge Kilometer will reorient our expanse of knowledge to a regional space format which recognizes a physical/chemical core with a biological shell surrounding it and a psychobiological surface interface to society -- thus the past, present and future will be holistically represented;

And a Networking Area will be the forerunner for universally exchanging information and opinion that could, with sufficient earth stations (perhaps 300) interconnected by satellite worldwide, lead to the formation of a planetary brain.

A pay-only-what-you-select-to-do charge would be made at this facility.

Mystic Choice

The site is valuable because it is within close proximity to both the past (The Mystic Seaport Museum) and the present (The Mystic Marinelife Aquarium, Olde Mystick Village, downtown Mystic and area shops, restaurants and motels); the future (*SPATIALWORLD*) is thus complementary. For example, the first great ocean to be conquered by mankind was the sea. The second will be space in all its multifaceted dimension. Ships of the first kind are historically preserved at Mystic in the Seaport Museum. A space ship thus serves as a link to the future "across the interstate highway" in Old Mystic already with solid ties to the past.

Here the ecological terrain will be maintained and used for enhanced purposes, while the visitor's view from the spaceship itself will be extraordinary, as if seeing from a mountaintop. And the town of Stonington will benefit from tax dollars. Traffic problems from added visitors could even be eliminated by frequently scheduled airportlike shuttle buses allowing visitors to park only once while still allowing them to visit all the area's facilities.

Special Permit Request

Both RA-40 Section 3.44 (Item "V") and RM-20 Section 3.54 (Item "N") already include a category entitled "Public-Private recreation facilities." Our initial request was to use this category.

(Note: Recreation is defined by Webster both as "giving new life or freshness to" and "forming anew in the imagination.")

As an alternative, a special permit category for RA-40 Section 3.44 (Item "AA") and RM-20 Section 3.54 (Item "S") is proposed as follows (to be shortened as desired by the commission):

"Futuristic, adult-oriented, computerized, information cynosure for regional space awareness recreation communicated through a high technology, educationally entertaining, cultural enhancement facility for profit."

Also, a new regulatory category (Section items 5.4.14 -- also identified as above) might have some of the following restrictions:

- A. Be applicable only where GB, RA-40 and RM-20 zones exist in tandem for one property owner.
- B. Permit construction above ground where no more than "X" percent of the acreage is involved.
- C. Require that parking be in small pods where the natural terrain can be maintained.
- D. Demand that the ecology of the area must be preserved or enhanced by natural landscaping.
- E. Allow stream to be dammed where applicable to form small ponds, yet not exceed "Y" acres.
- F. Specify that the height of the above ground building may not extend higher than "Z" feet from the highest land level over the building's construction since it would be built on the natural slopes of the hills.

About the Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, archeologists, recreation specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area.

The Team is available as a public service at no cost to Connecticut towns.

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 reviewing a wide range of projects including subdivisions, sanitary landfills, commercial and industrial developments, sand and gravel operations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

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 officials of a municipality or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the Chairman of your local Soil and Water Conservation District. This request letter should include a summary of the proposed project, a location map of the project site, written permission from the landowner 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 Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information regarding the Environmental Review Team, please contact Jeanne Shelburn (889-2324), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, 139 Boswell Avenue, Norwich, Connecticut 06360.