GARDEN VALLEY STUDY

Garfield Township
Grand Traverse County, Michigan

Prepared with a grant from
Michigan Coastal Zone Management Program
Michigan Department of Natural Resources
Division of Land Resource Programs

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The following study was prepared with the cooperation of the Traverse Bay Regional Planning Commission, Roger Williams, Director.

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INTRODUCTION

During the decade of the 1970's, the Grand Traverse area has experienced one of the greatest growth rates over its history. Pressures can be felt in all of the townships surrounding the City of Traverse City for continued and expanding development. Historically, Boardman Lake and the Boardman Valley have been considered the back door of the Grand Travrse community. The river and lake system were associated with the logging industry from the earliest time of development of the modern community. Early in the twentieth century the river was extensively dammed for power purposes, either to turn water wheels for the direct use of mills, or to generate electrical power for the community. Only when Airport Road was extended across the valley was there consideration given to the development of land uses which were not industrial in character, the earliest commercial development was that of Logan's Landing in an area known as Under the Willow Tree. That development was followed shortly by the Logan Racquet Club.

Concern for the Boardman Valley and its future, particularly adjacent to the City of Traverse City was addressed by Johnson, Johnson and Roy, Inc. in a report entitled, The Boardman River Study in 1973. In a cover letter in that report Mr. William Johnson stated, "It is realized that the nature of our recommendations leaves your office and local groups with much to do in the way of developing land use alternatives and performance standards.

Over the past decade Garfield Township has taken an active role in developing land use plans and standards for the river environment. As the reality of development takes place, however, these standards and land uses need to be reviewed, updated and strengthened. This project prepared using Coastal Zone Management funds reported on herein provides detailed design guidelines and plans for all lands within the river and coastal zone environment, plans for public lands as well as those in private ownership.

The intent of this report is to be graphic and to present a series of maps that can be used by the Township Planning Commission and Town Board in reviewing land uses and making appropriate changes to the Zoning Ordinance to accomplish the goals that are being set forward in the descriptive plans.

In undertaking this study there were nine tasks which were carried out. Each of those tasks is described below.

1. Preparation of base mapping and background information. It was necessary to aseemble base mapping from a variety of sources in order to undertake the study. Recent detailed mapping had been prepared for a hydroelectric dam site study sponsored by Grand Traverse County. That mapping covered approximately half of the study area. Mapping prepared for the Logan's Landing development at an earlier date provided an additional source of information. To deal with the section between the Sabin Dam and the City dump, it was necessary to enlarge the USGS quadrangle maps combined with Township plat maps and individual business site plans to gain the information needed.

As development takes place in the future, detailed mapping of this area is essential, particularly since the Hartman-Hammond connection is part of this project area.

2. Review of Township existing land use. A thorough review was made of existing Township land use and the proposals for future land use. The various structures and buildings found throughout the valley are shown on the topographic mapping.

A detailed study of the physiographic character of the area was prepared, including an analysis of soil information prepared on the base maps, as well as a detailed study of the vegetation, flora and fauna found throughout the area prepared by a noted local expert on natural environments. Subsequent sections of this report deal with findings from the various studies regarding these matters.

3. Review existing legal controls and regulating agencies. There are a number of agencies which have legal controls over the development of the area. Most involved is Garfield Township through its zoning and subdivision regulations. Zoning classifications appear on the background sheets. The Boardman River has also been declared a natural river coming undder that state act for a distance of about one mile within the study area covering the section approximately from Sabin to the Boardman Dams. Even though the study area comes under that jurisdiction, the State has recognized the Garfield Township Zoning Ordinance as a controlling element.

Other controlling agencies and acts are the Army Corps of Engineers and the Michigan Wetlands Act. Each of the appropriate agencies will have to be contacted in time as improvements are made along the valley.

4. Analyze existing publicly owned lands. An analysis was made of the publicly owned lands, including the Sid Medair Park north of South Airport Road, the former Traverse City dump and the Grand Traverse County Nature Education Reserve. Sketch plans were prepared for the various areas.

5. Identify additional lands to be included in the public sector and easements where appropriate. Illustrated are the areas recommended for public acquisition and the easements necessary to accomplish a trail system along the waters edge.

6. Develop master site plan for public lands. Illustrative master plans have been prepared recommending improvements in the public areas indicated above.

7. Public hearing. A public hearing was held on this matter by the Planning Commission. The Minutes of that hearing are attached as an appendix.

8. Publish a report for use by local officials. This report is intended to summarize the information collected during the study period and to present it in a form which can be distributed to public officials. In addition, a set of maps has been prepared with a scale of one inch equals 200 feet (1" = 200') for use in Planning Commission and other appropriate meetings.

BACKGROUND AND VEGETATION STUDY

The Grand Traverse Boardman River Valley exhibits a combination of natural features of the area. These features possess outstanding scientific and recreational values. The records of past glacial activity is evident throughout the Boardman River Valley and surrounding countryside. There is a diversity of ecological environments and habitats offering excellent opportunities for study, research and relaxation.

The Grand Traverse County lands were acquired by treaty from the Ottawa Tribe of the Allgonquin Indian Nation in 1855. Many of the early settlers to the region cleared learge areas of hardwood by cutting and burning. The tall timber, especially the white pine, was exploited early, about 1847 to 1880. The hardwoods; maples, beeches, and birch lasted somewhat longer. Logging operations were conducted at several primary points on the Boardman River and in Traverse City. Large areas of slash burned over. Many attempts to farm the sandy soils ended in failure. Much of this wasted land was returned to the state for delinquent taxes and is now part of the Fife Lake State Forest.

The climate of the Grand Traverse Region is strongly influenced by the waters of Lake Michigan and both East and West Grand Traverse Bay. This type of climate is considered quasi-marine or modified continental. Prevailing westerly winds from Lake Michigan have a stabilizing effect in delaying early fall frosts giving plants a longer time to mature. This also perpetrates a longer cool spring, retarding spring blooming. The average date of killing frost in spring is May 18 and in the fall, October 7. Besides the effect of "the bid lake" on the temperature, the parameters of these waters radiate an effect on rainfall. Average precipitation may be between 26 and 29 inches a year. Precipitation is well distributed throughout the year. Snowfall is usually between 80 and 120 inches a year. The mean January temperature is 19 degrees Fahrenheit. And the mean maximum in July is 80 degrees Fahrenheit.

The topography of this area has also been strongly influenced by the forces of nature: Wind, water, ice and especially past glacial activity.

The Boardman River Valley has been covered by at least four major continental glaciers; (from the oldest to the youngest,) Nebraskan, Kansan, Illinoin and Wisconsin. The last ice sheet of the Wisconsin glacier formed the basic surface features of the county. Geologists estimate the last finger of the ice sheet advanced some six to ten thousand years ago. When this sheet melted it left what is known as the Manistee moraine. The lower Boardman Valley, including the lands of Grand Traverse Nature Education Reserve, contains glacial debris from the southern boundary of the Manistee moraine. Further to the south lies the remains of the older Port Huron moraine. The Manistee moraine is from three to four miles wide. Between these two moraines lie great gullies and outwash plains. One gulley forms the bed of the Boardman River and outwash plains surround it on the east, south and southwest. To the northwest is the extensive

outwash plain of the Port Huron moraine.

Though there appears to be no exposed limestone rockbeds on the Reserve or lower Boardman Valley from the Nipissing or glacial Lake Algonquin; various rocks and conglomerate remnants from earlier times are scattered in the glacial debris throughout the land surface. Other ground features nearby include rock beaches, kettles and kames, terminal and ground moraines and drumlins. Most are orientated in a northwest-southeast direction indicating the direction of glacial retreat.

The Boardman River Bed averages about 560 feet above sea level and the highest plateau about 680 feet, in the study area.

In earlier times, virgin forests covered the entire region except for small areas of grassy marshland. The early settlers found three major groups of trees: (1) Sugar Maple (Acer saccharum), beech (Fagus grandifolia), Elm (Ulmus sp), and other hardwoods on limey loam soils; (2) white pine (Pinus Strobus) and red pine (Pinus resinosa) on sandy soils; (3) white-cedar (Thuja occidentalis), balsam fir (Abies balsamea) and black spruce (Picea mariana) on acidy poorly drained wetlands.

Other less common but associate trees were red oak (Quercus rubra), White oak (Quercus alba), quaking aspen (Populus tremuloides), bid-tooth aspen (Populus grandidentata), hornbeam (Ostrya virginiana), yellow and paper birch (Betula spp.), ashes (Fraximus spp.), basswood (Tilia americana), jack pine (Pinus banksiana), tamarack (Larix laricina), and formidable stands of hemlock (Tsuga canadensis), Upland burned over areas on sandy soils are covered by stands of pin cherry (Prunus pensylvanica), aspens (Populus spp.) and jack pine-oak (Pinus banksiana and Quercus spp.).

Present ground cover in wooded parts of the Lower Valley include oak bracken (Pteridium aquailinum var. latiusculum), sweet fern (Comptonia peregrina), sumac (Rhus typhina) and species of honeysuckle (Lonicera spp.). Cutover areas that may have been burned or may have been farmed, support blueberries (Vaccinium spp.), raspberrys (Rubus spp.), currents (Ribes spp.), and wild strawberrys (Fragaria spp.). Some juniper (Juniperus) appears on the sandy ridges. Natural wetland and prairie grasses occur in openings such as big blue stem (Andropogon gerardii) and Canada bluegrass (Poa compressa). Crabgrass, foxtails, and many forbs cover the sandy till plains that once were farmed.

complete survey has not been established at this time for the Boardman Valley. However, typical residents include the white tailed deer (Odocoileus virginianus), red fox (Vulpes vulva), raccoon (Procyon lotor), snowshoe hare and cottontail rabbit (Lepus americanus Sylvilagus Floridanus), beaver (Castor canadensis), otter (Lutra canadensis), mink (Mustela vison), skunk (Mephitus mephitus), several species of mice and shrews, and others.

Amphibians and reptiles probably number as many as thirty or more species and are common along the river course and impoundments. Numerous springs and small creeks offer clean, cool water for these animals.

The bird and wildfowl populations are

especially high due to an abundant food supply and protection.

Viable fish populations occur in the clean waters of the Boardman River and its tributaries. Brown trout (Salmo trutta), brook trout (Salvelinus fantinales), northern pike (Esox lucius), and many species of small fish and minnows abound in these waters. The high dams on the Boardman River have prevented the recently introduced salmon from reaching the upper waters of the Boardman River.

In describing vegetation of the Grand Traverse region it becomes necessary to define certain terms that help make that presentation more clearly understood.

Vegetation can be thought as occurring in units or communities. Some units are large and some very small. Each unit depends on certain natural and climatic conditions native to that region. Each individual area has inter-related groups of individuals. Some species of a group can exist independently while others, in order to successfully survive, must have a direct association with other species.

A community describes any unit (with a species complex) of vegetation, regardless of rank or development. Major units of vegetation are considered formations (deciduous, conifers, grassland) while association is a major climax unit of a formation. A climax unit consists of primary (sometimes dominant) and a secondary (accessory) species that are historically and genetically stable and have features that express a relationship (physiognomy) one to another.

All vegetation changes as a result of succession - that is a natural progression and development. Any one stage of development is considered a seral stage. In the course of time each seral stage are replaced by other stages which are brought about by the reactions of the existing vegetations, climatic changes and topographic changes such as erosion, deposition and so on. Finally, a climax unit develops where no further changes are possible because existing dominants resist the intrusion of new forms.

In forest communities a layering effect is indicated by a canopy of top layer, over a secondary layer or understory. The understory will gradually replace the canopy, in some instances, as members of the canopy die.

In grasslands communities the climax stage is reached through a series of preclimax stages such as 1. the weed stage, 2. the short-lived grass stage, 3. the early perennial, 4. the climax grass stage. Each stage is dependent on natural grazing, fire and so on. In this region it takes 40 years or more to reach a climax grassland.

Wetland climax situations are becoming rare because of man's intrusions upon the stages of succession. Man is inclined to want to use a certain stage of succession for his own benefits, thereby keeping the vegetation of a particular stage in a constant state of "bloom" in order to produce the desired effect. Added nutrients, harvest, water retention and so on, encourage the natural status of progression.

Wetlands are very productive eco-systems and any stage from oligotrophic (new, young) to eutrophic (older, developed) may be evident at any one watershed at any time.

In all forms of life there is a struggle for survival; for light, space, water and nutritional needs. This is called competition. Some forms (trees) may be considered tolerant if they can develop in the shade of other trees. Intolerant species are usually primary and require full sun. Stable conditions eventually produce a tolerant species.

Virgin forest conditions are the result of maturity reached by the natural process of development. Virgin forests may be old but not necessarily climax. After a disturbance (fire, cutting and so on) the forest growth is called second growth. Some original plants may occur in second growth after cutting, but if cutting precedes fire, the results may be strongly modified. Any disturbance sets back succession. Primary stands occur on bare or unoccupied areas. These usually end in all-age stands. Even-age stands develop at nearly the same time due to the modifying agent that left space available.

Dominants are trees that require the largest area and have maximum numbers in the canopy layer. Dominants may occur as several species, in association with other trees, or as co-dominants. Other trees or plants may occur, especially in disturbed areas, which are considered accessory trees.

Overlapping of an area with different vegetational zones is called eco-tones. Today, nearly all of temperate north America could be called a broad eco-tone.

The area of study was in Grand Traverse County, Michigan, sections 14, 22 and 27. It extends south from the east side of mid-Boardman Lake to the Boardman Dam and including portions of the wetlands, both east and west of the Boardman River, south of Logan's Landing. Also included is the northern portion of the Grand Traverse Nature Education Reserve.

A compartment examination was considered in classifying the vegetation of this area as well as the Releve' method of counting species, but both systems were discarded in favor of the zonal concept. This zonal approach will be used to recognize and classify the real vegetation of this region. Each unit is in a transition state. Since soils and vegetation are so closely interwoven, they will be treated and discussed together. From time to time it may be necessary for the reader to refer to adjacent study maps or accompanying slide photos. Zones considered in the study area will be uplands, banks and sloped, swamp forests and other wetlands.

Uplands considered here will be those plateaus or till plains elevated above the river bed and more or less flat to rolling and steep. Soils are podzols. Podzols are gray-brown and derived from glacial drift, composed of quartz

and pockets of calcareous materials. They are typed as Kalkaska loam, (KaA) with a zero to two degree slope, KaE with an 18 to 25 degree slope and KaF with a 25 to 45 degree slope.

Soils of the Kalkaska series (KaA) are well drained and sandy. They have a low water table. Woodland areas have a dark colored surface layer above the dark reddish-brown loamy sand. Small pebbles of limestone are evident. "Open areas" have a grayish subsurface layer. These soils in the study area have been cultivated but now are reverting to primary forest. Enroaching shrubs and small trees are beginning to replace the lichens, grasses and forbes that have covered the soil since the last cultivation or pasturing, about the late 1950's.

Species of Cladonia are the primary lichen on these soils. Roots of Canada bluegrass (Poa compressa) and June grass (Aveneae Koeleria) bind and help hold the thin soils. Sheep sorrel (Rumex acetosella), hawk weed (Hieracium spp.), ox-eye daisy (Chrysanthemum leucanthemum) are co-dominant forbs with St. Johnswort (Hypericum perforatum) and bladder campion (Lilene cucubalus) appearing later in the season.

The encroachment of shrubs is evident over all the open areas with sumac (Rhus typhina) being the dominant invader. Intolerant secondary shrubs and small trees include groups of pin cherry (Prunus spp.), dispersed by seed, and aspen clones, dispersed by roots, and several incidentals such as rock elm (Ulmus thomasii) and juniper (Juniperus compressa Var. depressa).

In the northwest corner of the Reserve is an old abandoned orchard. Living fruit trees include apple (Malus pumila) and wild plum (Prunus americana). The plum has spread over an extensive area but the apple trees are dying due to lack of care and old age.

Bittersweet (Celastrus scandens) is very prolific near the edges and on the high banks above the west side impoundment of Sabin Dam. The vines mingle with shrubs and trees on the steep banks. Plants of Celastrus cover several acres.

Water-loving shrubs are enroaching on the previously pastured mucky loamy (RWa) sand. Red-osier dogwood (Cornus stolonifera) willows (Salix spp.) and speckled alder (Alnus rugosa) are dominant shrubs with young white-cedar (Thuja occidentalis), spruce and birches coming in even-age stands. Sturdy herbaceous plants crowd each other in severe competition. Bee balm (Monarda didyma), several species of golden rod (Solidago spp.), thoroughworts (Eupatorium), beggarticks (Bidens frondosa) are only a few of the plants taking over this old pastureland.

Soils known as Leelanau-Kalkaska (LKF) are represented in only two portions of the Reserve; one near the old power dam site and one north of Sabin Dam. These soils have a dark colored surface layer and a reddish (Fe compounds) subsurface layer. In eroded areas the surface layer may be very thin. Soils are composed of well drained loamy sand and clay loam.

Underlying materials are calcareous. Many seepage areas (springs) are found near the base of slopes. Pockets of sand and gravel are sometimes more than ten feet thick.

Sugar maple (Acer saccharum), ash (Fraxinus pennsylvanica) and poplars (Populus tremuloides and Balsamifera) are dominant trees but growing sparsely on gradual slopes. Ninebark (Physocarpus opulifolius) is the dominant shrub with several associates, such as sumac (Rhus typhina), willows (Salix spp.), speckled alder (Alnus rugosa), and dogwoods (Cornus spp.). Near the railroad bed, sweetfern (Comptonia peregrina) and black berries (Rubus allegheniensus) compete on dryer ground.

On the northern margin of the study area on the southeast side of Boardman Lake, there is an upland plateau where oaks (Quercus spp.) are dominant. These are very large trees and are mixed with white pine (Pinus strobus) and beech (Fagus grandifolia). Soils here are of the RWA Series or Ribicon sand, mostly uncultivated and level.

Grasses and forbs are the major ground cover on dry uplands. However, beneath groups of maples and ashes, fringed polygola (Polygala paucifolia), trillium (Trillium grandiflorum) and several species of violets (Viola spp.) and others are found in the early spring and summer. In one eroded spot, an alien Sedum has covered the loose soil. In another, common lilac (Syringa vulgarus) have spread into sizeable clones.

Kalkaska (KaE and KaF), including the thin loamy soils of KIF Series soil groups, exhibit characteristic erosion and loss of surface layer. Slopes range from moderate to steep, 20 to 45 percent. These sloping soils have not been cultivated. Some have been cleared as a result of lumbering or lumbering operations. The soil has a thin, dark colored surface layer over a gray subsurface layer. Exposed places have lost the surface layer due to erosion.

Natural boundaries separate these slopes from the more level uplands. These slopes contain remnants of northern hardwoods. While none can be called true climax, small portions of undisturbed forest with a minimum of selective cutting has resulted in a mixed hardwood cover. In general, northern mixed hardwoods are a broad transitional zone between the conifer zone to the north, and the mixed mesophytic zone to the south.

Co-dominant trees occupy the forest canopy and consist of suger maple (Acer saccharum), basswood (Tilia americana) and elms (Ulmus americana and U. rubra). Since the introduction of Dutch elm disease, many of the elms are dying and understory trees and shrubs are competing for the available space.

Associated trees are aspen (Populus spp.), black cherry (Prunus serotina), red maple (Acer rubra), ash (Fraxinus pennsylvanica), hophornbeam (Ostrya virginiana), and oak (Quercus spp). Hemlock (Tsuga canadensis) and yellow birch (Betula alleghaniensus) occur in most habitats on all slopes. White pine (Pinus strobus) is scattered throughout.

Beneath the shelter of these trees and shrubs, the herbaceous layers emphasize more northern species. Moose maple (Acer pensylvanicum), Honeysuckles (Lonicera candensis), beaked hazelnut (Corylus cornuta), many species

of hardy ferns, Canada yew (Taxus candensis) compose some of the shrubs. Among herbaceous plants (some of them now protected by law), are found Trilliums (Trillium grandifolium), trout-lily (Erythronium americum), bead-lily (Clintonia borealis), yellow lady's slipper (Cypripedium calceolus), moccasin-flower (Cypripedium acaule), fringed polygala (Polygala paucifolia), pipsissewa (Chimaphila umbellata), and columbine (Aquilega canadensis). These are but a few of the abundant diverse plants.

On the more severely eroded banks of the main river and of the western Sabin Dam backwaters, the soil loss is more extensive. This soil has accumulated at the river's high water edge. White-cedar is by far the mocst common tree, with white pine, maples and ash inter-mixed higher up the banks. These stands, though narrow, are quite conspicuous. Nine-bark (Physocarpus opulifolius) and witch-hazel (Hamamelis virginiana) are two shrubs that seem to be able to stand the strain of erosion. Cladonia pyxidata and Peltigera canina (dog lichen) are loosely attached to the soil. In the wetter parts of this transitional zone grow sensitive fern (Onoclea sensibilis), cinnamon fern (osmunda cinnamomea), and others. Also, gold-thread (Coptis groenlandica), starflower (Trientalis borealis) and several species of Habenaria grow in the accumulated humus. Other plants found here are several species of liver-worts. Often overlooked, but considered by botanists to be sensitive, these delightful and often tiny plants require a constant clean water supply in order to survive. Genera represented include: Calypogeia, Fissia, Raddi, Riccardia, Radula, Geocalyx, Marchantia and Ptilidium.

Rising above the water level of the dam impoundments and on the floodplain at the northern boundary of the Reserve, are islands of coarse sands and stratified materials. The soil is of the Crosswell Series (CpA and CpB). The water table is, of course, very high and fluctuates to a certain degreebecause of dam flow requirements and flooding conditions.

The terrain is flat to gently sloping. No major big trees occupy these sites. However, small trees of the aspen-maple-basswood communities prevail. Speckled alder (Alnus rugosa), red-osier dogwood (Cornus stolonifera) and common shrubs. Because of the difficulty in getting to these islands the herbaceous surveys are incomplete at this time.

At several points along the river are poorly drained "creek bottoms" with numerous small creeks flowing directly into the river offering rich vegetative habitats. These Lupton (Lu) muck soils may be more than four feet thick and the organic materials are mostly decomposed plant materials. Layered and intermixed with this muck are silts and minerals extracted from seepage, overwash, flood materials and so on. Near the old mill site, at the south end of Sabin impoundment on the Reserve, is a small area of Houghton (HO) muck covered with marsh grasses and cattails.

Sticky Lupton mucks support a few trees except those of the familiar white-cedar (Thuja occidentalis), tamarack (Larix laricina), and balsam fir (Abies balsamifera) On hummocks around the edges of this marshland are found

vigorous aspens (Populus spp.).

The drainage lands adjacent to "old mill creek" support covers of cattail (Typha latifolia), sedges, and grasses. Water loving plants such as marsh marigold (Caltha palustris), skunk cabbage (Symplocarpus faetidus), Iris and Lobelia, and pickerelweed (Pontederiacordata) are prolific in these wetlands. Besides mosses and liverworts, large areas of ground surface are covered by thick mats of horsetail fern (Equisetum sylvanticum) and other Equisetiums, including curly rushes. Creeklets that drain into the river are sometimes blocked by dense, succulent growths of watercress (Nasturtium officinale). Also, midway between Boardman Lake and the Reserve's northeast boundary is a small cattail swamp that a clear small creek drains into, connecting an adjoining cedar swamp.

Near the northern boundary of the Reserve and at a lower elevation than the dam impoundment is found a mosaic of soil types. They are Kerston (Kt.) mucks, which are poorly drained and composed of alternate layers of organic materials and mineral matter. They occur on floodplains, often inundated after heavy rains. They may be spongy indicating a peaty subsurface.

At the south end of Boardman Lake and extending upstream as far as Sabin Dam, are extensive "cedar swamps" located at intervals on both sides of the Boardman River. These swamps are thickly covered by second growth white-cedar (Thuga occidentalis). Margins of these swamps support tamarack (Larix laricina), balsam fir (Abies balsamifera), balsam poplar (Populus balsamifera) and quaking aspen (Populus tremuloides).

The understory is limited under the conifers but where light penetration is adequate, red-osier dogwood (Cornus Stolonifera), alternate-leaved dogwood (Cornus alternitolia), and Michigan holly (Ilex verticillata), also known as common winterberry holly, have taken a vigorous stand. Algon the river's edge are tangles of ninebark, willow and alder, with riverbank grape (Vitis riparia) and virgin's bower vines (Clemitis virginiana).

Mixed species compose the ground cover beneath the white-cedars and lowland conifer forest. Many species of mosses including a flowering moss (Mnium spp.) and spaghnum (Spaghnum spp.). In most standing water areas liverworts are common, mostly Marchantia spp. Other species include sarsaparilla (Aralia nudicaulis), Canada mayflower (Maianthemum canadense), dwarf raspberry (Rubus pubescens), nude miterword (Mitella nuda), bluebead-lily (Clintonia borealis), dog violet (Viola conspersa), and numerous beds of three-leaved false solomon's-seal (Smilacina tritolia). Scattered plants of small yellow lady's-slipper (Cypripedium parvitlorum) and showy lady's slipper (Cypripedium reginae) were found. Hummocks are often covered with goldthread (Coptis tritolia), and foamflower (Tiarella cordifolia). Common ferns are found throughout the swamp forest and include: sensitive (Onoclea sensibilis), royal (Onoclea regalis), ostrich (Matteuccia struthiopteris), woodland oakfern (Gymnocarpium dryopteris), bladder fern (Cystopteris bulbifera), Cinnamon Fern (Osmunda cinnamomea L.) and many others.

Near the mouths of creeks and in the backwaters of the river bends are beds of silt, loams and gravels, laid down in stratified deposits. These areas are always wet, sometimes shifting and sometimes vegetated and stable. How strongly the roots of vegetation hold the soil depends on the amount of water flow and pressure on the roots of this vegetation.

Also especially noteworthy are the areas of loamy and gravely soils (CPA Series) along the margins of the river south of the flood plain at Logan's Landing. These are areas of open park-like lands, some formerly cultivated, interspersed with beautiful white-cedar trees. These trees are foliated to the ground level and have not been browsed by deer. The soils are stable and the park-like areas vary in width from a few feet to several hundred yards.

Included in this report is an area of upland soil (RcA) that is now a building site for the bus garage and maintenance building of the Traverse City Area Public Schools. Though this parcel is no longer covered with plants, the soil is (was) of interest. It is excellent sandy loam from six to eighteen inches thick and in the past supported a garden for the old County Hospital. The soil was composed of overwash materials accumulated from the morainal hills above, and mixed with gravels. Porosity was good and the soil well drained. Since the adjoining creeks and riverbank support sugar maple (Acer saccharum), yellow and white birch (Betula spp.), and white pine (Pinus strobus), it is assumed that this narrow plain also once supported a northern hardwood forest. It seems ironic that the "best soil on the Reserve is now covered by a parking lot.

No attempt has been made to control insect damage or restrict disease. Heart rot by fungi and effects by Dutch elm disease have nearly erradicated all species of Ulmus. Sporophores of Hydnum spetentrionale, Pleurotus ostreatus, and many species of Polypores are common on trees. Cankers caused by Eutypella spp. are common on maple. Sap rotting fungus (Daedalea unicolor) may occur on dead trees as well as living, especially paper birth. Most insects or diseases do not attack simultaneously, therefor this can be considered a 'safe risk' forest area.

Some animal damage has been noted. Very little by the white-tailed deer, a moderately small amount by beaver, and a considerable amount by hares and rabbits (Lepus americanus and Sylvilagus floridanus) in 1973 to 1976. Grouse budding is not heavy but does occur. "People" damage and fire damage is a problem. A 2-3 acre fire in the summer of 1975, east of the Sabin Dam building damaged some White-cedar, pincherry and grasses.

In summary, the vegetative analysis of the study area is not considered to be a complete vegetated survey, due mostly to the minimal time alloted. A complete inventory should cover a longer period of time and several seasons, since changes are constantly taking place. Yet, we

recognize that the composition of much of northern Michigan's mixed hardwood forest is reflected here. Northern hardwood communities are aggressive, and easily recapture adjacent areas, eventually promoting ecological stability.

While no extremely sensitive habitats were found in the study area, there are some fine examples of wetlands in northern forests. The dwarf scouring rush and other scouring rush beds north and slightly west of Sabin Dam are well worth preserving. Also, the beds of three leaved-solomon's seal, in the cedar swamps, are not normally found in this area. The cedar swamps on both sides of the river are natural barriers to the adjacent banks and uplands, and yet open to park-like meadows near the river with stable soils.

Leaching from the old City dump site is not visibly evident.

No endangered or threatened species were observed, but a number of protected Michigan wildflowers were noted such as the Showy Lady Slipper and the small yellow Landy Slipper, and others.

This writer recommends that the wetlands south of Airport Road to Sabin Dam and joining the Grand Traverse Natural Education Reserve (which is already preserved), be considered for preservation status; to protect the area from misuse and to act as a purifier of the lower Boardman water shed. Under sound management practices, these wetlands will continue to add clean water to the Boardman River, serve as examples of northern mixed hardwood forests, as well as be esthetically pleasing to the people of the area.

List of Plant Species Found in the Study Area (Not in Order) by Habitat

A. Uplands and slopes (Mixed Hardwood Forest)
Sugar Maple (Acer Saccharum)
Beech (Fagus granditolia)
White Oak (Quercus alba L.)
Red Oak (Quercus rubra L.)
Green Ash (Fraxinum pennsylvainica)
White Ash (Fraxinus americana)
Largetooth Aspen (Populus grandidentata)
Quaking Aspen (Populus tremuloides)
White Pine (Pinus strobus)
White Birch (Betula papyrifera)
June Berrie (Amelanchier spp.)
Pin Cherry (Prunus pensylvanica)
Black Cherry (Prunus serotina)
Choke Cherry (Prunus virginiana)
Hornbeam (Ostrya virginiana)
Apple (Pyrus spp.)
Hawthorn (Crataegus spp.)
Hemlock (Tsuga canadensis)
Basswood (Tilia americana)

Blueberrys (Vaccinium spp.)
Bush-honeysuckle (Diervilla lonicera)
Alternate-leaved dogwood (Cornus alternitolia)
Round-leaved dogwood (Cornus rugosa)
Silky Dogwood (Cornus amdomum)
Witch-hazel (Hamamelis virginiana)
Tartarian Honeysuckle (Lonicera tatarcia)
Limber Honeysuckle (Lonicera dioica)
Poison Ivy (Rhus radicans)
Wintergreen (Gaultheria procumbens)
Juniper (Juniperus communis var. depressa)
Creeping juniper (Juniperus horizontalis)
Mapleleaf Viburnum (Viburnum acerifolium)
Nanny-berry (Viburnum lentago)

Staghorn Sumac (Rhus typhina)
Hazelnut (Corylus spp.)
Bittersweet (Celastrus scandens)
Red elderberry (Sambucus pubens)
Ground Hemlock (Taxus canadensis)
Currant (Ribes spp.)
Gooseberries (Ribes spp.)
Wild red raspberries (Rubus idaeus strigosus)

Large-leaved aster (Aster macrophyllus)
Large-flowered Bellwort (Uvularia grandiflora)
Columbine (Aquilegia canadensis)
Trillium (Trillum grandaflorum)
Gay wings (Polygala paucifolia)
Lily-of-the-valley (Maianthemum canadense)
Rockcress (Arabis spp.)
Wild Strawberry (Fragaria spp.)
Round-lobed Hepatica americana)
Wood-betony (Pedicularis canadensis)
Yellow canada violet (viola pubescens)
Bergemot (Mondarda fistulosa)
Canada Thistle (Cirsium aruense)
Dandelion (Taraxacum officinale)
Goldenrod (Solidago spp.)
Yarrow (Achillea millefolium)
Pussytoes (Antennaria neglecta)
Adders tongue (Erythronium americanum)
Wood fern (Dryopteris intermedia)
Brackenfern (Pteridium aquilinum)

B. Lowlands (Swamp forests)
White cedar (Thuja occidentalis)
Tamarack (Larix laricina)
Balsam fir (Abies balsamea)
White spruce (Picca glauca)

Speckled alder (Alnus rugosa)
Black willow (Salix nigra)
Red Maple (Acer rubrum)
Black ash (Fraxinus nigra)
Yellow birch (Betula alleghaniensis)
Balsam poplar (Populus balsamifera)
Mountain maple (Acer spicatum)

Red-osier dogwood (Cornus stolonifera)
Ninebark (Physocarpus opulifolius)
Sandbar willow (Salix interior)
Wild rose (Rosa spp.)
Riverbank Grape (Vitis riparia)
Virgins bower (Clematic virginiana)
Virginia Creeper (Parthenocissus quinquefolia)
Currant (Ribes spp.)
Green-brier (Smilax hispida)
Chokeberry (Aronia melanocarpa)
Leatherwood (Dirca palustrus)
Labrador Tea (Ledum groenlandicum)
Climbing nightshade (Solanum dulcamara)
Creeping juniper (Juniperous horizontalis)

Marsh marigold (Caltha palustris)
Partridge berry (Mitchella repens)
Water-lily (Nymphaea odorata)
Peppermint (Mentha piperata)
Meadow rue (Thalictrum polygamum)
Bead lily (Clintonia borealis)
Twisty stalk (Streptopus amplexifolius)
White lettuce (Prenanthes altissima)
Dog violet (Viola conspersa)
Bog violet (Viola nephrophylla)
Purple avens (Geum rivale)
Rough avens (Geum virginianum)
Jewelweed (Impatiens pallida)
Skunk cabbage (Symplocarpus foetious)
Three leaved duckweed (Lemna spp.)

Yellow lady's-slipper (Cypripedium calceolus)
Showy lady's slipper (Orchis spectabilis)
Jack-in-the-pulpit (Arisaema atrorubens)
Houndstongue (Cynoglossum officinale)
Swamp strawberry (Fragaria vesca)
Panicled white aster (Aster simplex)
Sasparilla (Aralia hispida)
Butterwort (Pinquicula vulgaris)
Anemone (Anemone quinquefolia)
Cut leaved buttercup (Ranunculus acris)
Bristley buttercup (Ranunculus pensylvanicus)
Common fleabane (Erigeron philadelphicus)
Starflower (Trientalis borealis)
Naked miterwort (Mitella nuda)
Bloodroot (Sanquinaria canadensis)
Cancer root (Orobanche unitlora)
Golden ragwort (Senecid aureus)
Green headed coneflower (Rudbeckia laciniata)
Water parsnip (Sium suave)
Joe Pye weed (Eupatorium spp.)
Boneset (Eupatorium perfoliatum)
Fragrant bedstraw (Galium tritlorum)
Broad-leaved cattail (Typha latifolia)
Yarrow (Achillea milletolium)
Blue cohosh (Caulophyllum thalictroides)
Bishop's cap (Mitella diphylla)
Grass-of-parnassis (Parnassia glauca)
Foamflower (Tiarella cordifolia)
White baneberry (Actaca pachypoda)
Solomons seal (Polygonatum biflorum)
Broad lobed toothwort (Dentaria diphylla)
Wild ginger (Asarum canadense)
Buckbean (Menyanthes tritoliata)
Water shield (Brassenia schreberi)
Watercress (Nasturtium officinale)
Snakeroot (Sanicula marilandica)
3 leaved solomons seal (Smilacina trifolia)

Bur-reed (Sparganium chlorocarpum)
Sedges (Carex spp.)
Scourint-rush (Equisetum hyemale)
Dwarf scouring-rush (Equisetum scirpodes)
Horsetail (Equisetum arvanse)

Cut-leaved grape fern (Botrychium dissectum)
Oak fern (Dayopteris disjuncta)
Maiden hair fern (Adiantum pedatum)
Royal fern (Osmunda regalis)
Cinnamon fern (Osmunda cinnamomea)
Marsh shield fern (Dryopteris spp.)
Bladder fern (Cystopteris bulbifera)
Sensitive fern (Onoclea sensibilis)
Lady fern (Athyrium Filix-femina)
Spaghnum moss (Spaghnum spp.)
Flowering moss (Mnium spp.)
Liverworts (Marchantia), (Ricciocarpus), (Jungermannia).

GEOLOGICAL DEVELOPMENT
(source unknown)

The geologic development of the Grand Traverse Bay region may be summarized by four major events spanning millions of years. The first event is the laying of bedrock by sedimentation during oceanic intrusion in the Paleozoic period. The next event was glacial erosion and deposition during the Pleistocene period. After the recession of the glacier, the region was further modified through the hydrologic action of ancient lakes. Finally, flora and fauna were reestablished in the area and present drainage patterns began development (Door and Eschmann 1970, Hough 1958, Martin 1957).

The bedrock in the Grand Traverse Bay region reflects the effects of sedimentation from two of the six major Paleozoic oceanic-encroachments on North America. The basic foundation of the Grand Traverse Bay region was formed during two of these periods, the Devonian and Mississippian. A map of the bedrock formations is shown in Figure V-1. The bedrock underlying the outermost portions of the bay and the extreme northeastern portions of the drainage basin is largely Middle Devonian limestone of the Traverse group. These rocks are the oldest component of the bedrock foundation of the region. Very few outcrops of these rocks exist except along the northeastern shore fo the bay, principally in Charlevoix County. These limestone rocks fossilized representatives of the Paleozoic flora and fauna within their layers. These strata are therefore of interest to geologists and rock enthusiasts who yearly comb the shores of Grand Traverse Bay searching for "Petosky stones" and other fossilized organisms.

Black Antrim shales from the late Devonian and early Mississippian periods were the next segment of the bedrock foundation to be formed, partially overlying the limestone from the southeast. These shales underlie a large segment of the open bay and lands to the northeast and southwest. Outcrop exposures of this shale are found between Torch Lake and Grand Traverse Bay.

Overlying the Antrim shale to the southeast are the Ellsworth shales of the early Mississippian period. This bedrock underlies both the east and west arms of Grand Traverse Bay, and much of the southeast and eastern portions of the drainage basin. The most recent of the Mississippian bedrock formations found in the area are the Coldwater shales which overlap the Antrim shales, again from the southeast. These shales underlie an area beginning just southeast of the bay and extend over most of the Boardman River basin. Other, much younger, bedrock shale was deposited in the region but was subsequently eroded to its present southern limits. Very limited amounts of Marshall and Michigan shales are found in the southernmost portions of the Grand Traverse Bay basin.

Following the Paleozoic formation of the bedrock, the surface features were drastically altered by the effects of the continental glacier. Beginning about one million years ago an ice sheet 3 to 5 kilometers thick advanced and retreated across the Great Lakes Region four times. The final advance of this continental glacier into northern Michigan occurred just 11,500 years ago. The Valders advance was relatively short-lived and ended the last of the

four major glacial periods, the Wisconsin. The effects of the Valders advance and, to a lesser extent, those of the earlier substages of the Wisconsin glacier determined the surface geology of the Grand Traverse Bay region. The movements of the glacier, advancing, stagnating, and receding, transported and deposited rocks and soil throughout the region. As a consequence of this action the surface geology of the region is characterized by moraines, glacial outwash, till plains, and drumlins (see Figure V-2). These features, particularly moraines, defined river basins and valleys.

The weight of the glacier depressed the northern part of the continent. Following the retreat of the Valders ice sheet, the Grand Traverse Bay region was part of ancient Lake Algonquin which included the entire Lake Michigan and Lake Huron basins. The lake stage at that time was 184 m above present sea level. The lake then drained southward into the Mississippi River via the Chicago outlet and eastward through the Detroit-St. Clair river system.

As the glacial ice retreated further, the northern outlets to Lake Algonquin were exposed and the lake level dropped drastically to the Chippewa-Stanley stage of 70 m above present sea level. Crustal rebound of glacially depressed regions, however, slowly raised the northern outlets and subsequently elevated the lake stage to the Nipissing stage (184 m above present sea level), which persisted for 3000 years. The powerful rising waters of the lake cut and formed much of the present shoreline of Grand Traverse Bay. Wave and current action carried sediments, eroded and undercut cliffs, and deposited this material creating shoals, bars, and bays. During this period the crustal uplift continued, separating Elk and Torch lakes from the main lake. As the level of Lake Nipissing rose it finally eroded away the St. Clair River channel and the lake dropped to its present level (176.5 m above present sea level).

Minor geologic changes followed the drop in Lake Nipissing. Plant and animal life spread north from the unglaciated southern areas, and rivers slowly developed their modern courses. The Boardman River, formerly a tributary of the Manistee River which empties directly into Lake Michigan, was diverted to its present hydrologic course by streams flowing from the northern slope of the Manistee moraine.

Surface features which dominate the present day landscape include: the Port Huron moraine (which forms the southern boundary of the watershed), the Manistee moraine, and the rolling till plains and drumlins of Antrim and Leelanau counties and Old Mission Peninsula. Soils of the region are generally well-drained, glacially derived sands, loamy sands, or sandy loams. Some poorly drained organic soils are present in low protions of the Boardman River and upper Chain-of-Lakes areas. The major portion of both Leelanau and Old Mission Peninsula are rolling and hilly with elevations several hundred feet above the bay. The land along the east shore of the bay is mixed in character revealing some rolloing highlands, some flat areas, and a few steep-sided drumlin ridges. South of the bay the lands are principally of low relief and include outwash and glacier deposits. This geographical character continues south to the Port Huron moraine, the southern boundary of the Grand Traverse Bay basin.

DAMS, ELECTRICAL POWER AND INDUSTRY

(Excerpts from paper by Roland J. Hasselbart)

In 1892, Lorraine K. Gibbs of Mayfield began organizing the Electric Water Power Company with plans to construct a hydro-electric dam on the Boardman River south of Traverse City. The Grand Traverse Herald reported that his work was done in the face of strong opposition; it being declared that his effort would be a failure and nothing would be accomplished.

In September of 1893, in spite of this opposition, Gibbs - along with Frank Fredrick, Wm. Bauld, J. I. Gibbs and C. I. Hall of Traverse City and Jas. Hodger of Fife Lake - formed the Electric Water Power Company. They then secured riverfront rights from the "townline" to a point three miles south. The name was changed and on November 3, 1893, the company was incorporated as the Boardman River Electric Light and Power Company. At this time, land was purchased to build a dam. On April 13, 1894, the Grand Traverse County Board of Commissioners granted the Boardman River Electric Light and Power Company permission to build a dam across the river. Construction began later that month. By November, the dam was completed. On November 27, 1894, electricity was turned on to several commercial buildings and a few residences. Soon after this a contract was signed with Traverse City to furnish power for street lights. This hydro-electric power plant was the first three phase generator in northern Michigan and the second in the United States.

William Love, long time City Light and Power Superintendent, began his career with H. D. Campbell and Sons but hired out to Boardman River Electric Light and Power in 1894. Bill reminisced about those early days of electrical power in an interview with the Traverse City Record Eagle.[2]

Boardman River Electric Light and Power equipment had all been purchased from the G. E. Company and was guaranteed to work. "But," said Love "it almost required 28 trouble shooters to keep the 28 G.E. street lamps in service - and they could all be heard two blocks away."

Finally a Mr. Lewis Bell from Schenectady, New York, came to try and prove that the lights were not only a success - but not noisy. He proved neither, so the company purchased a Thompson-Houston 9 and 6-10th ampere dynamo to do the street lighting.

Later the company bought a second-hand 3 phase machine, the same as the one originally purchased; and then "our troubles did begin." Love went on. General Electric didn't build synchroscopes, so the local firm had to build their own with blue prints furnished with the machine.

The employees worked for a week trying to synchronize the two machines. The General Electric Company finally sent out an expert from Chicago. He worked for a week and gave it up as a bad job. Love said they were resigned to the necessity of running one machine at night and the other in the daytime. The same day the general electric man left, Love was walking past John T. Beadle's harness shop. Beadle had one of the only electric motors in Traverse which he used for sewing heavy tugs or harnesses for lumber teams.

2 Record Eagle late 30's

Beadle saw Love passing the store and stopped him. He told him because of the rush of business he had come back the night before to run the sewing machine - but it would only run backwards!

Love knew what that meant, so he hitched up his horse and drove five miles to the power plant, crossed the leads on the new machine, tried the synchroscope - and everything worked fine.

The street lights at this time were the old fashioned arc carbon lamp, hooked up in a series. As a result anytime one light went out, every light on the circuit did likewise; so there were frequent hours of darkness. Also they were operated on a moonlight schedule which meant when the calendar said the moon was shining, the arc lights were out, regardless of whether or not it was cloudy.

"The Boardman River electric current was then as is universal now, 110 volts 60 cycles, where as the old Campbell generators were 50 volts 125 cycles and this meant that neither motors nor lamps were interchangeable. When one happened to get a Campbell lamp on a Boardman River circuit, the effect was a good deal like a photographic flash bulb." 3

As Traverse City grew, new generators were added at the Boardman River dam to meet the increased demand for energy. In January 1898, Boardman River Electric Light and Power doubled their electrical output with the addition of a fifth, larger, dynamo.

By 1900, H. D. Campbell and Sons Water and Electric Light Company could no longer meet the needs of its customers. Henry had not been active in the company for a number of years and rather than spend more money to upgrade the equipment, the decision was made to discontinue operations. In July 1900, the waterworks was sold to the City of Traverse City, and the electric plant was sold to Boardman River Electric Light and Power. This was the beginning of the Traverse City Water Department and also establishes Boardman River Electric Light and Power as the sole supplier of electricity to Traverse City.

Boardman River Electric Light and Power continued to expand their generating capacity. In February 1903, all five generators at the Boardman Dam were replaced with one "immence dynamo" that doubled the power output. Then on January 6, 1905, the Grand Traverse County Board of Supervisors granted Boardman River Light and Power permission to build a second dam downstream from the original dam. Before this dam could be constructed, it was announced in September 1906, that the Heald-Stevens Company of Grand Rapids had purchased the Boardman River Electric Light and Power Company as well as the Traverse City Gas Company. Possession was to take place on November first. Construction of the new dam

3 Don S. Morgan - Record Eagle - late 30's

would begin that fall. The lower dam (now known as Sabin Dam) was completed in 1907.[4]

1917 began a period of troubles for the power companies. Both Boardman River and Traverse City Light and Power's demand for electricity had exceeded their capability to generate. On top of this, the companies were plagued by a series of mishaps which reduced their ability to generate electricity. First, on September 27 a mysterious explosion destroyed the spillway at Sabin Dam. Many people suspected it was a dynamite blast, but the pond was drained to investigate, and no evidence of dynamite was found. Generation of electricity was halted at Sabin until the dam could be rebuilt. Later that same year, the powerhouse at the upper dam was destroyed by fire and had to be rebuilt with improvements. In November, Municipal Light and Power and Boardman River Electric Light and Power began working conjointly to meet the city's demand for power by supplying electricity through the same circuits.

In January 1918, Superintendent Gifford of Municipal Light and Power recommended that the city purchase Boardman River Electric Light and Power to insure maximum power output. The people of Traverse City later voted against merger of the two power companies.

On September 16, 1925, Boardman River Electric Light and Power Company was sold to General Power and Light Company of Chicago. General announced that they would continue to operate the company under the Boardman River name and planned to expand and modernize the power plants. Despite these plans for improvements, General Power's ownership of the Boardman generating facilities was of short duration. Before the end of the year, Northern Michigan Public Service, a new local corporation, assumed control of the Boardman River company. Northern Michigan Public Service furnished electrical power to Traverse City until May 21, 1928, when National Electric Power Company of New York purchased all assets of the Traverse City Company. National Electric operated in Michigan under the name of Michigan Public Service Company. National also purchased the dam site of the old Hannah Lay Gristmill with plans to generate electricity at that location also.

In the spring of 1930, the lower dam (Sabin) was enlarged and repaired. A new generating plant with modern generators that raised the power output from 350 to 800 k.w. was constructed. As soon as this project was completed, a contract was awarded to Price Brothers of Lansing to construct a new dam 200 yards upstream from the upper dam. This dam would be 475 feet from bank to bank and 45 feet high. A new canal would be dug to divert the river and a generating plant several hundred yards downstream. This new plant would produce approximately 2,200 k.w. This project was completed in early 1931. The old power plant was then abandoned and torn down.

Michigan Public Service Company continued to perate the two dams until 1950 when Consumers Power Company purchased all assets of Michigan Public Service Company.

4 Arlie Killman photograph.

By 1969, the two old Boardman River Electric Light and Power Dams were badly in need of repair. The expense of repairing them could not be justified by the income received from the electricity they generated. Consumers Power discontinued the use of these two dams and removed the generators. Not wanting to be responsible for these facilities and the surrounding property, Consumers sold them for $1.00 to Grand Traverse County.

This left Traverse City and the Brown Bridge Dam the only source of power production on the Boardman River.

In 1974, Grand Traverse County dedicated the property purchased from Consumers Power as a Natural Education Reserve. The land was thus set aside for education and quiet recreation. Traverse City included the Keystone Dam site as part of the Reserve in 1975.

THE VALLEY PLAN

For the purposes of the study, the valley was divided into sections described as follows: (1) north edge of Nature Reserve to Boardman Dam; (2) south edge of City dump to north edge of Nature Reserve; (3) South Airport Road to south edge of City dump; (4) Township-City line to South Airport Road. Each of these sections is briefly described below with text covering, (1) existing conditions, (2) opportunities and constraints, (3) recommendations.

Section 1 - North Edge of Nature Reserve to Boardman Dam. The area begins just south of the Boardman Dam at Cass Road. It is bounded on the west by Cass Road and the C & O Railroad, and on the east by Keystone Road and the Pennsylvania Railroad. Lands on the west side of the pond in this section known as Sabin Pond are zoned agricultural. Lands on the east side are zoned either R-1B, Residential, or R-1M, Multiple Family Residential.

Much of the land on the west side of the lake is owned by the Grand Traverse Nature Reserve. Other lands are owned by the Traverse City School District which has its bus barn in this area. The School District also owns a building kwnon as the Boardman Valley Hospital, an abandoned county hospital facility which is presently being used for school district storage. A letter regarding that building is appended to the report.

The Nature Reserve lands are developed with a number of parking areas and a rather extensive trail system which exposes the habitats throughout the area. There are pit toilets and a teaching shelter which constitute the facilities in the area. At the present time the trails and interpretative facilities throughout the area are in need of considerable improvement.

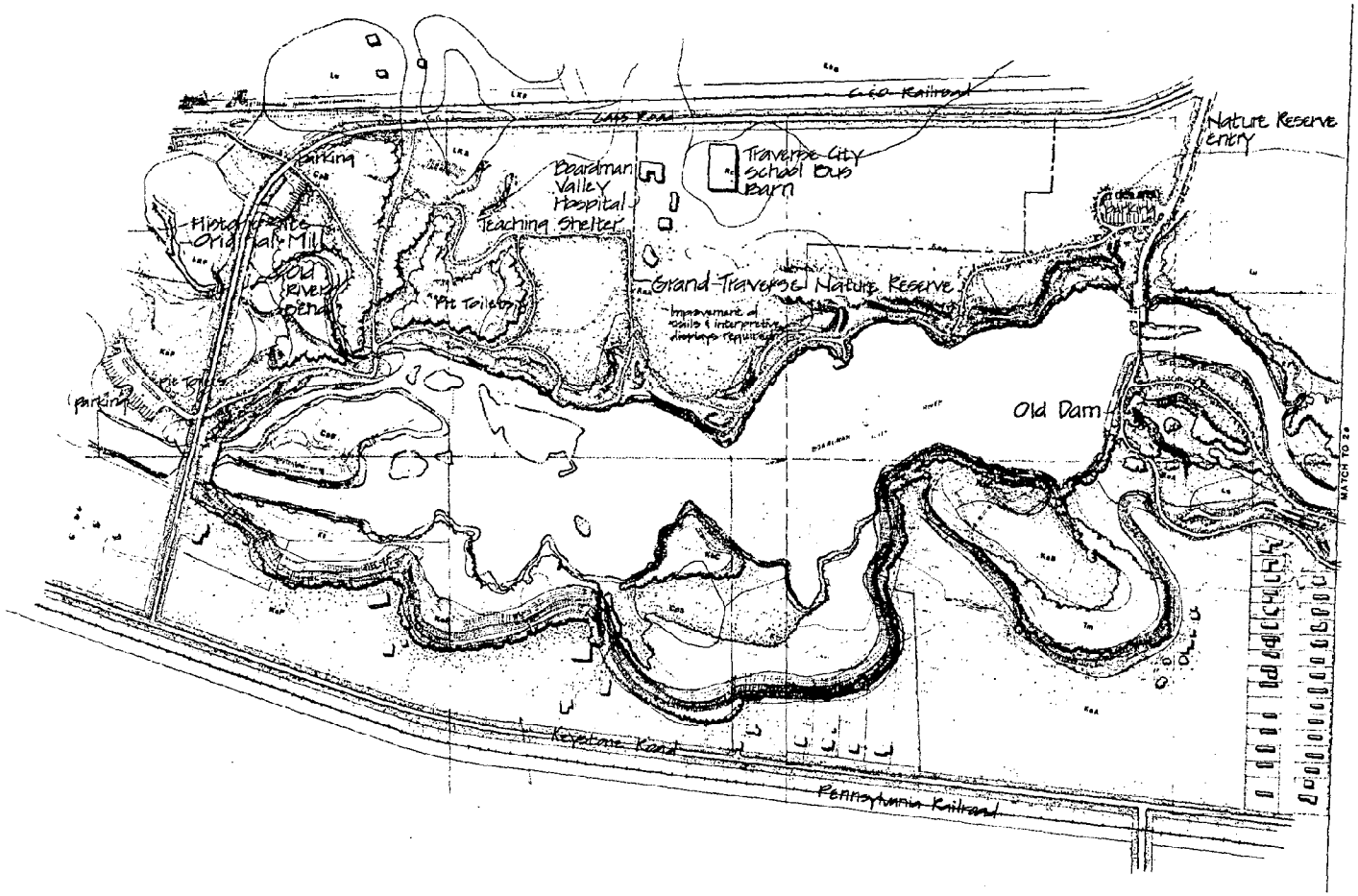
Within this section there are two existing power dams which have been abandoned for power generation, however, which are being considered for reactivation under the small dams program being promoted by the U.S. Federal Government. Also at each of the locations of the existing dams are the remains of earlier dams built during the earlier part of the twentieth century. The remains of these dams are historically significant and present opportunities for historical and cultural interpretation.

Along the east side of the lake there are numerous private residences, some on relatively large pieces of land. It is not anticipated that there will be great pressures in this area for subdividing or new development other than in that area which is zoned R-1M, Multiple Family.

Below the Sabin Dam the Nature Reserve uses trails which fall on three private ownerships. In the future consideration should be given to obtaining easements or right-of-ways from the private owners to cross those properties.

There are numerous opportunities for continued interpretatio nand enhancement of the Nature Reserve. The trails which exist at the present time present a good beginning, however, there is a great need for their maintenance, upgrading and improvement, as there is need for an adequate interpretative signing program to

fully explain the natural features and phenomena which occur in the area. Suggested public improvements include upgrading of the parking areas, improvement of the trails, installation of interpretative facilities and perhaps the inclusion of the Boardman Valley Hospital Building as a natural education center as well as a headquarter office type building for non-profit organizations operating in the area. The building could also serve as a museum for both natural interpretative displays as well as works of art related to natural phenomena as well as wildlife.



MASTER PLAN

1a

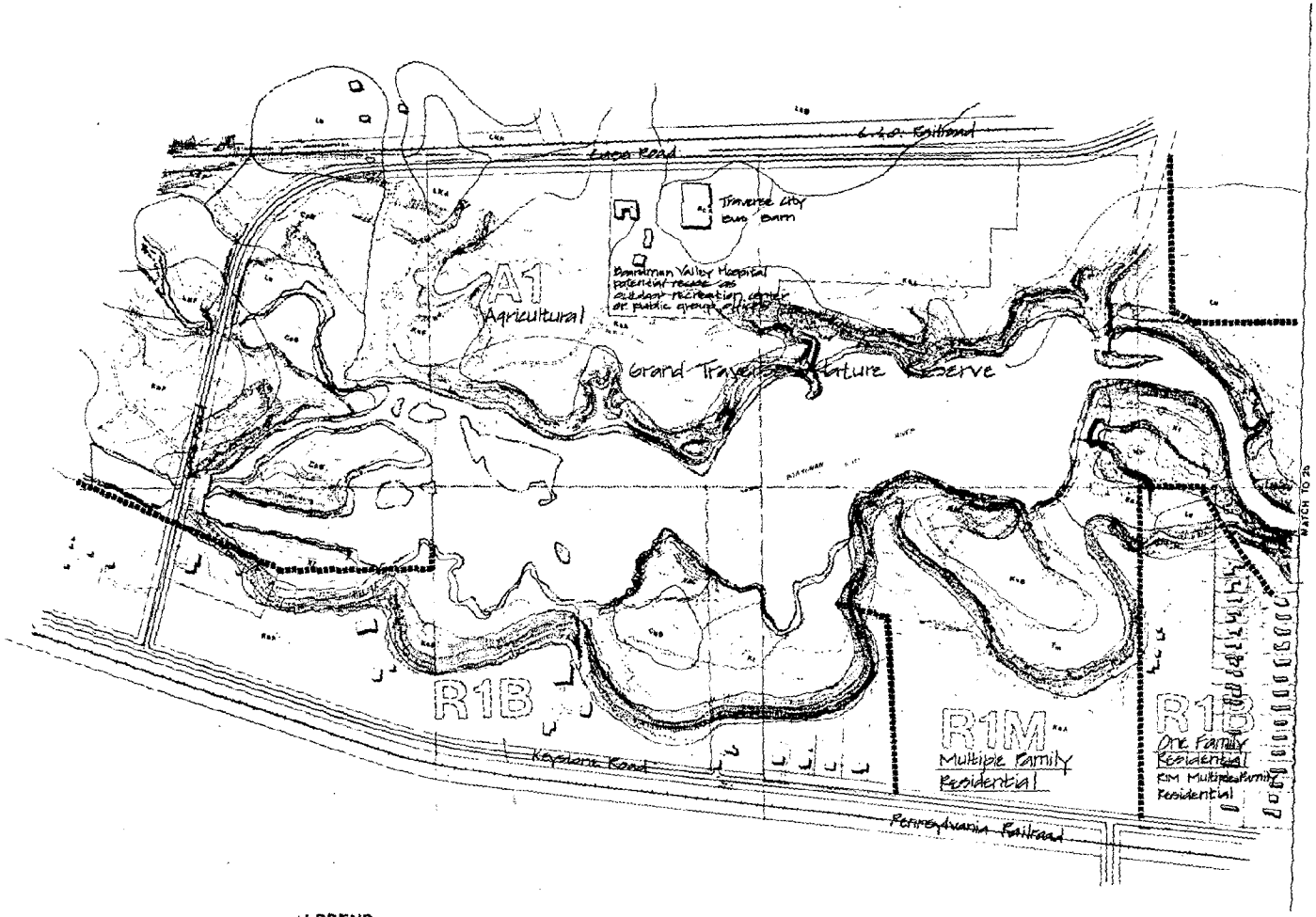
SCALE 0' 100' 200' 400' 800'

NORTH

BOARDMAN VALLEY STUDY

GARFIELD TOWNSHIP

LAND PLANNING & DESIGN ASSOCIATES



LEGEND

A1 ZONE

Agricultural EXISTING ZONE

proposed office PLANNED LAND USE

0' 100' 200' 400' 600'

SCALE

NORTH

ZONING PLAN

1b

BOARDMAN VALLEY STUDY

GARFIELD TOWNSHIP

LAND PLANNING & DESIGN ASSOCIATES

For the purposes of the study, the valley was divided into sections described as follows: (1) north edge of Nature Reserve to Boardman Dam; (2) south edge of City dump to north edge of Nature Reserve; (3) South Airport Road to south edge of City dump; (4) Township-City line to South Airport Road. Each of these sections is briefly described below with text covering, (1) existing conditions, (2) opportunities and constraints, (3) recommendations.

Section 2 - South Edge of City Dump to North Edge of Nature Reserve. This area is bounded on the east by Keystone Road and the Pennsylvania Railroad and on the west by Cass Road and the C & O Railroad. The immediate valley area throughout this section is zoned agricultural. The uplands on the west are zoned M-1, Industrial and in the southern end of the project on the east are zoned R-1B, Residential.

Hartman Road approaches and dead ends at Cass Road from the west about halfway through this section. Hammond Road similary approaches the valley area from the east, however, does not reach Keystone Road due to a severe bluff. The connectionof these two roads has been discussed extensively as a necessary link in the regional transportation network. The accompanying maps show a potential right-of-way which would minimize destruction of the valley and would minimize the use of poor soil areas.

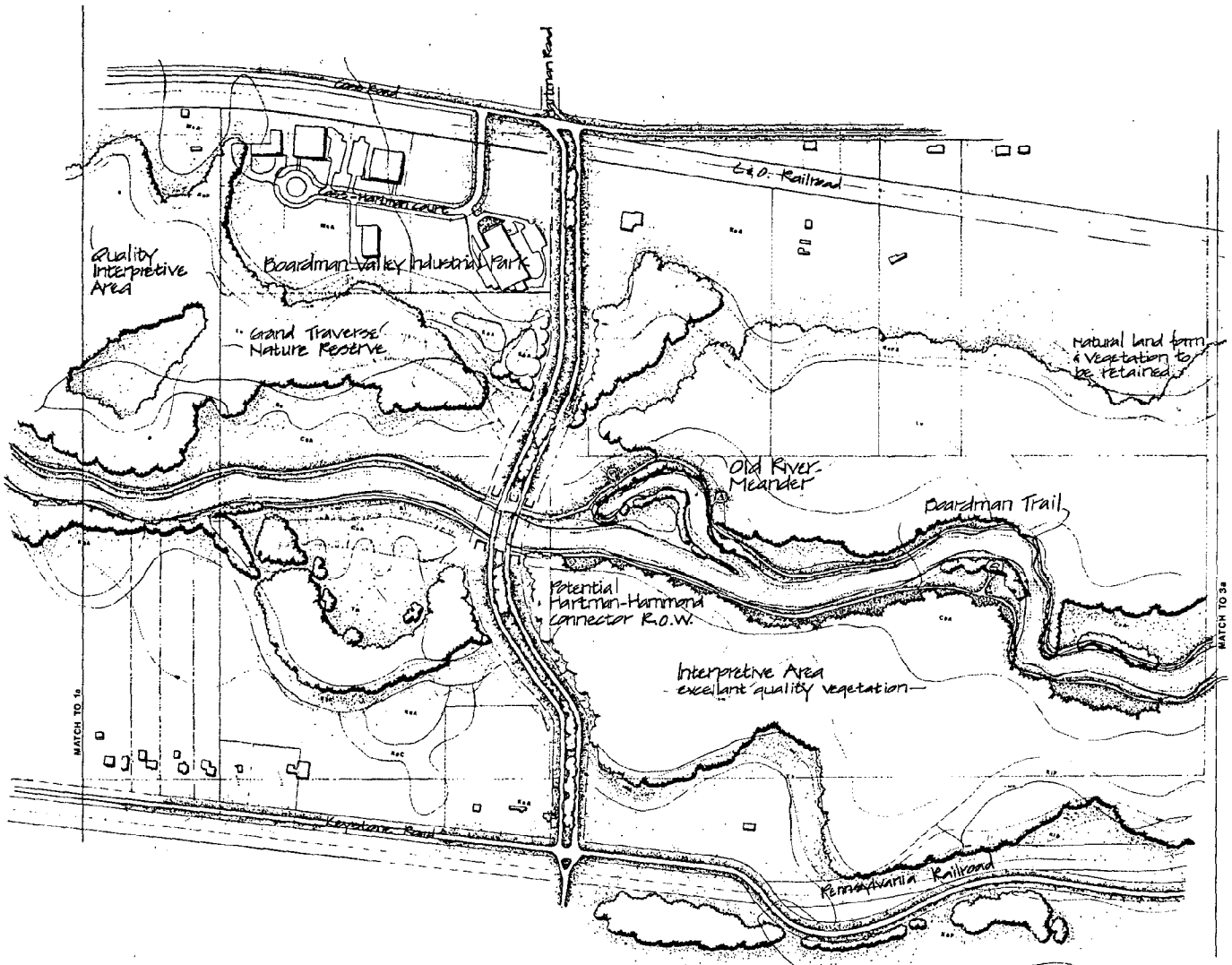
There is need for much better mapping of this area so that more detailed studies can be prepared fo the valley and the implications of such a crossing, as the only mapping available for this section is from the U.S.G.S. 20 foot contour interval maps.

The land throughout most of this section is in private ownership with the exception of a small parcel which is the northern most area of Grand Traverse Nature Reserve, a natural area owned by the Grand Traverse County under the jurisdiction of the County Commissioners. The Reserve has extensive holdings to the south of this section in Section 1 and further south in Garfield Township and adjoining Blair Township.

Many of the low lands in this area have excellent quality swamp type vegetation which is deserving of preservation. Also about half way through this sectio nthereis an old meander of the river which has been cut off from the main channel through rechannelization. This is an excellent area for interpretative activities.

There are approximately 130 acres of land in the immediate valley area which would be suitable for public acquisition, which would give a continuous link of public ownership between the Nature Reserve and the City dump property discussed below. Eighty acres of land is in one ownership which likely would have to be an outright purchase by one of the governmental units. This purchase would secure the most valuable interpretative areas. Other lands could be acquired through the reservation of open space easements as other large parcels are developed using planned unit development procedures. Under this scheme there would then be an opportunity to formally develop the trail system along the river's edge from the City dump

all the way to the Nature Reserve, with many opportunities for interpretative activities and displays to be located throughout the valley.



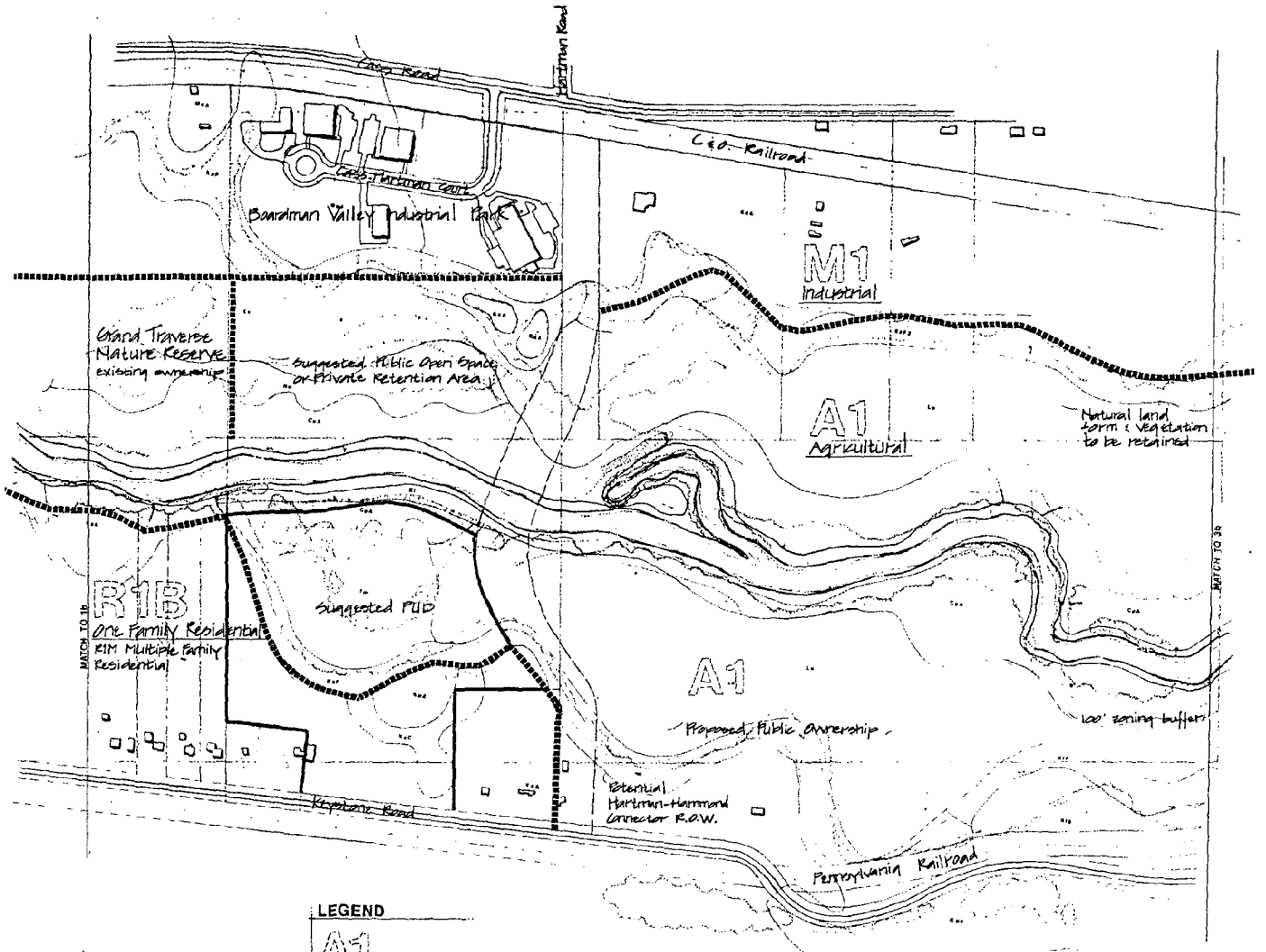
MASTER PLAN

2a

BOARDMAN VALLEY STUDY

GARFIELD TOWNSHIP

LAND PLANNING & DESIGN ASSOCIATES



LEGEND

A1 ZONE
Agricultural EXISTING ZONE
proposed office PLANNED LAND USE

SCALE 0' 100' 200' 400' 600'

NORTH

ZONING PLAN

2b

BOARDMAN VALLEY STUDY
GARFIELD TOWNSHIP
LAND PLANNING & DESIGN ASSOCIATES

For the purposes of the study, the valley was divided into sections described as follows: (1) north edge of Nature Reserve to Boardman Dam; (2) south edge of City dump to north edge of Nature Reserve; (3) South Airport Road to south edge of City dump; (4) Township-City line to South Airport Road. Each of these sections is briefly described below with text covering, (1) existing conditions, (2) opportunities and constraints, (3) recommendations.

Section 3 - South Airport Road to South Edge of City Dump. This area is bounded on the east by Keystone Road and the Pennsylvania Railroad and on the west by the C & O Railroad. Lands along the west side of the valley are bounded on the west by the C & O Railroad are generally zoned industrial. Lands in the immediate valley are zoned A-1, Agricultural; R-1A, Rural Residential; and C-2, General Business; the C-2, General Business being a part of the Logan's Landing development along South Airport Road west of the river. Uses on the east side of the river adjacent to South Airport Road are industrial, however, do not fall in the immediate valley area.

A large portion of the property in the immediate valley is a part of the Logan's Landing planned unit development which includes the Logan Racquet Club, as well as proposals for a limited number of townhouse units and office structures scattered throughout the valley in addition to the general business areas along South Airport Road.

The City dump on the south end of this section is the result of many years of filling by area residents. The dump site owned by the City of Traverse City has been abandoned due to the potential for contamination of the nearby river, and is in the process of being covered and eventually revegetated.

Much of the bottom land is lupton muck, although there are a variety of other soils types, the muck will severely limit the potential for development.

Recently the Planning Commission of the Township has considered a proposal for the rezoning of the Logan lands east of the main channel of the Boardman River. The proposal is for a planned unit development with all structures having accessibility to South Airport Road. The remaining part of the parcel is isolated by the river and an adjacent old river channel, this would remain in open space and could be either dedicated to the public or remain as open space held by a homeowner's association.

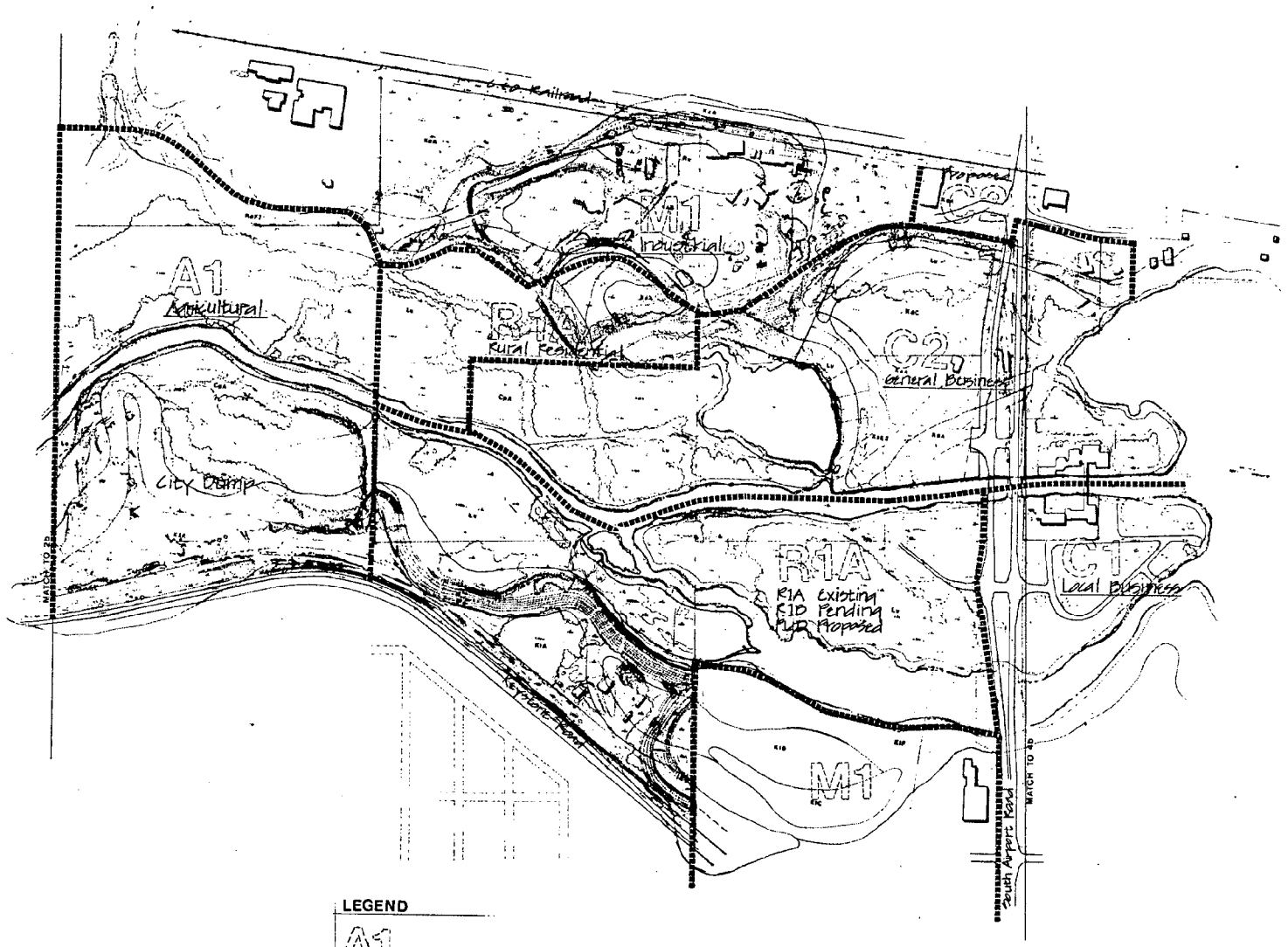
There are numerous opportunities for development throughout this section of the study area, both in the public and private sectors. The former city dump could be developed for low intensity recreation, such as a jogging trail and picnic area. The built up land provides for interesting views up and down the valley and would make an ideal running area.

Along the westerly edge of the valley bluff there exists an informal trail which in the past has been used for limited hiking, bird watching

and fishing. This trail through the acquisition of easements and dedication of land through the planned unit development process along with the use of existing public lands could be developed to a high standard, linking section 1 with section 3.

Opportunities also exist for the development of a trail system on the private land on the west side of the river through the Logan development. This system would have to be worked out with the property owners, however, could also provide continuity into sections 2 and 1.

A site plan for the proposed jogging trail on the abandoned dump area follows.



LEGEND

A1 — ZONE

Agricultural — EXISTING ZONE

proposed office — PLANNED LAND USE

0' 100' 200' 400' 800'

SCALE

NORTH

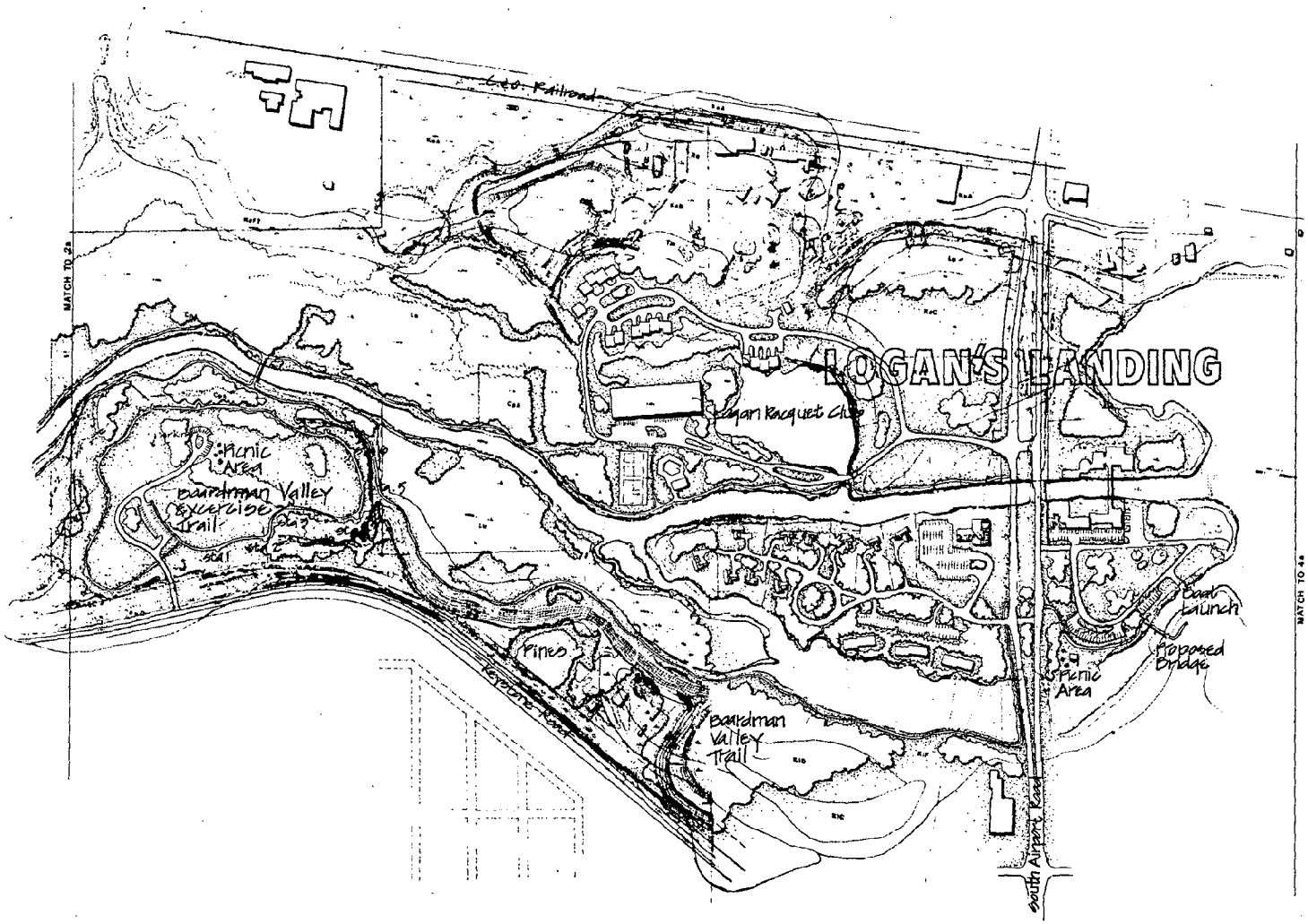
ZONING PLAN

3b

BOARDMAN VALLEY STUDY

GARFIELD TOWNSHIP

LAND PLANNING & DESIGN ASSOCIATES



MASTER PLAN

3a

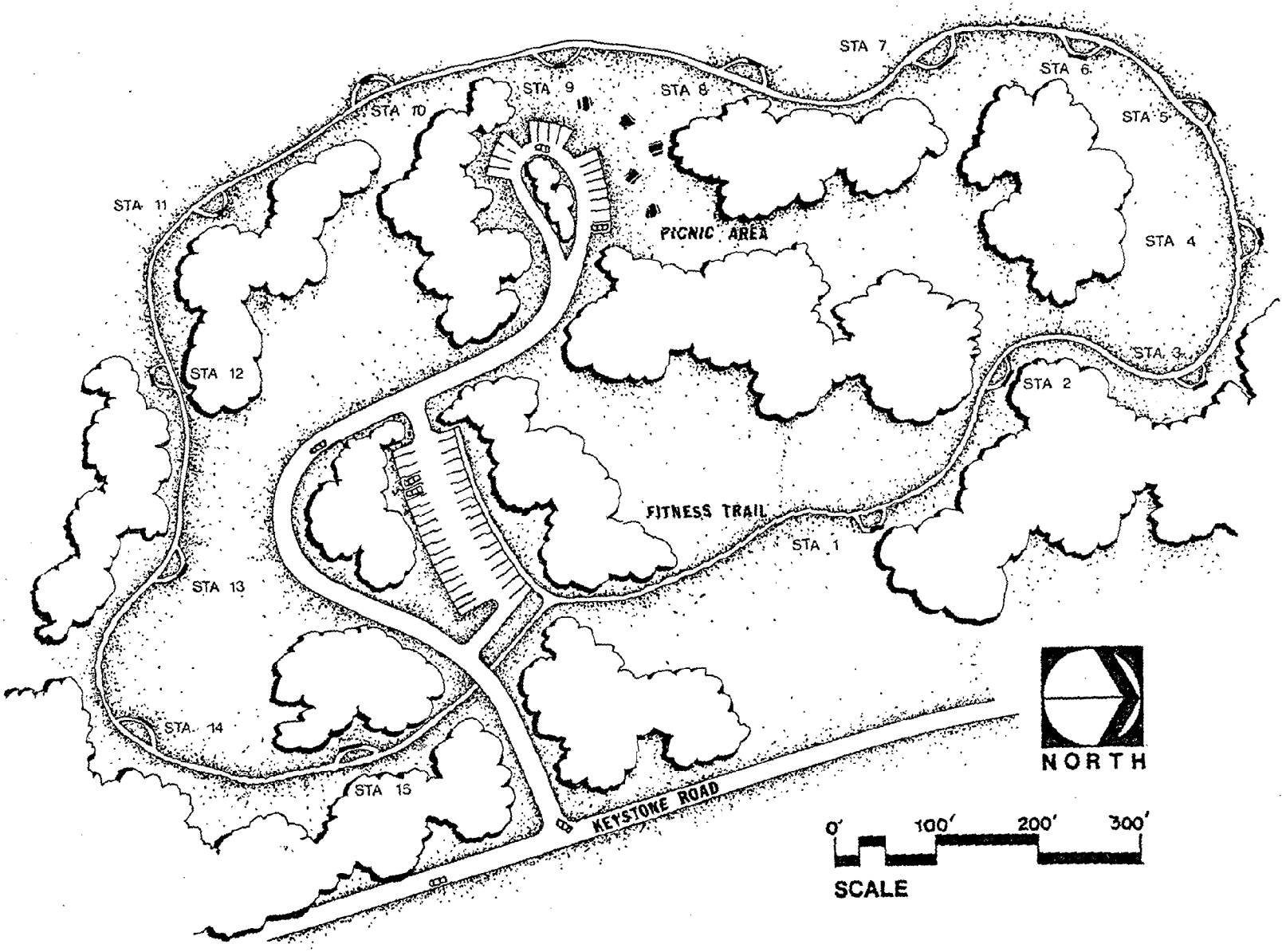
SCALE 0' 100' 200' 400' 800'

NORTH

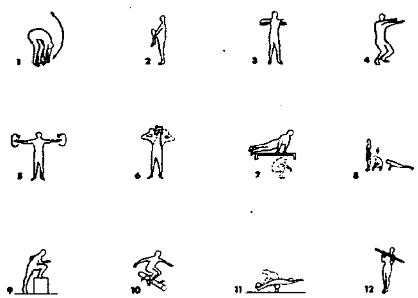
BOARDMAN VALLEY STUDY

GARFIELD TOWNSHIP

LAND PLANNING & DESIGN ASSOCIATES

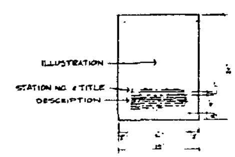


FITNESS TRAIL ——— SITE PLAN



NOTE: center each illustration on each sheet in the space provided. See details of sheet and plaque.

(2/55) ILLUSTRATIONS
SCALE 1"=1'-0"



(1/55) SHEET & PLAQUE DETAIL

1 BEND AND STRETCH
Bend trunk forward and down flexing knees. Resume standing position. 10 repetitions.

2 KNEE LIFT
Raise left knee grasping leg with hands and pulling knee against body. Lower to starting position. Repeat with right knee. Repeat 10 left and 10 right.

3 WING STRETCHER
Elbows at shoulder height fists in front of chest. Thrust elbows backward vigorously. 20 repetitions

4 HALF KNEE BEND
Stand erect, hands on hips. Bend knees halfway while extending arms forward, palms down. 10 repetitions.

5 ARM CIRCLES
Arms extended describe small circles with palms up. Do 15 backward circles. Reverse, turn palms down and do 15 small circles forward

6 BODY BENDER
Bend trunk sideward to left, keeping hands behind neck. Return to starting position. Repeat to the right. 10 left, 10 right.

7 VAULTING BAR
Place both hands on bard and with a jumping motion go over the board. 5 repetitions.

8 SQUAT THRUST AND STAND
From a standing position squat down placing hands on ground and thrusting feet back. Reverse order. 10 repetitions.

9 LOG STEP UP
Place one foot on the stump and step up on it. Step down. 15 repetitions

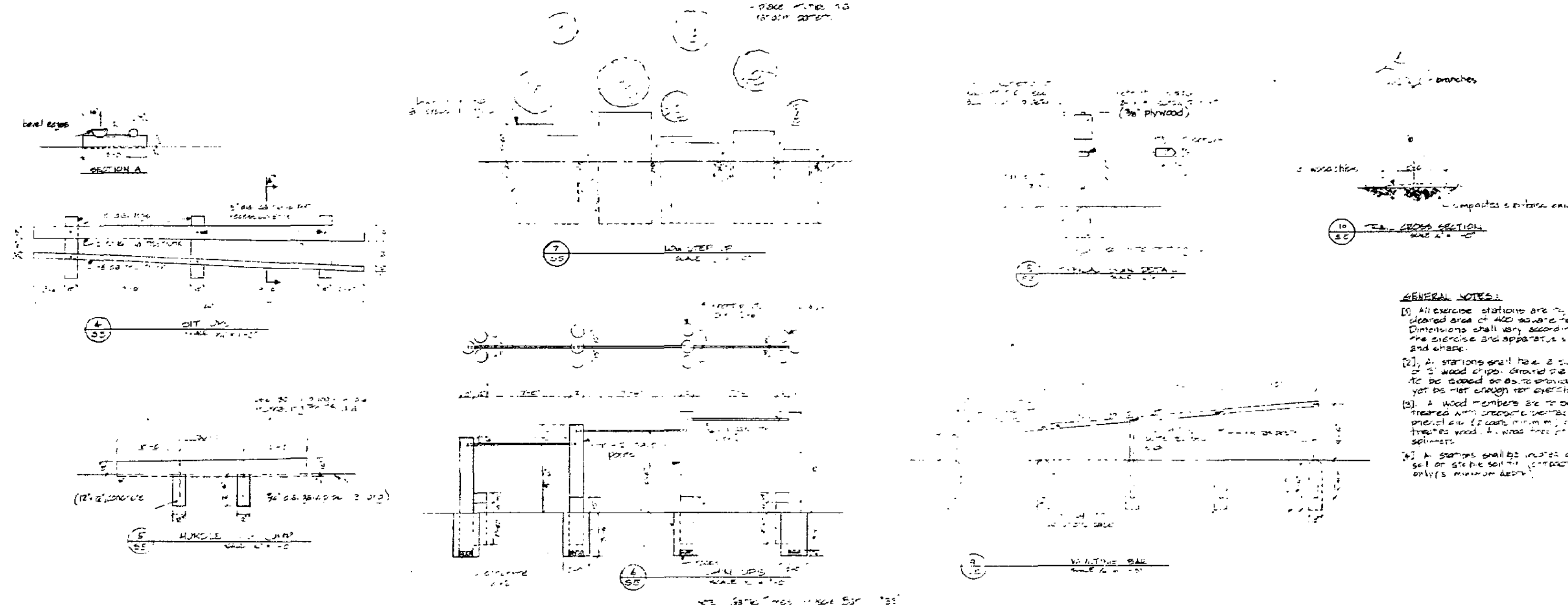
10 HURDLE LOG JUMP
Hurdle with both feet together from one side of log to the other. 15 repetitions

11 SIT UP
Position body horizontally as illustration shows. Sit up touching leg with hands. 10 repetitions

12 CHIN UPS
Hold bar so that back of hands face towards you. Pull until chin is level with the bar. Return. 8 repetitions.

NOTES:
[1] All instruction signs at station are to be ... plywood, ... with one coat of sealer, primer and two color ...
[2] They are to be ... and covered with 1/8" plexiglass or ... fastened at ... with wood screws.

(3/55) STATION NUMBERS, TITLES & DESCRIPTIONS
NO SCALE



GENERAL NOTES:
[1] All exercise stations are to be a cleared area of 400 square feet. Dimensions shall vary according to the exercise and apparatus's size and shape.
[2] All stations shall have a surface of 3" wood chips. Ground shall be to be sloped so as to provide runoff, yet be flat enough for exercises.
[3] All wood members are to be treated with creosote or pentachlorophenol oil (2 coats minimum), or pressure treated wood. All wood free of large splinters.
[4] All stations shall be located on stable soil or stable soil fill (compacted) sub-base only (5" minimum depth).

GEILE ENGINEERING

DRAWN BY:
REVISIONS:

LAND PLANNING & DESIGN ASSOCIATES
EAST LANSING, MICHIGAN

BOARDMAN VALLEY STUDY
garfield twp — grand traverse co.

FUN·FITNESS TRAIL

SHEET NO.

Section 4 - South City Limit to Airport Road. This area is bounded on the east by the Pennsylvania Railroad, Park Drive and Woodmere Ave., on the west by the C & O Railroad, and the south by South Airport Road. Lands on the west side of Boardman Lake are zoned M-1, Industrial, on the south end of the lake C-2, Commercial west of the Boardman River and C-1, Commercial southeast of the Boardman River. Lands along the east side of the lake are zoned R-1M, Multiple Family Housing.

Lands on the west side of the lake are generally committed to industrial uses, although some properties are isolated from the waters edge by the C & O Railroad. Much of the area is used for spray irrigation by the nearby food processing plants. There are also a limited number of businesses adjacent to South Airport Road.

Along the east side of the lake the land is vacant having never been developed within the Township, and having therefore mature trees, particularly in the area which is bounded by Woodmere and the Pennsylvania Railroad. This area has been used extensively for casual recreation and is criss-crossed with a number of trails which give access to the waters edge. These have been used for a variety of recreational pursuits, including trail riding, four-wheeling and fishing access.

At the south end of this sectionis the Logan's Landing development, including a variety of shops in close relation to both sides of the river and having a covered bridge connection. Also in this area immediately east of Logan's Landing, bordered on the east by an old river bed is a small park and boat launch area operated by the Coutny Road Commission known as Sid Medair Park. This facility has extremely limited development, parking is casual on the grass, and there are no picnic facilities although it is used by a wide range of picnickers who either eat in their cars or on the grass areas. This park area is also a collecting area for the swans which inhabit Boardman Lake and is a prime area for feeding purposes. There presently is no link between this park and the private lands used for recreational purposes on the east side of the river.

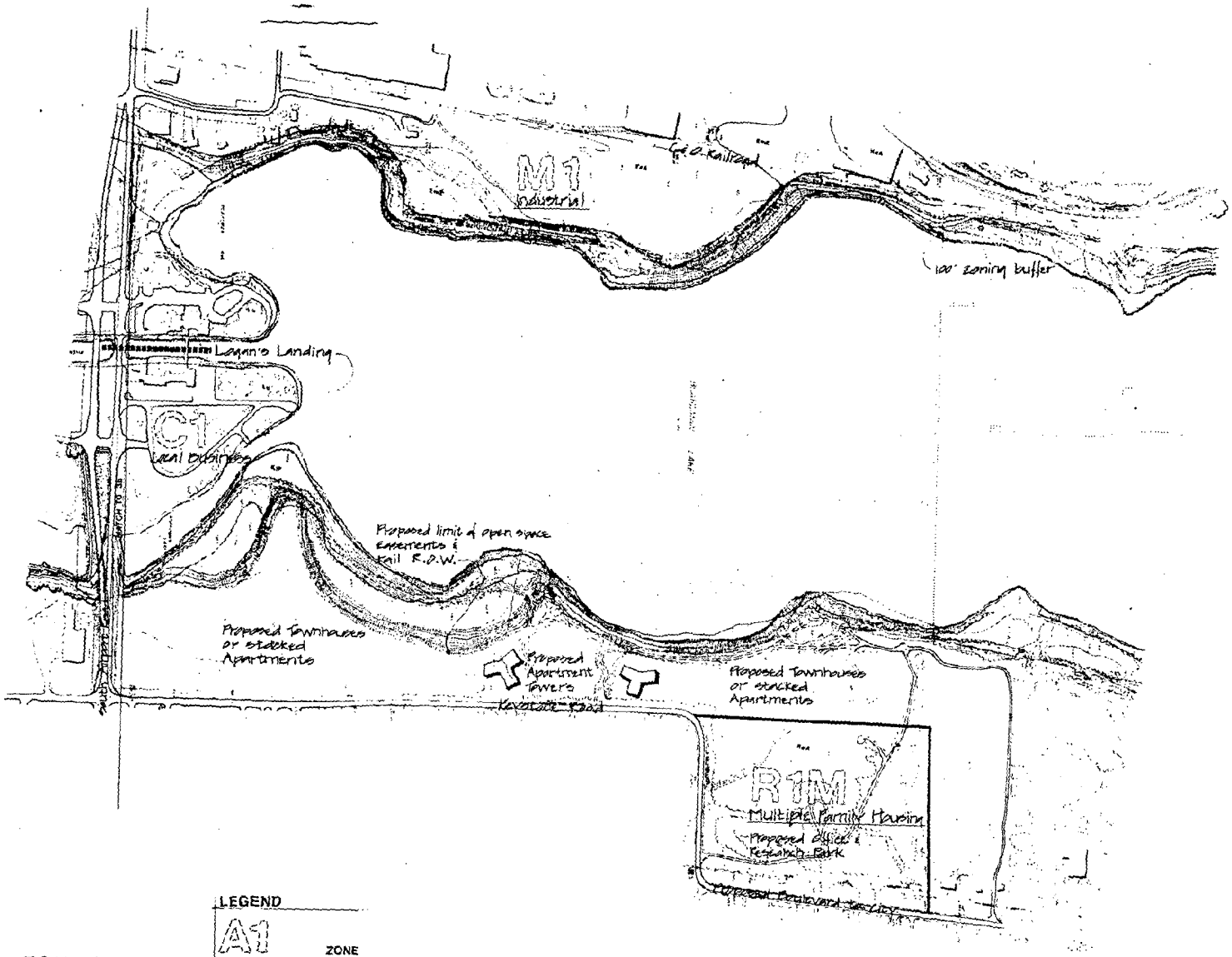
There are numerous opportunities for development throughout this section of the study area. The existing informal trails along the eastern lakeshore provide a link with similar trails in the City, as well as with an informal trail that extends from South Airport Road south into the valley. As the area along the east side of the lake is developed in the future, there should be an opportunity to preserve this trail system and to make it a formal part of the development that takes place. One way to accomplish this is through the planned unit development prodedures of the Township Zoning Ordinance requiring that the properties along the lake be developed under those procedures setting aside the shorelands as accessible open space.

As part of this procedure, the Township could obtain open space easements and further could devise a method in the Zoning Ordinance whereby the developer could receive bonus densities in exchange for cooperation with such easements.

Housing, either mid, or high rise, and town-houses or stacked apartments remain the most suited type of housing which could be developed throughout this area.

The par at Logan's Landing also provides considerable opportunities for improvement. Recommended are new parking areas set aside from the roadway, plantings, picnicking facilities and a bridge linking the private lands described above and the park area. A site plan for this area follows.

There are no public improvements suggested on the west side of the lake, however, it is suggested that a 100 foot zoning buffer be established for potential future secondary trailsystem, and to preserve the lakeshore.



ZONING PLAN

4b

LEGEND

A1 ZONE

Agricultural EXISTING ZONE

Proposed office [illegible]

0' 100' 200' 400' 800'

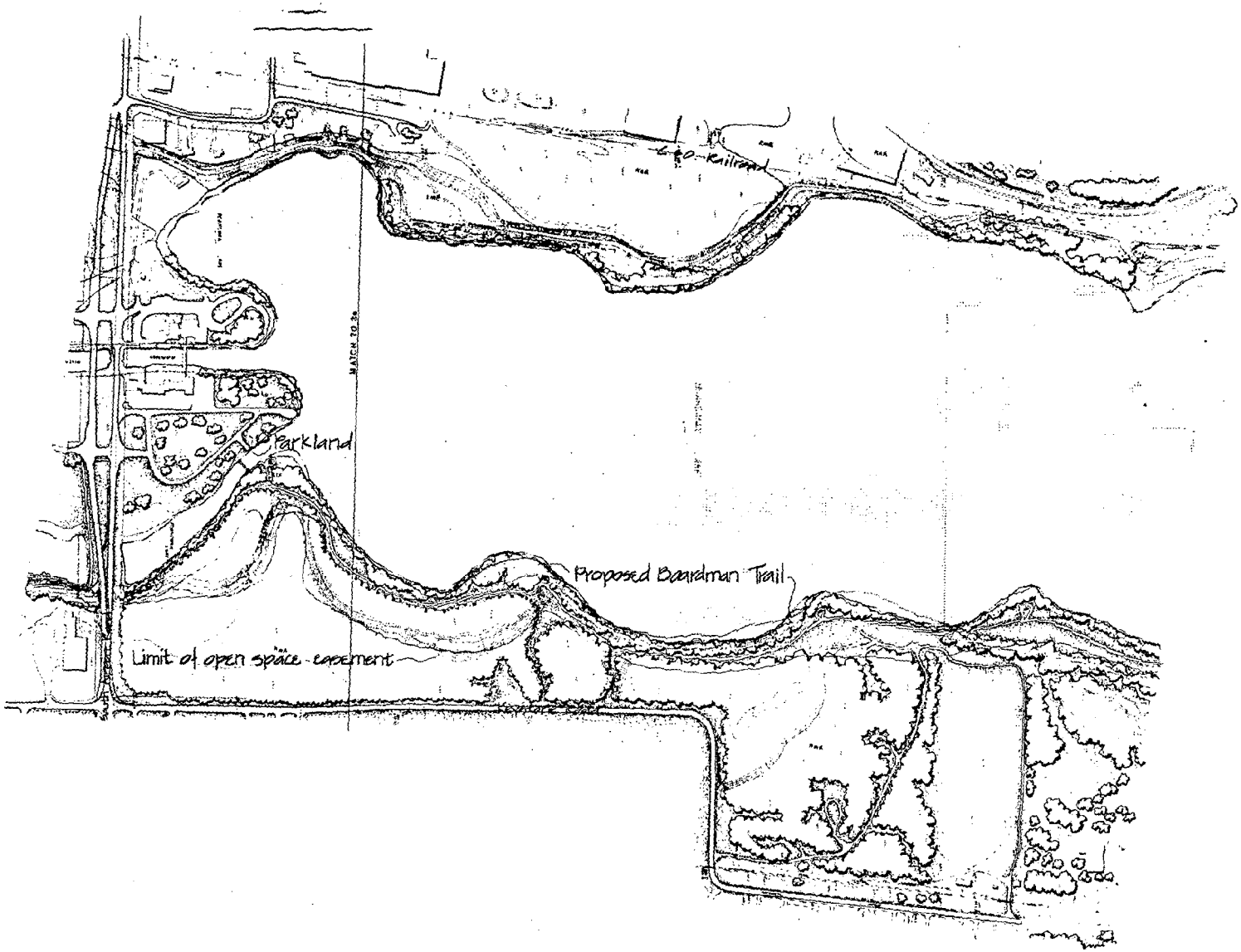
SCALE

NORTH

BOARDMAN VALLEY STUDY

GARFIELD TOWNSHIP

LAND PLANNING & DESIGN ASSOCIATES



MASTER PLAN

4a

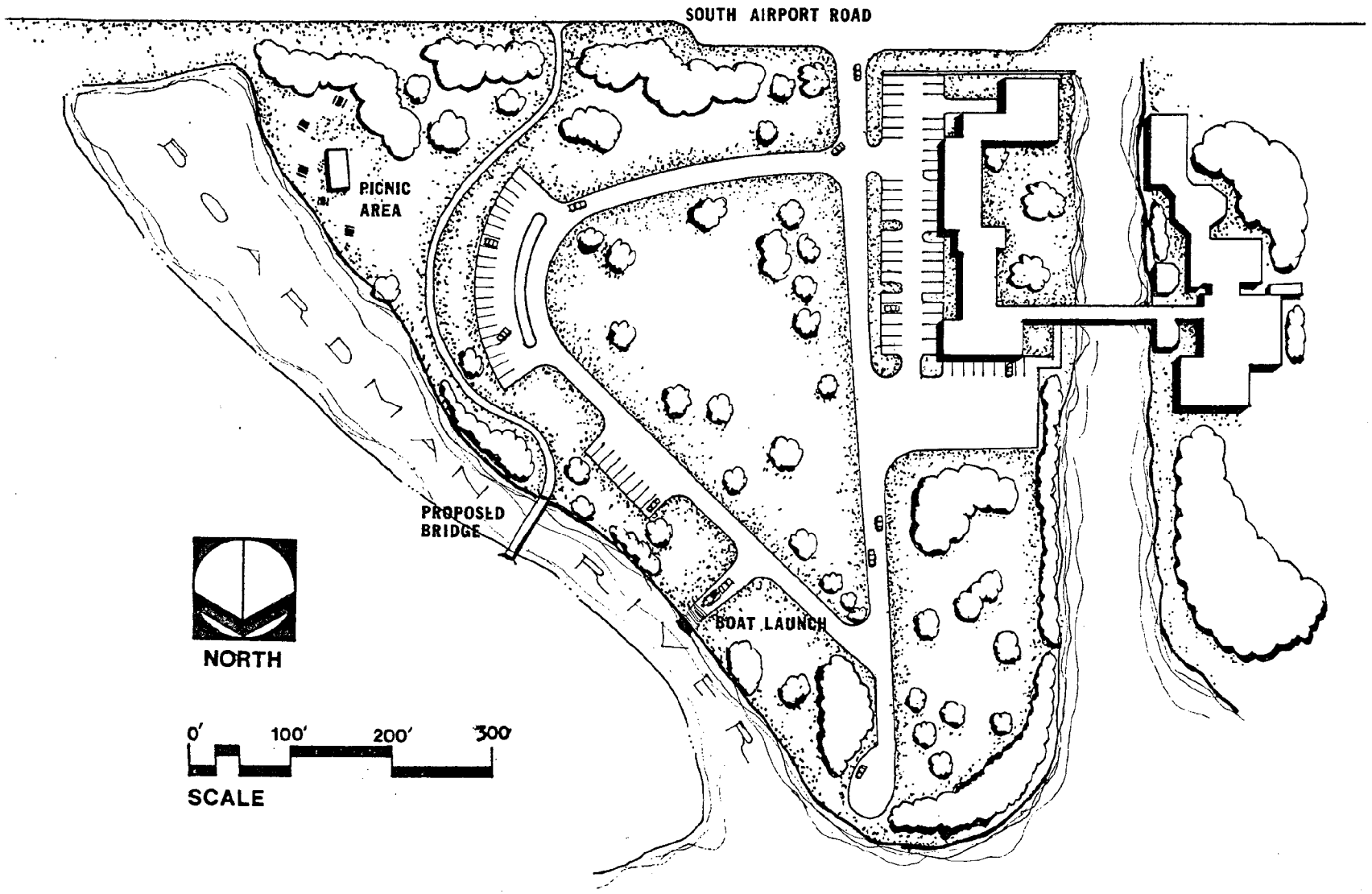
SCALE 0' 100' 200' 400' 800'

NORTH

BOARDMAN VALLEY STUDY

GARFIELD TOWNSHIP

LAND PLANNING & DESIGN ASSOCIATES



LOGAN'S LANDING ——— SITE PLAN

INTERPRETIVE DISPLAYS

PROPOSED INTERPRETIVE DISPLAYS -

SAMPLE SUBECTS

BOARDMAN VALLEY STUDY

1. The Boardman Valley - an overview.
2. The Boardman Vally - physiography
3. The Boardman Valley - a cross section
4. Dams on the Boardman
5. The lumbering era
6. The Boardman Valley - pre hydro dams.
7. Boardman River Electric Light & Power
8. Original bridge and roadway of Cass "Poor Farm" Road
9. Forest succession
10. Wetlands
11. River/meanders
12. Boardman Valley Hospital
13. Climax forest
14. Natural Education Reserve Map
15. Wild flowers of the Boardman Valley
16. Birds of the Boardman Valley

APPENDIX

Letter by G. Harsch reviewing Boardman Valley Hospital Building

Public hearing

Based upon out site visit to the above mentioned location, I would pass along the following comments.

Having been involved with a number of projects anticipating the reuse of an abandoned building, I was impressed in this case with the condition of the hospital and the minimal amount of deterioration which has taken place during its disuse. The greatest deterioration likely is in the electrical and mechanical systems which would have to be explored by an engineering professional.

The building does seem very worthy of saving and converting to a reuse. Perhaps the most obvious conclusion would be to suggest that it become a public or quasi-public use.

Its location within an agricultural zone of the Township does limit the possibilities for reuse. Section 6.10.2 of the Ordinance recites the following uses which perhaps could be considered: (7) public areas and public parks; (9) supplemental uses: customary accessory uses and buildings incidental to the permitted principal use of the premises.

This would suggest that the building could be used for activities related to the adjacent nature preserve.

Section 6.10.4 indicates uses permitted by a special use permit, including (3) institutional structures; (8) veterinary hospitals; (10) public buildings; and (15) boarding residences.

In the last instance, the building might be suitable for conversion to a foster care residence or a group of foster care residences. In that regard there is a state agency actively seeking sites for foster care residences in the area which might be interested in such a facility.

It would seem perhaps the most logical use of the building would be for activities of a public or quasi-public nature. It is my understanding that the Historical Society might be interested in part of the property for museum purposes. It would seem parts of the building could be used for classroom and laboratory facilities related to the nature preserve programs, that offices could be provided for local non-profit organizations. Further, there are numerous public agencies that rent space for offices that perhaps could be located in the building.

It further occurs to me that perhaps the school system could better utilize parts of the building for more organized storage facilities.

A final suggestion for reuse would be for some type of residence. There has been a considerable amount of work in recent years converting buildings from one use to another. For this to happen om Garfield Township, there would have to be an amendment to the Zoning Ordinance, perhaps the establishment of a new building preservation district to allow for reuse. I am enclosing for your information a recent copy of Historic Preservation Magazine which has several articles covering adaptive reuse and an article from Urban Land Magazine covering a project of a similar nature.

Such adaptive reuse if fundable under HUD programs when monies are available.

I realize the above mentioned comments are fairly broad and set a framework for various uses that might be considered. It would seem to me that a final decision on reuse should result from a detailed study of these possibilities. There are some grant programs available which could provide funding to study the building in certain circumstances. The National Foundation For The Humanities has planning grants for museums which could be utilized if a decision was made to explore that type of reuse. Other funds are available through the Michigan Council of the Arts, the Michigan Council For The Humanities, and perhaps from local foundations. There is one local foundation having considerable investments in the Township and could perhaps be approached. We would be happy to work with you in approaching agencies and foundations.

Finally, our tour of the building indicated that there is considerable flammable material stores in the basement, further that it is evident that there have been attempts to start fires in the building; there is paper ash in the front hallway and spent matches laying on the cardboard stores in the basement. We feel because of the difficulty in securing the building, that it would be wise to remove the easily combustible materials so that the building does not become the subject of a major fire before a reuse can be made.

After you have had a chance to review this preliminary material, we would be happy to meet and discuss some plan of action with you.

The regular meeting of the Planning Commission of the Charter Township of Garfield was held Wednesday, September 5, 1979, at 7:30 p.m., at the Garfield Townhall, 3848 Townhall Road, Traverse City, Michigan.

Board members present: Tezak, Guldice, Harrison, Kinney, CLark, Leggett, Harvey

Also present: G. Harsch, Township Planner; and William Wise, Township Attorney

Boardman Valley Study

A public hearing was held on the Boardman Valley Study Maps of the Boardman River Valley were submitted for review.

A Coastal Zone Management Grant was obtained so that the Township could look at the Boardman Valley and make some detailed recommendations about what would happen in the area roughly bounded by the two railroads extending in the Township boundary on the south to the point where Cass Road crosses the river at the upper end. The northern limit of the study area is the Township boundary which crosses Boardman Lake in the area, and the southern limit is down at the dam where Cass Road comes around to Keystone.

The drawings submitted indicated the soil types and the areas of steep slopes, also indicated were buildings which fall within the study at the present time. Harsch stated it is his understanding the City will be putting the final cover of material on the dump, and it will be seeded, and that will be the extent of the dump.

Harsch discussed the plan as it relates to the Natural River Act, that it recognizes the Township Zoning Ordinance is the controlling ordinance with respect to development in the valley. There is the possibility of a continuous trail system along the river. He discussed the possibility of connecting Hartman-Hammond Road across the valley in some way in order to create a link in the circumventual route around the City.

A summary of the vegetative analysis of plant materials of the Boardman Valley was reviewed. Harsch stated part of the study was to identify areas that would be suitable for public ownership; there would be minor changes in zoning which might be desirable, that the Township might want to structure another zone which would allow for research park kind of activity.

Discussion was held regarding trails and trail systems. Ted Okerstrom of the Boardman Valley Advisory Council stated he likes the idea of developing the river area as a recreational plan, that the plan should be coordinated between the City and the Township in making the connection along the river.

Harsch stated the Planning Commission could take leadership in proposing changes in the Ordinance to the Town Board, that the Commission could adopt a plan for the valley and pass it on to the Town Board, that the Nature Reserve Center should be the owner of the property. He stated there is no problem with the master plan,

that the Boardman Valley Study relates to the master plan, could be adopted as a river plan and be incorporated in the master plan. He suggested that the Planning Commission take the initiative to rezone the property in the study area.

Mary Asher inquired about securing easements along private property on the river. Harsch stated the easements would be a minimum of 100 feet on each side.

The meeting was adjourned at 9:30 p.m.

Garfield Twp.

STATE OF MICHIGAN } ss
County of Grand Traverse }

R. O. Schultz being duly sworn deposes and says he is one of the printers and publishers of the RECORD EAGLE, a daily newspaper printed and published in Traverse City, Grand Traverse County, Michigan, and circulating in said county, that the

Notice

a copy of which is hereunto annexed, has been published in said RECORD EAGLE once each day as follows:

August 31, 1979

Subscribed and sworn to before me this

day of

19

Notary Public in and for Grand Traverse County.

Commission Expires

19

Notary Public, Grand Traverse Co., Mich.
My commission expires [illegible] 12, 1979

CHARTER TOWNSHIP
OF GARFIELD
PLANNING COMMISSION
PLEASE TAKE NOTICE that the Planning Commission of the Charter Township of Garfield will hold its regular meeting Wednesday, September 5, 1979, at 7:30 p.m. at the Garfield Townhall, 3848 Townhall Road, Traverse City, Michigan and will discuss the planning of land uses in the Boardman Valley.
Keith Guldice, Secretary
Planning Commission, Charter Township of Garfield
Aug. 31, 1979—1T.

Publication charge - $17.00