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## A Social Impact Assessment Study of the Barrier Sand Dune Controversy in Bridgman, Michigan

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A SOCIAL IMPACT ASSESSMENT STUDY OF  
THE BARRIER SAND DUNE CONTROVERSY  
IN BRIDGMAN, MICHIGAN

by

Linda Lee Sweigart

A Thesis  
Submitted to the  
Faculty of The Graduate College  
in partial fulfillment of the  
requirements for the  
Degree of Master of Arts  
Department of Anthropology

Western Michigan University  
Kalamazoo, Michigan  
April 1981

A SOCIAL IMPACT ASSESSMENT STUDY OF  
THE BARRIER SAND DUNE CONTROVERSY  
IN BRIDGMAN, MICHIGAN

Linda Lee Sweigart, M.A.

Western Michigan University, 1981

This analytical anthropological study examined the inter-relationships among the population, environment, and modes of technology of a small community in southwestern Michigan. The researcher assumed a participant-observer role and engaged in a social impact assessment by (1) conducting a survey among the residents in the community of Bridgman, Michigan; (2) analyzing the data and making recommendations concerning the impact of a proposed sand mining operation in the community; and (3) providing detailed records of the assessment process.

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Linda Lee Sweigart

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CHAPTER I  
INTRODUCTION  
A Perspective

This anthropological study utilizes a cultural-ecological framework wherein the interactions are explored of the culture, technology, environment and the economy of a small community. The community in the midst of political controversy constitutes the site of the investigation which was undertaken by the researcher. The relatively new research technique of social impact assessment required the researcher to live in the community and to engage in a participant-observer role. This technique is used as an aide in the decision-making process. It is hoped that this study will help us to learn more about our ability to plan, to manage, to resolve and to understand better our relationship with one another and with our environment.

Environmental Awareness

There is a growing concern for the preservation of the natural environment in our United States. Increasingly we find controversy between private interest groups and citizens concerned with preserving our natural areas for future generations.

The increased numbers of controversies may be due to greater governmental regulations and controls and to growing public awareness of the need to preserve, manage and protect our resources

and/or increased population pressures. Increased demands for our limited resources by rapidly growing and diversified technology have intensified the concerns of everyone.

This concern has brought forth legislation for the protection of not only the physical environment but the human environment as well. The investigation of social impacts is mandated in legislation such as the National Environment Policy Act of 1969 (NEPA/PL 90-190). This act required all federal government projects, and the several states utilizing federal funds, to include a comprehensive statement of significant effect on the quality of the human environment. These statements should be a systematic, interdisciplinary approach of the social and natural sciences. There has not been any definition of the "quality of human life" provision of NEPA. This undefined section of the act is, in part, attributable to many governmental agencies not having submitted appropriate guidelines to the Council of Environmental Quality, the administrative agency responsible for enforcement of NEPA provisions.

#### Statement of the Controversy

The citizens of Bridgman, Michigan were perplexed due to the issue of whether to grant or to deny a permit to mine the barrier sand dunes of their community. The Michigan Department of Natural Resources and the Bridgman Planning Commission are the legally assigned authorities empowered to act for the citizens. A large mining conglomerate, The Martin-Marietta Aggregates Corporation, owns 253 acres bordering Lake Michigan which are comprised of

barrier sand dunes. On the opposing side there are numerous local and state environmental groups working to preserve these dunes.

#### Need for the Study

There has been a conflict over the use of barrier sand dune land in Bridgman, Michigan, since 1973. This conflict has legal, political, environmental, economic, social and recreational implications. Our national experience with the resolution of this type of conflict has often been unfortunate. There is a need for a more just and expeditious settlement of these environmental cases for all the parties involved.

The field of anthropology has pioneered in offering conceptual frameworks for the study of cultures undergoing the process of change. The discipline's extensive history of using such dynamic processes as participant-observation and other field techniques has complemented and contributed to social impact assessment (SIA).

#### The Social Impact Assessment

Research on the social impact assessment of the proposed mining of the barrier dunes of Bridgman, Michigan was done within the framework customary to SIA practice:

Social impact assessment is the study of the effects of natural physical phenomena, activities of government and business, or any succession of events on specific groups of people. The investigation of these effects is mandated in statutory and regulatory requirements of legislation such as the National Environmental Policy Act of 1969. Individuals who are competent to perform social impact assessments should have formal training in one or more of the social sciences

beyond the Bachelors degree, including training in quantitative methods; the ability to communicate the results of their work to a general audience, including specialists in other areas, and the public; and experience in documenting their research and findings in a clear and useful format (Sibley, Partridge & Orbach, 1980, p. 1).

Social impact assessment may be used in the planning process to lay out the potential effects of various alternatives, and to determine in advance the social costs and benefits of the project implementation. There is as yet no authoritative statement as to the criteria of adequate social assessments of development projects. The SIA determination helps decision makers to decide for or against a project. It also aids in determining what form of the project will have the best net return of social benefits relative to social costs.

In determining social costs and benefits, quality of life considerations are examined. SIA focuses directly on real and potential changes in people's lives. An important aspect of SIA is that alternatives not previously envisioned by the planners, opportunity costs, are evaluated.

Though social impact assessment has not crystallized into an academic formulation, there is a unanimity among practioners about their practice. They agree that the social characteristics of both intended and unintended target populations must be taken into account. It is important to look at not only the potential effects perceived by planners and administrators, but also the unanticipated effects. Means of achieving the ends of the project other than those of the planners must be found and evaluated in terms of all

costs, both monetary and non-monetary. Short term and long term effects of the projects must also be taken into account.

From an academic view point social impact assessments will frequently appear incomplete and lack elegance. To have value for the decision maker, the SIA must be both economical and timely. Much rigor is needed to accomplish an assessment within such time and financial constraints. Relevant data, method and theory from all disciplines must be utilized. It is important the assessment be expressed in such a way as to be useful not only to planners and administrators, but it must be of utility to the general public, as NEPA requires public hearings. The general task of a SIA is always the same: a clear, documented description of the real or potential effects of events and behaviors on specific groups of people.

There has been considerable effort to inform social scientists about what is being done in social impact assessment. This is done through short courses sponsored by the National Science Foundation, annual workshops at the annual meetings of the Society for Applied Anthropology, The American Anthropological Association and numerous symposia. There is a SIA Network which publishes a newsletter 10 times a year, and has a membership of over 2,000.

This social impact assessment was undertaken in order to achieve three specific and sequential goals:

1. To conduct a survey of the attitudes of the residents of Bridgman concerning sand mining.
2. To analyze the survey data and to make recommendations for the public interest.

3. To prepare a written record of the process in order to assist in resolving community conflicts.

The conduct of the social impact assessment required the researcher to live in the community to observe and to interact.

The interviews were conducted between May 29 and June 8, 1979. Compilation and interpretation of the survey data were necessary before recommendations of the SIA could be presented at the public meeting of the Department of Natural Resources (DNR) on June 14, 1979. It was important to have the results of the SIA prior to the policy decisions of the DNR.

## CHAPTER II

### THE COMMUNITY

#### Significant Aspects of the History of the Community

According to D. W. Ensign (1880), Lake Township's first white settler was attracted by the area's bountiful forests. They were large and full of wildlife, especially deer. High wooded dunes bordered Lake Michigan and in those early days a large swamp called Big Meadow covered the township from the southwestern corner to the northeast of the territory. John Harner settled in Lake Township in 1834, and is reputed to have said, "It looks pretty good to me and others are sure to follow" (p. 149). Others did follow. Within 10 years, as the white settlement began to increase, the wildlife began to diminish. One local hunter is said to have killed as many as 60 deer in one winter.

The manufacturing interests of the township prospered because of the abundance of forests and the accessibility to water. The major activity was lumbering, and sawmill after sawmill was built. The largest was constructed in 1856, The Charlotteville Lumber Company. The three founders of this company were Charles and Warren Howe, and George Bridgman. The operation included a 500 foot pier on Lake Michigan, an inland steam sawmill in the area of the present community, and a small railroad that connected the two. The lumber was shipped from the pier by schooners and was sold mainly in Chicago. In 1863 the mill was destroyed by fire, as



were two later mills erected on the same site. Several other mills in the area also were eventually abandoned or destroyed by fire.

Charlotteville was Lake Township's first village. It developed in the vicinity of the lumber company. The township's population grew from John Harner and family in 1834 to 557 people in 1860. By 1870, there were 1006 residents.

George Bridgman, one of the owners of the large lumber company, was instrumental in arranging for the Chicago and Michigan Lake Shore Railroad to be run through the township in 1869-1870. Furthermore, he platted a village named Bridgman half a mile East of Charlotteville along the railroad line. A station was built in Bridgman in 1870, from which products were shipped to Chicago and the East. The railroad spurred the development of the entire area and the population increased. During the prosperous years of the 1870's, the village of Bridgman expanded and eventually merged with and absorbed the village of Charlotteville.

The Laketon Post Office was established in 1861. Ten years later it was renamed the Bridgman Post Office in honor of George Bridgman who served as Postmaster from 1863 to 1870.

The growing population kept looking for more space. A range of high sand dunes lined the lake. Spreading from their base inland was a plain of sandy soil, a stretch of fertile, loamy soil, and then the Big Meadow Swamp. Through the efforts of Ozro Baldwin, an early settler, the Big Meadow Swamp was drained. This Big Meadow area covered several square miles. Once drained, it soon became the most productive farmland in the township. Lumber

production was replaced, over a period of time, as the principal source of revenue by the fruit growing industry.

By 1890 the population growth of Lake Township again expanded. Portions of the township were densely populated with clusters of small fruit farms. Large amounts of berries were produced.

Ozro Baldwin, in 1887, produced a good crop of raspberries and decided to advertise the plants in Philadelphia. It was not long before the nursery business was booming in Bridgman. Ozro's business was named the Railroad View Plant Farm.

Bridgman then became the center of the strawberry industry. According to local fruit men, the soil is especially favorable for the raising of strawberries. The nurseries of Charles Whitten, A. L. Baldwin, and F. L. Ackerman were devoted to the production of this fruit, which was then loaded and distributed by rail to all parts of the country. To this day there remains a large number of small fruit farms.

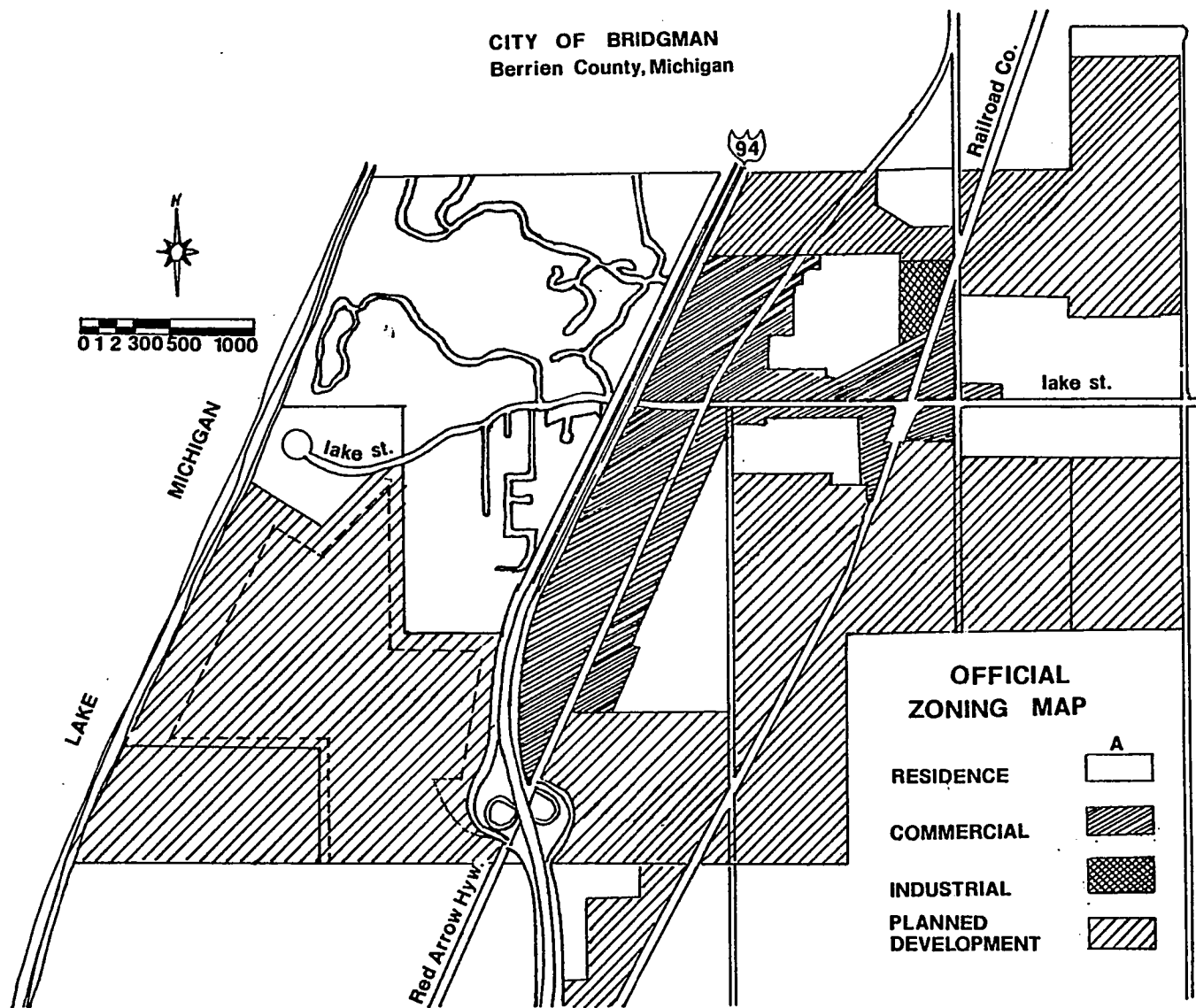
In the 1920's a local newspaper called the "Community Enterprise," a movie theater, W. K. Mathieu's Foundry, and a local bank were established. The crash of the stock market did not dampen Bridgman's social activities. People continued to pack the German Beer Hall (with its polka bands) at Weko Beach throughout the 1930's.

In 1949, Bridgman became a city. When construction began on the Donald C. Cook Nuclear Plant in 1968, a large surge of economic and population growth began again in Bridgman and the township. Shortly after completion of the nuclear plant, a new modern high school was built. Tax breaks were offered by the city to encourage

the development of new business enterprise. Several tool and industrial companies were attracted to Bridgman and employment opportunities increased.

The city of Bridgman has a population today of approximately 2,100. It is governed by an elected mayor and an elected commission form of government. There are seven elected city commissioners who appoint a professional City Superintendent as the town manager. The city has municipal services such as police and a voluntary fire department facility, and a library. Within the city there is an elementary, middle and high school. The community is served by the Mid-Michigan Telephone Company, Michigan Gas Utilities, and the Indiana and Michigan Electric Company. The small town of Bridgman has: eight restaurants, one bakery, three beauty shops, one barber, three service stations, two pharmacies, two taverns, three food stores, two fruit markets, three nurseries, and a laundramat. Moreover, Bridgman has some 49 other businesses offering a wide variety of sales and services to the community. Nineteen manufacturing companies are located in town. The closest center for business exchange is the Benton Harbor-St. Joseph area, while Chicago is still the major area for business exchange.

Bridgman's high undulating dunes are a part of a chain of dunes stretching from the Warren Dunes State Park in the south to the Grand Mere nature area to the north. There is considerable tourist activity in this region because of the beauty of the dunes. Bridgman's Weko Beach is owned by the city and continues to grow in popularity and financial benefit.



### The Site

The site owned by the company covers an area of 253 acres between Lake Street and the south boundary of Bridgman, east of Interstate Highway 94. It contains miles of waterfront land with sandy beaches, a section of the range of wooded barrier sand dunes (the tallest of which is named Mount Edward), a small creek and a wetlands area. The forest is of the highest aesthetic quality. The primary vegetation is described as a climax deciduous forest. Several species of trees are found and include basswood, oak, hop hornbeam, hemlock, beech and maple. In terms of plant succession this area has been rated botanically as "the highest type which can be supported by the obtaining set of external factors and the type which tends to perpetuate itself year after year under similar conditions and does not render the environment unsuitable for its offspring" (Fuller, 1967, p. 202). This mature and established forest appears able to buffer the stresses of the physical environment to a greater extent than a younger plant community. Even though this type of climax forest may not be as productive as a younger community, its stability and "its ability to buffer and control physical forces (such as water and temperature) are desirable characteristics from the viewpoint of the human population" (Odum, 1963, p. 88).

The forest contains two unique growing organisms that deserve special mention. First, there is a plant growing in the forest which is listed in the "threatened" category on both the

U.S. List of Endangered and Threatened Wildlife and Plants, and the Michigan List of Endangered and Threatened Species. This vascular plant is named ginseng (Panax quinquefolius) and was positively identified by the Kalamazoo Nature Center. Its existence on the site is also acknowledged in the Environmental Impact Study prepared by Environmental Research Group, Inc. The second notable feature is the existence of hemlock trees that are more than 200 years old.

In addition to supporting a wide variety of plant communities, the climax community supports an equally diverse fauna. There are a great variety of mammals inhabiting the Bridgman South Site. Raccoons, squirrels, opossum, deer and other small mammals abound in this area. A large number of reptiles, amphibians and birds also make their home in this forested area. The site is in the path of the Mississippi Flyway. In spring of 1979 there was a reported sighting of a Bald Eagle. Large numbers of ducks and geese abound.

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## CHAPTER III

### THE CONTROVERSY

#### The Martin-Marietta Aggregates Corporation

The Martin-Marietta Aggregates Corporation (hereafter referred to as The Corporation) owns 253 acres of land which is known as the Bridgman South Site. This area extends for two miles along the Lake Michigan shoreline and is situated west of Interstate 94, north of the First Church Camp, and south of Lake Street. It has been designated by the State as a barrier dune region and its use is, therefore, governed by Michigan Public Act 222. Because coastal sand dunes constitute a unique geographical and ecological environment, their preservation has recently become an important issue. As a consequence, the Michigan legislature passed the "Sand Dune Protection and Management Act" of 1976 to regulate and control coastal dune sand mining. Coastal dune sand, as defined by this act, includes all sand within two miles of the shoreline of any of the Great Lakes.

The Corporation purchased this land 25 years ago for the express purpose of mining it. They have been paying taxes on this property during this period. Part of the site was mined by The Corporation during the construction of Interstate 94 by the Michigan Highway Department. Mining was resumed during the early 1970's until in 1973 the city of Bridgman filed for a temporary restraining order, claiming that The Corporation had violated Ordinance 47.

This ordinance of the city of Bridgman, Michigan is a zoning ordinance that regulates all land use. To date 23 acres have been mined on the Bridgman South Site. The Corporation has applied to the city for a permit to mine an additional 144 acres.

#### The Importance of Sand

Michigan's number one industry in terms of money and employment is manufacturing. The state is also the nation's leading producer of industrial sand, which is very important to the manufacturing industry. Sand is used for making cores and molds which are utilized by the automotive, steel and glass industries. Dune sand is highly preferred because it is round, clay-free, high in silica and of proper grain size. Furthermore, production costs are low since the dune sand is easily mined and needs little refinement.

#### The Proposal to Mine Sand

Martin-Marietta proposed a plan to mine sand in a 50.20 acre area in July 1977. The city engineer reported that the previous mining by The Corporation was not completed satisfactorily because there were limited stabilization efforts made, slopes were too steep, and stockpiles of topsoil were not in evidence. In September, the city of Bridgman filed a temporary restraining order. This restraining order has been upheld through a series of court hearings and legal battles. In November, a local environment group, Hope for the Dunes, joined the city in the legal battle. In February 1978, the court ruled that the city commissioners did not



have the right to act unilaterally or act without the Planning Commission in granting the July 1977 permit. Since that time, a number of additional environmental groups and individuals have also become involved in the controversy.

In May 1978, The Corporation filed a new plan to mine sand. It planned to partition 144 acres of the Site into 10 cell units. The concept of cell units is required by the terms of the State Public Act 222 regulating the preservation and management of barrier sand dunes. The proposed plan is notable because it would allow 59.26% of the 144 acres to be mined in the first operational phase (referred to as cell numbers 1, 2, and 3 in the requested permit from the State of Michigan). The plan then allows for the remaining 40.74% of the 144 acres to be mined over seven operational phases (referred to as cell numbers 4 to 10). It is also proposed that a new processing plant be built on the Bridgman South Site.

The mining process would first consist of stripping the vegetation and top soil. It is planned that the cell units would be mined sequentially to reduce the effects of erosion. The mining would proceed in conformity with market demands. Large trees would be harvested and either sold or given away for firewood. All the other organic material would be piled up and used later for mulch. Two to eight inches of the top soil would be removed by using bulldozers and scrapers. This material would also be used in the reclamation process.

### The Reclamation Process

It is proposed that the reclamation process will begin after the mining of each cell has been terminated. Each mined area will be graded and sloped. Then the top soil which had been stripped and stockpiled would be spread out over the graded surface. The Corporation's revegetation process is two-fold. Once the top soil has been distributed, nitrogen fertilizer, in ammonium form, would be applied to the area. Then, in the Spring or Fall, a combination of marram grass (Ammophila) and sand reed grass (Calamovilfa) would be planted. It would be distributed in clumps of two or three plants spaced 18" x 18" apart, with three rows planted every 40 feet. This distribution would be much greater on exposed slopes in order to stabilize the soil.

A wide variety of mulches was mentioned to protect the plantings against wind and rain while the roots of the grass develop. In order to protect the grass shoots which will stabilize the sand that is already in place, the land will be posted with signs to discourage trespassing. If this grass barrier is broken by hikers, for example, the wind may be able to reach unprotected sand and start erosion.

The second phase of the revegetation would not commence for up to two years after the introduction of the dune grass. The planting of trees would begin once the grasses were established. The trees to be planted would be comprised of scotch, jack, white and red pine, and poplar. These nursery trees would be planted in 30 foot intervals.

### The Environmental Impact Statement

An Environmental Impact Statement (EIS) was prepared for The Corporation by Environmental Research Group, Inc., of Ann Arbor. Originally, the Department of Natural Resources was supposed to prepare environmental impact statements on all proposed projects seeking permits. However, due to a severe lack of state funds, the DNR requested companies to submit their own environmental impact statements. As the company retains the research group, it could become difficult to maintain a level of objectivity. Environmental Impact Statements may have significant omissions and may be self-serving.

Some alternatives were offered in the Environmental Impact Statement; however, they were not investigated by the researchers in any depth. A main criterion for choosing a course of action appears to be profitability for The Corporation.

### The Environmentalists

Hope for the Dunes, a local voluntary association formed to preserve the dunes of Bridgman, was advised by legal counsel to secure experts for the battle. A number of individuals from various disciplines testified on the various inadequacies of The Corporation's environmental impact statement. Furthermore, a list of some pertinent concerns was compiled by the environmentalists' legal counsel, Fredrick Dilley, and reported for consideration:

A. Removal of dune structure.

- B. Removal of subjacent support of barrier dunes.
- C. Projections as to recovery time for reclamation.
  - 1. Reclamation of wooded areas.
  - 2. Reclamation of lesser vegetation.
- D. Truck traffic.
- E. Noise and air pollution.
- F. Water pollution.
- G. Identification of fauna focusing on unique fauna and the particular times and places for nesting, bearing young, etc.
- H. Identification of flora focusing on unique flora and the times for growth and propagation.
- I. Potential meteorological effects.
- J. Potential economic effects.
- K. Aesthetic factors.

(1979, p. 1).

Experts from many scientific and related fields were sought by Hope for the Dunes for testimony before the Department of Natural Resources and the Bridgman City Commission. It was in such context that Dr. Garland, as an anthropologist, was contacted. He contacted this researcher to assist in obtaining the necessary objective field data.

The environmentalists and their experts examined the EIS and responded aggressively. The environmentalists promoted public awareness of the controversy. They sponsored numerous informational meetings at the local high school. They handed out literature door to door and used volunteers to distribute flyers at the beaches and parks. Several petition drives were instituted in order to

secure citizen participation and a commitment to save the dunes. The petitions were submitted to the City Planning Commission. One petition was directed to the Governor of Michigan. Extensive media coverage was obtained.

Martin-Marietta agreed, through public pressure, to leave Mt. Edward and the wetlands in situ, in an undisturbed state. Then the environmentalists still wanted to know what the effects would be with the mining and flattening of the region. Would Mt. Edward shift or gradually become a blowout as its lateral support sections are removed? Would the wetlands be filled in by blowing sand from the surrounding mined areas? They stressed that dunes are irreplaceable and there is a limit to recreating the environment.

CHAPTER IV  
THE SOCIAL IMPACT ASSESSMENT  
Phase I. The Planning and Organization

The social impact assessment was used as a policy tool in order to consider the costs and public benefits of the proposed mining. As expected in any other pragmatic matter, timing is an essential element. The researcher had 11 days to conduct the SIA. The planning and organization (Phase I) coincided with the actual beginning of field work (Phase II). The assessment was designed with the following sequential goals:

1. To conduct a survey in order to ascertain the attitudes of the population (business and residents).
2. To analyze the survey data and to make recommendations to the decision makers for the public interest.
3. To prepare a written record of the process to assist other researchers in the continuing effort to resolve community conflicts in a peaceful and economically beneficial manner.

The social impact assessment is best viewed as consisting of four distinct phases. These phases are described in detail in various sections of this study as follows:

Phase	Description	Location in this Study
1	The Planning and Organization	Chapter 4
2	The Beginning of the Assessment	Chapter 4
3	The Survey	Chapter 5
4	The Survey Data, Recommendations and Conclusions	Chapter 6

## Phase II. The Beginning of the Assessment

Once settled in an apartment in Bridgman, the researcher set out to establish herself in the community. She first introduced herself to several of the city officials in order to make her presence and purpose known. It was necessary for her to become immersed quickly in the rapidly moving events. It was assumed that the governmental leaders would have ready access to extensive background information.

The first contact was with the City Magistrate. The SIA researcher introduced herself as "a graduate student from Western Michigan University conducting a social impact assessment on the effects of sandmining on the community of Bridgman." This was the approach used with all informants. She asked for "any information you might have on the community and suggestions as to others to contact."

The next contact was with the City Clerk at City Hall, who provided the researcher with a copy of the Bridgman and Lake Township Directory, as well as access to the minutes of all City Commission and Planning Commission meetings which contained references to sandmining. Also provided was a copy of the "City of Bridgman Ordinance 47" which included a zoning map with street names that proved to be most helpful. Furthermore, the researcher was kept informed as to the upcoming meetings concerning sandmining.

A Planning Commission meeting was attended on May 31, 1979, and a City Commission meeting on June 4. Then three weeks later the

the researcher attended a second Planning Commission meeting on June 21. At this meeting the citizens of Bridgman had an opportunity to voice their views publicly on whether or not a permit to mine sand should be granted The Corporation.

The library was the next source of information. The researcher introduced herself to the head librarian and asked her for historical information about Bridgman. The researcher was given another copy of the local directory and was disappointed to find only one brief history of the city. Then she contacted a couple of Hope for the Dunes members who gave her the names of some local influential persons and suggested that she should talk with them. Within the first two days the researcher had completed Phase II, the Beginning of the Assessment.



CHAPTER V  
THE SURVEY  
Survey Technique

The survey technique used by the researcher was a verbal open-ended interview. The 86 interviews were conducted from May 29 to June 8, 1979. An open-ended interview technique was used in order to elicit the attitudes of Bridgman residents concerning the controversy. In order to insure a maximum of information from good quality responses, the open-ended technique was employed. It also permitted respondents total freedom in their replies. A verbal technique was selected instead of a written questionnaire in order to obtain an unlimited set of responses.

Procedures

The researcher introduced herself to each respondent as a graduate student from Western Michigan University. She explained that she was conducting a survey on the effects of sand mining on the community of Bridgman. Several people knew of her presence and activities because of an announcement of the study which appeared in The Community Enterprise, the local newspaper (May 31, 1979, p. 2). The researcher was careful in her associations and avoided people conspicuous in the controversy. This reinforced the researcher's role as an unbiased participant observer. It was also necessary to assure the citizens of the confidentiality of their discussions.

The researcher decided not to make lengthy written notes in the presence of the interviewee in order to insure a free flow of information. Generally, each interview lasted one half hour or less, although a few continued for up to one and one-half hours. The length of the interview depended on the respondent's knowledge, interest, and communicativeness. The use of a nonstructured interview encouraged the respondents to verbalize their views on the controversy or to raise other issues they chose. The researcher did not impose a time limit. This technique was also chosen because of its value as an educational process. It quickly became apparent that many respondents were ignorant of their statutory voice (option) as to granting a permit to mine.

#### The Goals

The goals of the survey were: (A) to determine citizens' perceptions about sand mining in Bridgman; (B) to collect appropriate data suitable for analysis; (C) to keep careful written records for the written case study.

#### The Sample

The survey was directed to the residents of the community of Bridgman, with a part also directed to nonresidents who own small business establishments in the city. These nonresidents were included in the survey sample because of their investment in Bridgman, their civic pride, and their potential for influencing residents. The following tables indicate the location of the

respondents' business or residence (Table 1); the age distribution of respondents (Table 2); and the length of respondents' residence in Bridgman (Table 3). It should be noted that the wide geographic distribution shown in Table 1 was obtained by identifying distinct areas created by the intersection of Lake Street, Red Arrow Highway and Interstate 94 (See Map, p. 11).

### The Questions

The informants were asked if they were residents of Bridgman and if so, for how long. They were then asked how they viewed sand mining in the city and how it affected them. The researcher wanted to know what they saw as the benefits to Bridgman; e.g., new employment, increased tax revenues, increased business, potential increase of plat land. In a similar manner, the researcher wanted to know what they saw as the costs to the city; e.g., increased burden on roads, potential increased burden on water and sewer from future plant development (this last issue was never discussed). The researcher encouraged each respondent to discuss the possible secondary effects of the sand mining; e.g., changes in weather phenomenon. How would this change affect the growing patterns of crops, changes in the water table, loss of scenic topography, loss of attractive vegetation, loss of wetlands, loss of flora and fauna, loss of lateral support to Mt. Edward, possible increase of traffic accidents, and increased amounts of blowing sand.

Table 1

Business and/or Residential Location  
of Respondents in Sample

Location	Number	Per- cent
Residence between Interstate 94 & Lake Michigan	14	12.2
Residence south of Lake Street	17	14.8
Residence north of Lake Street	16	13.9
Residence on periphery of City	3	2.6
Nonresidents (business and/or shopping regularly in the City)	13	11.3
Lake Street offices or business	22	19.1
Red Arrow Highway office or business	15	13.0
Residence not noted (business owner/managers)	15	13.0
TOTAL	115	99.9

Note: Responses greater than number of respondents since both  
business and residential locations were noted.

Table 2

## Age of Respondents

Age	Number	Percent
18-21	1	1.12
21-29	10	11.60
30-39	23	26.70
40-59	18	20.90
over 60	18	20.90
Not noted	17	19.80
	<hr/>	<hr/>
TOTAL	86	100.00

Table 3

## Length of Residence in Bridgman

Length	Number	Percent
Under 6 years	13	15.1
6 - 15 years	21	24.4
Over 15 years	10	11.6
Life-long	25	29.1
Nonresident or not noted	17	19.8
	<hr/>	<hr/>
TOTAL	86	100.0

## CHAPTER VI

### THE SURVEY DATA, INTERPRETATION AND RECOMMENDATIONS

#### The Survey Data and Interpretation

The complete tabulation of the survey base data is presented in Appendix A. The survey data were compiled in terms of respondents' perceptions of negative and positive effects of sand mining in the community.

Table 4, on the following page, is a tabulation of the respondents' perceptions of the probable effects of sand mining at the Bridgman South Site.

#### Interpretation of Table 4.

We note from the Table that of the 86 persons interviewed, 13 persons offered no opinion, leaving 73 persons who expressed 148 probable effects of (an average of 2.07 responses per person). The overwhelming majority saw the granting of a permit to mine as having negative effects. Almost all respondents who expressed an opinion (54 out of 73) anticipated "adverse effects on biotic or land forms." An unexpected high percentage of respondents (42 out of 73) were concerned about the anticipated "adverse effects of weather, climate and/or blowing sand." It is of interest to note that almost all of the people who supported the proposal for sand mining (16 of 18 responses) were anticipating the expansion of employment or commerce.

Table 4

Tabulation of Probable Effects of Sand Mining  
of Bridgman South on the City of Bridgman

Negative	Number	Percent
Damage to roads or increased road hazard (-1)	23	14.28
Adverse weather, climate, and/or blowing sand (-2)	42	26.09
Adverse effects on biotic or land forms (-3)	54	33.54
Adverse effects on employment or commerce (-4)	11	6.83
Undesirable plat development (-6)	0	00.00
SUBTOTAL	130	80.75
Positive	Number	Percent
Better funding for road maintenance and/or traffic control (+1)	0	00.00
Benign modification of weather or climate (+2)	0	00.00
Desirable elimination of dunes or life forms (+3)	1	0.62
Expansion of employment or commerce (+4)	16	9.93
Plat development desired after mining (+6)	1	0.62
SUBTOTAL	18	11.18
No Effects (5) or No Opinion (-)	Number	Percent
No valued effect	2	1.24
No opinion	11	6.83
SUBTOTAL	13	8.07
TOTAL	161	100.00

Table 5 is a tabulation of the attitudes of the respondents to the question "Should mining be permitted?"

Table 5

## Mining Permitted

Responses	Number	Percent	Number	Percent
Yes	11	12.8	17	19.7
Yes (with controls)	6	6.9		
No	41	47.7	62	72.1
No (Compensate Corp.)	21	24.4		
No Opinion	<u>7</u>	<u>8.2</u>	<u>      </u>	<u>      </u>
TOTALS	86	100.0	86	100.0

Interpretation of Table 5

Of the total sample (N), 91.9% expressed opinions which were 72.1% against mining and 19.8% in favor of mining. (This is a ratio of 7 to 2 opposed to granting a permit to mine).

Table 6 is a tabulation of the attitudes of the respondents concerning future utilization of the site.



Table 6

## Preferred Development of the Site

Alternatives	Number	Percent
Mining	17	17.2
Residential	3	3.0
Resort or park	7	7.1
Industrial	1	1.0
Natural	56	56.6
No opinion	15	15.2
TOTALS	99	100.1

Note: Responses here number more than 86 since 13 stated two alternatives ("resort or natural," "mine or natural," etc.). "Mining" indicates respondents did not indicate further development beyond permitted mining. "Resort or park" was probably under-represented, since only the last few respondents were asked about the resort/residential development.

Interpretation of Table 6.

Of the total sample (N) a majority of 56.6% preferred the "natural" alternative for development. The apparently large number of individuals who expressed no opinion, 15 of 86 or 17.4%, may have been due to the question that was asked. Respondents may not have really thought about alternative development and, therefore, expressed no opinion. This social impact assessment was conducted under a time-financial deadline. These two limiting factors restricted the researcher from expanding the sample and questioning

respondents concerning alternative development, i.e., resort/residential development. It would have been valuable to develop this line of questioning. Since the assessment had to be completed in time to aid in the decision-making process of the Bridgman Planning Commission meeting held on June 21, the researcher did the best job possible with the time and money available.

It should be noted that there was an internal consistency of response as shown by the 17.2% who preferred mining (see Table 6) and the 19.8% of the respondents who were in favor of mining (see Table 5).

#### Additional Interpretative Data

The use of the verbal open-ended interview technique provided the researcher with a broad spectrum of attitudes all of which were not tabulated. The importance of these recurrent themes can not be evaluated without further research but should certainly be reported. It is hoped that they will prove to be of interest and value to others. It was not possible to investigate everything in the assessment process with the time and financial constraints imposed.

#### Recurrent Themes

##### Recurrent Theme No. 1.

Respondents were genuinely concerned with the property owner's exercise of free right of property utilization. A majority of those

surveyed felt that the Corporation should receive a profit from their land investment. Typical responses such as "the land was purchased for the express purpose of mining," or "Martin-Marietta owns the land, they can damn well do with it what they want," and "they have paid taxes on the property for 25 years," reflect the respondents' concern for the property owner.

Recurrent Theme No. 2.

Residents expressed discontent with the government and its representatives. People spoke of their feelings of helplessness. Local Government leaders were thought of as "buffoons," or individuals "out for their own good." Doctrinaire pronouncements such as "you can't fight government," or "you can't fight big business," and such opposites as "there's too much regulation of business," or statements like "we don't need to worry, the state will control the mining to prevent problems," were common throughout the interviews. Citizens expressed the fear that they were losing sight of their role in the formulation of demands which can be acted upon through the governmental process.

Recurrent Theme No. 3.

People felt a strong resentment against private, exclusive, and expensive residential developments. There are two developments, Wildwood and Dunewood, in the dunes, west of Interstate 94 in Bridgman. The roads in both developments are posted with signs that say "Private." Many respondents expressed resentment of this.

Others felt that "There are too many Chicago people up here with their expensive retirement homes. Then there is the poor guy like me who has to work for a living." Two respondents said that they would prefer mining over another Wildwood or Dunewood type development for the affluent. Attitudes such as these are reminiscent of those identified by Foster (1962) in Traditional Societies, for "If someone is seen to get ahead, logically, it can only be at the expense of others . . ." (p. 53).

#### Recommendations of the Social Impact Assessment

The careful interpretation of the survey data and an assessment of the probable effects of alternative actions, led to the following list of criteria for choosing a viable alternative in an attempt to resolve the controversy. An alternative was sought which would do all of the following:

1. Retain the dunes as a barrier between the land and the lake;
2. Promote employment;
3. Increase the tax base and other city and state revenues;
4. Promote Bridgman's business on a year-round basis;
5. Provide for a reimbursement to The Corporation.

These criteria are responsive to the survey respondents' stated desires.

One such concept that would meet all of the above criteria with few undesirable environmental effects would be a Planned Unit Development (PUD). Such a development

. . .combines zoning, subdivision control and other land-use procedures to allow a developer more design flexibility while replacing the traditional, rigid, limited-use zoning districting standards with broad general standards and with detailed administrative review and approval of specific plans. A PUD is particularly appropriate for application in developing areas (Hagman, 1971, p. 454).

It was the recommendation of this SIA that the sand mining permit be restricted to excavation ancillary to development of Bridgman South as a Planned Unit Development. The mined sand could be sold by the land owner for a profit or retained for some future use. This alternative development permits restriction of the use of the dunes in a more natural state. It would also retain the dunes as a barrier between land and lake activity.

Area employment would increase both during and after the construction of a Planned Unit Development. Local contractors and laborers would be employed in such a project. The completed development would employ a wide range of workers, clerks, artisans and professionals. It would generally be a labor intensive type of facility, further increasing the tax base. Employment possibilities would expand as the development expands.

A Planned Urban Development involving a resort-entertainment-convention complex with condominiums and dining and lodging facilities, with controlled access to the dunes various environmental niches for aesthetic appreciation and nature study, would strengthen

Bridgman's economy through diversity. The tax base, economic activity and employment opportunities would be expanded well beyond the 25 years envisioned in the mining proposal. The PUD alternative generates revenues to both the property owner, and the City and State.

A Planned Unit Development would promote the development of the tourist industry in Bridgman. The area around Bridgman with the exception of the city's Weko Beach is underdeveloped as a tourist center. There is considerable tourist development south of Bridgman at Warren Dunes State Park and to the north of Bridgman at the twin cities of Benton Harbor--St. Joseph. The current energy crisis has necessitated travel limitations and the present tendency of people in the area is to visit and maintain second residences, especially in the dunes along the lake. A resort-condominium alternative would capitalize on the presence of 1.1 million people living within a 50 miles radius of Bridgman. Permanent and part-time residents would be attracted by the favorable scenery and convenience of local shops.

This Planned Unit Development would promote business in Bridgman year around instead of the current doubling of business during the summer months. Vacationers could utilize the facilities throughout the seasons. The great variation within the dunes and surrounding forests invites development as a possible cross country ski area.

The Corporation could be justly reimbursed either through participation with the city, citizens and/or resort-developers in the PUD alternative, or by selling its interest in the property

for immediate gain from the sale.

Several Planned Unit Developments in Michigan have already been placed in dune areas similar to Bridgman's fragile environment. Sugar Loaf near Leland, Heritage near Glen Arbor and Crystal Mountain near Interlochen, have all developed ways of minimizing the variety and amount of utilization without sacrificing the environment or aesthetic values. Preserving the dunes, while providing considerable benefits to private sectors, governmental units, the State of Michigan, and the public is the kind of preservation and management of barrier dune areas envisioned by Public Act 222. This plan was offered in the public interest. It may be possible to move the community from controversy to a mutually beneficial program of development through this social impact assessment.

### Conclusion

This social impact assessment of the barrier sand dune controversy in Bridgman, Michigan has:

1. Examined the need for such a study within the community.
2. Stated and adhered to current social impact assessment practices.
3. Surveyed the attitudes of residents from all side of the controversy.
4. Analyzed the survey data and selected a viable alternative in an attempt to resolve the sand mining controversy in the public interest.
5. Prepared a written record of the entire process for use in resolving other community conflicts.

The study was conducted under rigorous time and financial constraints to provide decision-makers a clear description of the real or potential effect of sand mining and/or the alternative land use recommendations on the citizens of Bridgman. It was used as a basis for discussion of information for public involvement and public awareness at the DNR public hearing (June 1979).

This study and other similar interdisciplinary studies should be used to better understand the social implications and consequences of changes in economic, technological, political, and natural physical environments.



APPENDIX A  
Survey Base Data

LEGEND:

Survey Base Data

Location

- 1 - Dunes between I-94 and lake
- 2 - South of Lake Street
- 3 - North of Lake Street
- 4 - Outlying

- 5 - Non-resident
- RA - Office or business on Red Arrow Hwy.
- L - Office or business on Lake Street
- - Not noted

Age

- 1 - Under 21
- 2 - 21-29
- 3 - 30-39
- 4 - 40-59
- 5 - Over 59
- - Not noted

Mining

- Yes - Grant permit to mine
- Limited - Grant permit w/stringent limitations
- No - Deny permit
- Mixed - Would like permit denied, but property right to mine
- - No opinion

Preferred Development

- 1 - Mining, no thought beyond
- 2 - Residential after mining
- 3 - Resort or park
- 4 - Industrial after mining
- 5 - Natural ("no action")

Positive (+) and/or Negative (-) Effects of Sand Mining

- 1 - Road damage or maintenance or traffic hazard or greater control
- 2 - Weather and/or climate modification
- 3 - Biotic or land form modification
- 4 - Employment and/or business activity modification
- 5 - No effect
- 6 - Residential plat expansion

Randomly distributed, not in order of administration of interviews

<u>Respondent</u>	<u>Location</u>	<u>Age</u>	<u>Mining</u>	<u>Preferred Development</u>	<u>Length of Residence</u>	<u>Neg. or Pos. Effects</u>
1	?	3	No	5	3	-3, -2
2	?	3	Mixed	5	3	-3
3	4	5	No	5	5	-2, -4
4	2	5	No	5	5	-2, -3
5	3	5	No	5	4	-2, -3
6 ("No Comment)		?	-	-	-	-
7	1	4	Yes	1	5	+4, 5
8	1	4	Yes	1	5	+4, 5
9	L,?	5	Mixed	4,5	5	+4, +3
10	2	2	No	5	2	-2, -3, -4
11	2	3	No	3	3	-3, -4
12	2	4	Limited	1	4	+4
13	2	?	Yes	1	3	+4
14	2	?	Limited	1	2	-2, +4
15	1	?	No	5	5	-3, -2
16	2	?	No	5	5	-3, -2
17	RA	?	-	-	5	-
18	RA?	4	Mixed	-	3	-
19	L,1	3	No	5	3	-4, -3
20	L	?	-	-	3	-
21	L,?	?	Yes	1	3	-1, +4, -3
22	RA, 1	?	Mixed	1,5	3	-3
23	5, RA	?	No	5	-	-1
24	4, L	3	Mixed	5	-	-
25	4	3	No	5	4	-2, -3, -4

Respondent	Location	Age	Mining	Preferred Development	Length of Residence	Neg. or Pos. Effects
26	5, L	2	Limited	-	-	-
27	L, ?	4	No	1	2	+4, -3
28	?	3	No	5	5	-2, -1, -3, -4
29	Beach, L, 5	4	No	5	3	-1, -3, -2, -4
30	L, 1	4	Mixed	5	5	-1, -2, -3
31	RA, RA	4	Mixed	5	3	+4, -2
32	RA, ?	?	Yes	2	4	+4
33	RA, ?	?	Mixed	-	-	-3, -1
34	L, 2	?	Mixed	-	2	+4, -2
35	L, 5	3	No	5	-	-3, -2, -1
36	RA, 5	?	Neutral	-	-	-4, -1, -2
37	L, ?	5	Yes	-	5	-1, -2, -4
38	L, ?	4	No	5	5	-1, -2, -3
39	5, L	5	Mixed (No)	2	5	+6, -2
40	L, 1	3	No	5	5	-3, -1, -2
41	L, 1	4	No	5	2	-3
42	1	4	No	5	2	-3
43	2	2	No	5	?	-3
44	2	3	Mixed	5	4	-3, -2
45	2	3	Mixed	5	4	-3, -2
46	2	5	No	5	4	-3
47	2	5	Mixed	1, 2	5	-1
48	RA, 1	5	Limited	1, 5	4	-3, -2
49	3	3	Mixed	5	3	-3
50	3	3	Limited	1, 5	3	-

Respondent	Location	Age	Mining	Preferred Development	Length of Residence	Neg, or Pos. Effects
51	3	3	Mixed	1, 5	5	-3
52	3	3	No	5	3	-1, -3, -2
53	3	3	Mixed	5	3	-1, -3
54	L, 1	5	Mixed	5, 1	4	+4, -3
55	L	?	No	5	2	-2, -1, -3
56	3	5	No	5	4	-2, -3
57						
58	RA, ?	4	Mixed	1, 5	?	+4
59	L, 2	4	Mixed	1	2	+4, -1
60	L, ?	?	Yes	-	2	-1
61	L, 1	4	-	-	3	-
62	RA, 5	4	Yes	-	-	-
63	RA, 5	4	-	-	-	+4, -2
64	RA, 5	3	Yes	-	-	+4, -1, -2
65	3	5	No	5	5	-2, -3
66	3	3	Yes	-	3	-
67	3	1	No	5	5	-3
68	3	2	No	5	5	-3
69	5	5	No	5	-	-3
70	3	5	Limited	1, 5	5	-2
71	3	2	No	5	5	-3
72	3	3	Yes	1	5	-
73	3	3	Mixed	5, 1	5	-2, -3
74	RA, ?	3	No	3, 5	5	-1, -2, -3, -4
75	3	2	Mixed	5	5	-2, -3

Respondent	Location	Age	Mining	Preferred Development	Length of Residence	Neg. or Pos. Effect
76	5	5	No	5	-	-2
77	1	3	No	3, 5	3	-3, -1
78	1	3	No	3, 5	3	-3, -1
79	2	3	No	3, 5	3	-2, -3, -1
80	2	2	No	3, 5	3	-2, -3, -1
81	5	2	No	5	-	-2, -3
82	2	5	No	3, 5	2	-2, -3, -1
83	2	5	No	3, 5	2	-2, -3, -1
84	5	2	No	3	1	-4, -1, -2, -3
85	5	2	No	3	1	-4, -1, -2, -3
86	1	4	No	5	2	-3
87	1	4	No	5	2	-3

APPENDIX B

City of Bridgman Ordinance 47  
Article VII

14 1971 BRIDGMAN ZONING ORDINANCE No. 47

3. Yard Requirements:

(a) Setbacks: Each lot or parcel of land on which a building shall be erected shall have a front yard of not less than 45 feet in depth, measured from the edge of a public or private highway or street right-of-way. In the event a building is to be erected on a street or highway (public or private) on which there are existing buildings or structures having front yards of less than 45 feet depth, such new construction shall not have a front yard of less depth than the average depth of previously constructed buildings within two hundred (200) feet on either side of such building to be erected.

(b) Side Yards: Every industrial building erected on any lot or parcel of land with sidelines of record shall be so located that the side yard on each side of the building shall be not less than fifteen (15) feet in width; provided, however, that in the event a side line of a lot or parcel of land on which an industrial building is to be erected abuts on a lot or parcel of land zoned for residential purposes or upon which a dwelling exists, then the side yard next to such abutment shall be not less than twenty-five (25) feet in width.

(c) Rear yards: Every industrial building hereafter erected shall be so located that the rear yard shall be not less than twenty-five (25) feet in depth.

(d) Problem Lots: In the event that it is impracticable or would create hardship to comply with the provisions of this Section of this Article as to any corner lot, odd shaped lot, or lot with unusual terrain, then the Zoning Board of Appeals may specify setback, side yard and rear yard depths and widths less than is required by the provisions of this Ordinance.

4. Accessory Buildings: There shall be no limitation on the number or kind of accessory buildings permitted in this district, except that said accessory buildings shall conform to the restrictions above provided for main buildings as to yard requirements.

5. Parking Facilities: No building or addition to an existing building shall be erected in this district until the owner thereof provides off-street parking for employees, visitors and salesmen. One (1) parking space for each two employees, based on the greatest number of employees expected to be at work at any one time or period, shall be provided. A sufficient number of additional spaces shall also be provided to accommodate visitors and salesmen. Provided, however, in case it is impractical or would create

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undue hardship to comply with the provisions of this section of this Article, the Zoning Board of Appeals may specify parking facilities less than those required by the provisions of this Ordinance. All of the provisions of Article V, Section 6 relating to off-street parking are made a part of this Section and are incorporated herein by reference.

6. Off-street Loading Facilities: The requirements of off-street loading facilities in the Industrial District shall be the same as provided in Article V, Section 7 of this Ordinance.

7. In addition to provisions for off-street parking and loading zones, every application for a building permit in this district shall provide a plan for material storage and screening so as to eliminate unsightly open storage of materials, equipment, and supplies. Each application for a permit in this area shall also provide for appropriate landscaping and plantings so as to preserve and improve the physical appearance of the District.

8. Prohibition Against Reducing Lot Areas: No lot area in this district shall be so reduced by sale, division or by the erection of additional buildings or structures so that the yards or other open spaces shall be smaller than prescribed by this Ordinance nor shall the total area of any lot be reduced below the minimum requirements herein established.

ARTICLE VII.

PLANNED DEVELOPMENT DISTRICT

1. Description and Purpose: This district is intended to permit and control the development of pre-planned areas for compatible use of the various uses provided and allowed by the City of Bridgman Zoning Ordinance and Building Ordinances and for other special uses not so provided, including, but not limited to, residential, agricultural, hospital, outdoor theatre, public and private schools, philanthropic institution, college, golf course, country club, shopping center, research and development center, private club, community swimming pool, marina and other recreational facilities, service type business, commercial industry and industrial park and commercial or industrial extraction of natural resources. Provided, however, the use of any land in this District for any trailer park, mobile home park or trailer court is expressly prohibited. It is intended that this District shall afford each type of use reasonable protection from encroachment or interference by other incompatible land uses, and that reasonable protection be afforded to uses adjacent to this district. Areas may be zoned under this district when problems of size, shape, terrain, topography, or natural resources may require special regulation.



Zoning under this section of any area in the City of Bridgman and all proceedings in regard thereto, shall be done with due consideration for maintenance of reasonable conditions regarding emission and transmission of injurious or obnoxious noise, vibration, gas, smoke, dust, dirt, control of erosion and blowing sand, litter, odor and light glare, traffic congestion, drainage, lateral land support, effect on property values, light and air, overcrowding of persons, sanitation, general appearance of the area, and other similar considerations having an effect on public health, safety and general welfare of the people of the surrounding community.

## 2. Procedure:

(a) Any area of the City of Bridgman not presently zoned as a Planned Development District under this Ordinance may, by appropriate amendment to this Ordinance, be placed in a Planned Development District with or without application therefor by the owners of property in said area.

(b) Before any land is developed or improvements made in this District the owner or other interested party shall obtain approval of a Preliminary Development Plan and a Final Development Plan as herein provided.

(c) Preliminary Development Plan: The owner or other interested party shall submit to the City Planning Commission a Preliminary Development Plan, together with an application for approval thereof, setting forth in general the proposed uses to be made in the District, and including any then existing or proposed arrangement of streets, lots, rail spurs, access points, buffer strips, and rail, water, highway or other transportation arrangements, and the relationship of the tract of land involved to surrounding property. Approval of the plan by the City Planning Commission may be conditioned upon suggested changes in the plan which are in accord with the spirit, purpose and intent of this section and the ordinances of the City of Bridgman.

Final approval of a Preliminary Plan shall be by the City Commission, after receiving the recommendations of the Planning Commission thereon and shall incorporate the Preliminary Development Plan by reference. It shall also specify the permitted uses which shall exclude any other uses.

(d) Final Development Plan: Development or improvement of lots or areas within said District after

approval of a Preliminary Development Plan shall be accomplished by submission to the City Planning Commission of a Final Development Plan which shall include such of the following information as the City Planning Commission finds reasonably necessary to consider said plan:

(1) A plot plan based on an accurate survey showing location of present and proposed buildings and improvements, streets, railroads, lots, buildings, drives, parking lots, water and sewer lines and topographical features, including contours at a regular interval, ditches, water courses, ground cover and other pertinent physical features of the site.

(2) A description of the proposed operation in sufficient detail to indicate the noise, smoke, odor, vibration, dust and dirt, control of erosion and blowing sand, noxious gases, glare and heat, fire hazards, industrial wastes and traffic which may be produced by such operation.

(3) Engineering and architectural plans for controlling problems of the type enumerated under item (2) above, if deemed necessary by the developer, or if required by the City Planning Commission or their authorized representative.

(4) Preliminary architectural sketches or a general statement as to the type of construction and materials to be used in any proposed buildings or structures.

(5) The period of time within which the project will be completed.

(6) Additional information which the City Planning Commission or its authorized representative, may find reasonably necessary to evaluate the proposed development and its effect on surrounding areas.

(e) If the City Planning Commission shall determine that the proposed land use as shown on the Final Development Plan might have an enervating, debilitating or offensive effect on adjacent properties, whether industrial, commercial, residential or other, through the effects of noise, smoke, odor, dust and dirt, control of erosion and blowing sand, noxious gases, glare and heat, vibrations, fire hazards, industrial wastes or traffic, the City Planning Commission may require the Owner, through the use of qualified technical persons and acceptable testing techniques, to demonstrate the devices which shall be utilized.

ized to control the factors determined to be offensive. Upon acceptance by the City Planning Commission of such control devices, they shall be incorporated as a part of the Final Development Plans.

(f) The City Planning Commission in connection with approval of any application for a Final Development Plan may require reasonable undertakings by the applicant to guarantee and assure by agreement, including a performance bond to be posted by applicant, or by some other reasonable surety arrangement at appropriate stages of the Planned Development, that the development will be executed in accordance with the approved plan.

(g) Each plan shall make provision for material storage and screening of that area, off-street parking, loading zones, traffic patterns, landscaping, green strips, buffer zones, control of erosion and blowing sand, and other reasonable incidents of planning a development.

(h) The City Planning Commission shall consider the Final Development Plan and shall, when appropriate, direct that specific changes be made to conform with the spirit, purpose and intent of this Ordinance.

Approval or disapproval of a Final Development Plan shall be by the City Commission after receiving the recommendations of the Planning Commission thereon. A copy of said Final Development Plan, if approved, shall be transmitted to the City Clerk for filing with the City of Bridgman Zoning Ordinance.

(i) The City Planning Commission and City Commission are specifically authorized to require the recording of a plat in connection with any such application when such would be required by the Subdivision Control Act, being Act 288 of 1967 for the State of Michigan.

**(j) Sand Mining or the removal of soil resources:**

After the effective date of this Ordinance, no sand mining or the removal of any soil resources shall take place or continue if such operations have begun before the effective date of this Ordinance in the City of Bridgman unless and until a permit for such operations is first obtained from the City of Bridgman. All such applications for a permit for sand mining or the removal of other soil resources made to the City shall first be referred to the City Planning Commission for study, review and recommendations thereon. In addition to any or all of the other conditions and requirements of Article VII of this Ordinance,

titled, "Planned Development District", the applicant for a permit for mining sand or removing any other soil resources shall meet but not by way of limitation, the following requirements:

(1) No final permit for the removal or mining of sand or other soil resources shall be issued without the prior approval of the City Planning Commission and after a public hearing thereon. Notice of such public hearing shall be given by publication in a newspaper circulated in the City of Bridgman at least ten (10) days before such hearing is to be held.

(2) All changes in the natural contour of the land during mining operations shall be maintained as safe for any person having reason to be in the area of mining activity and for all children who might trespass upon the premises. The owner shall be responsible for taking such protective steps and measures as may be necessary to satisfy and secure public safety.

(3) No business, industrial structures or commercial buildings shall be erected without the prior approval of the City Planning Commission, except where the sand mining activity occurs in a commercial or industrial district where such buildings are a permitted use.

(4) No truck parking or truck storage area shall be located within two hundred (200) feet of any adjacent residence, or within fifty (50) feet of any adjoining property.

(5) All removal operations shall be screened either with a well maintained painted wooden fence or landscape screening or the planting of green belts as may be required in the discretion of the City Planning Commission.

(6) No part of the sand removal operation shall take place closer than two hundred (200) feet to the nearest adjacent residence or closer than one hundred (100) feet to any street line, or adjacent property line, without the prior approval of the City Planning Commission.

(7) Where quantities of sand or earth are to be removed from a parcel, a topographic contour plan of proposed restoration elevation shall be presented to the City Planning Commission. No removal permit shall be issued unless the City Planning Commission finds that the restored ele-

vation will be compatible with the surrounding areas and suitable for subsequent development for uses compatible with that district and that adequate safeguards are provided to insure and protect adjacent property from blowing sand and dust and that the property in question will be restored by the replacement of top soil and that such soil shall be stabilized and continuously maintained by appropriate plantings indigenous to the area in its natural and undisturbed state.

(8) All truck traffic shall be directed away from residential streets and traffic patterns shall have prior approval of the City Planning Commission.

(9) The City Planning Commission may require a surety bond in such amounts as it deems necessary to insure that the requirements and conditions of the permit are fulfilled, and may revoke permission to operate and continue the removal of said sand at any time when the conditions precedent to the issuance of the permit for removal are not being fully met.

(10) Trees and vegetation shall not be stripped off of dunes or hills preparatory to sand removal so as to unnecessarily expose large areas of sand subject to wind erosion that will cause sand and dust to be carried by the wind onto adjacent and adjoining properties or public or private streets and create a nuisance thereby. Insofar as it is practicable to do so, hills and dunes shall be bared or stripped in limited areas and only with the prior approval of the City Planning Commission so as to limit and restrict bared areas to sections where active day to day sand removal is being carried on, so as to avoid unnecessary erosion, blowing sand and dust. The City Planning Commission may at any time, after written notice to the owner, and with or without a public hearing thereon, limit any and all further stripping of dunes or further stripping of trees and vegetation from dunes or hills, until all areas previously bared are cleaned up, top soil replaced and stabilized by plantings thereon.

(11) All areas where sand has been removed to the finished grade as established by prior approval of the City Planning Commission, are required to be restored, the top soil replaced and stabilized so as to prevent erosion and the blowing of sand and dust onto adjacent property,

streets and highways. The restoration of top soil, planting of trees, grass or other suitable ground cover indigenous to area in its natural state shall be made by the owner of the sand mining operation and maintained in a continuous state of live growth to the end that erosion will be prevented, the blowing of sand and dust eliminated and the property restored so as to present as nearly as possible, except for contour, its natural state before the sand removal was begun. Such restoration, plantings and maintenance thereof shall be at the sole expense of the owner of the sand mining operation. Failure to comply with the restoration and maintenance of the land as hereinabove provided, after written notice to the owner, shall result in the revocation of the owner's permit to continue the removal of sand or other soil resources in the City of Bridgman.

(12) Where operations are carried on next to residences and where the noise created by earth moving machinery and trucks is such that the operation would unreasonably disturb the peace and tranquility of the occupants of such residences, the City Planning Commission may require as a condition of the issuance of a permit for sand removal that the operations be limited and restricted to the hours between 8:00 a.m. to 8:00 p.m. daily, except for Sunday, or such other reasonable restrictions as to time of operation that might be necessary, in the discretion of the City Planning Commission to preserve the peace and quiet of the neighborhood.

(13) It is considered essential to the public health, safety and general welfare to conserve and protect in its natural and undisturbed state all of the Lake Michigan Dunes Area within the City of Bridgman lying between the waters of Lake Michigan and extending inland perpendicularly from said water line to the rear line of the first principal range of sand dunes now bordering Lake Michigan, as more particularly shown on the attached map which is incorporated herein by reference. Sand mining in this area is expressly prohibited. This area shall be reserved and restricted for the development of parks, playgrounds, recreational facilities, with Inns and Lodges for accommodation of guests, uses permitted in the Residential "A" District and such other uses as may be approved by the Planning Commission and the City Commission as being

compatible with the preservation of the natural beauty of the area for the enjoyment and benefit of all present and future inhabitants. Except for uses permitted in Residence District A, all other uses in this area shall be granted only after the approval of a Preliminary Development Plan and a Final Development Plan, as part of a Planned Development District, submitted by the owner or other interested party to the Planning Commission and the City Commission. Special consideration has been given in planning the development and preservation of this Dune area so as to preserve this first principal range of dunes as a natural buffer to the storms generated on Lake Michigan for the future safety and protection of all the inhabitants and to prevent erosion, blowing sand and the shifting of the dunes that results from disturbance of the natural vegetation stabilizing the area. Accordingly, any Planned Development District in this Dune Area shall give special attention and consideration to good conservation practices which will preserve the natural beauty of the area as well as avoiding practices that would or might result in erosion, blowing sand and disturb the stability of the area.

3. General Provisions:

(a) In order to be zoned as a Planned Development District, the proposed area shall consist of at least five (5) acres.

(b) No transaction or use substitution privilege provided elsewhere in this Ordinance shall apply to this District.

(c) All of the provisions of the zoning, building and other ordinances of the City of Bridgman, shall control in this District except where inconsistent herewith in which case the provisions of this district shall supercede and control any other such provisions. In the event an area is developed under this district, for residential, commercial or industrial purposes, then all requirements of the other provisions of this Zoning Ordinance, including but not by way of limitation, requirements relating to lot areas, setbacks, side yards, and rear yards shall be observed as provided elsewhere in this ordinance for such uses.

(d) Appeals may be made to the Board of Appeals as provided in this Ordinance.

(e) In the event that any section, clause or provision of this section shall be declared by a Court to

be invalid, the same shall not affect the validity of this section as a whole, or any part thereof than the part so declared to be invalid.

ARTICLE VIII.

GENERAL PROVISIONS

1. Scope: Except as otherwise provided in this Ordinance, no lot or parcel of land and no new building, structure or part thereof shall hereafter be erected, constructed, located, moved or used for the purposes other than in conformity with the provisions of this Ordinance; and no existing building, structure or part thereof shall hereafter be reconstructed, altered or used for purposes other than in conformity with the provisions of this Ordinance.

2. Non-Conforming Use Regulations:

(a) Continuance of Non-Conforming Use: The lawful use of any parcel of land, or building or structure existing at the effective date of this Ordinance, although such use does not conform with the provisions hereof, may be continued except as hereinafter provided, and provided further that such non-conforming use of any such parcel, building or structure shall not be enlarged or extended beyond the use existing at the time of enactment of this Ordinance.

(b) Changes in Non-Conforming Uses: Whenever a non-conforming use is changed, in whole or in part, to a conforming use, such changed use shall not thereafter be modified or changed to any non-conforming use. A non-conforming use of a building or premises may, however, be changed to a kindred non-conforming use by the owner or occupant thereof, providing that such owner or occupant shall first submit to the Board of Appeals a written application setting forth fully the particulars and purposes of the change, and the Board of Appeals shall determine that the proposed change will not materially injure the appropriate use of other premises in the vicinity or the occupants thereof and will not be detrimental to the public health, safety and welfare; and, if the premises are located in or close to a residential neighborhood, will not detract from the desirability of such neighborhood as a residential area. If the application is approved, the Board of Appeals shall issue a Certificate of Approval accordingly.

(c) Discontinuance of Non-Conforming Uses: If any non-conforming use is discontinued through vacancy of the premises, lack of operations or otherwise

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