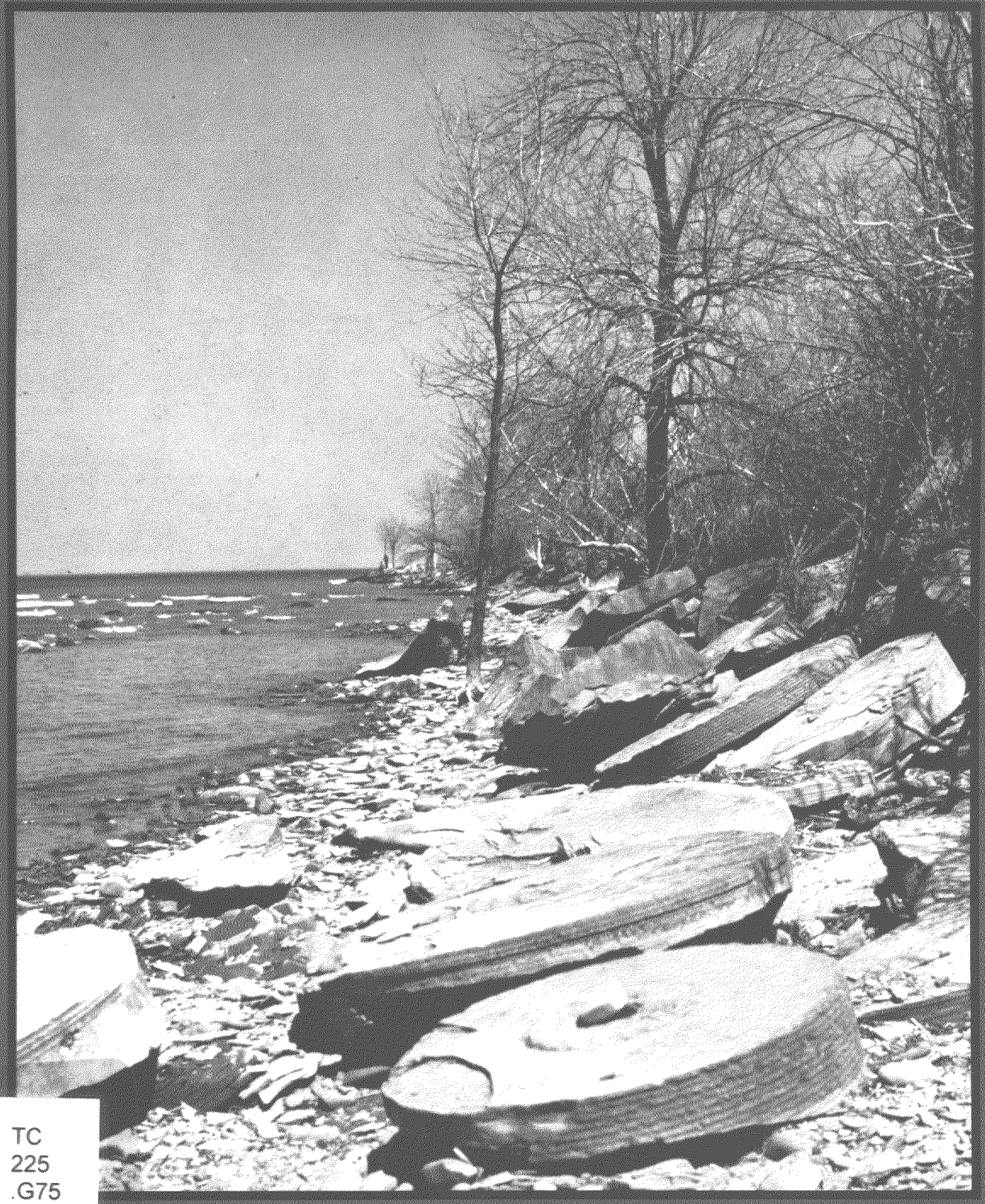
Coastal Management Study

Grindstone City



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Grindstone City

Grindstone City, Michigan
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I. Introduction

Background

Grindstone City was once the location of a thriving grindstone quarrying industry. Commercial quarry activity began in the 1830s and continued for nearly the next 100 years, finally ceasing in the early 1930s. The legacy that Grindstone City embodies is a rich history of early American industrial activity. The artifacts and knowledge of a technology no longer utilized and the culture and architecture of early American industry and life provide unique interpretative opportunities. Presently, Grindstone City is a small, unincorporated community providing seasonal recreation opportunities to residents and tourists visiting the upper thumb area of Michigan. The Grindstone City harbor provides a ramp and docking facilities for recreational boating. The two jetties surrounding the harbor have become active fishing sites from early spring to late fall. Private commercial operations provide services to seasonal trailer homes and visiting tourists. Grindstone City also supports a small summer cottage population.

Grindstone City's historical significance was first officially recognized by an historical site survey conducted by the Michigan Historical Commission in September 1956. As a result of the survey, Grindstone City was designated as Michigan Historical Commission Registered State Site No. 95. Additionally, in 1971, Grindstone City was entered in the National Register of Historic Places as an historic district. Its significance, as described in the nomination form, is based on 19th and 20th Century "Commerce," "Industry," and "Architecture."

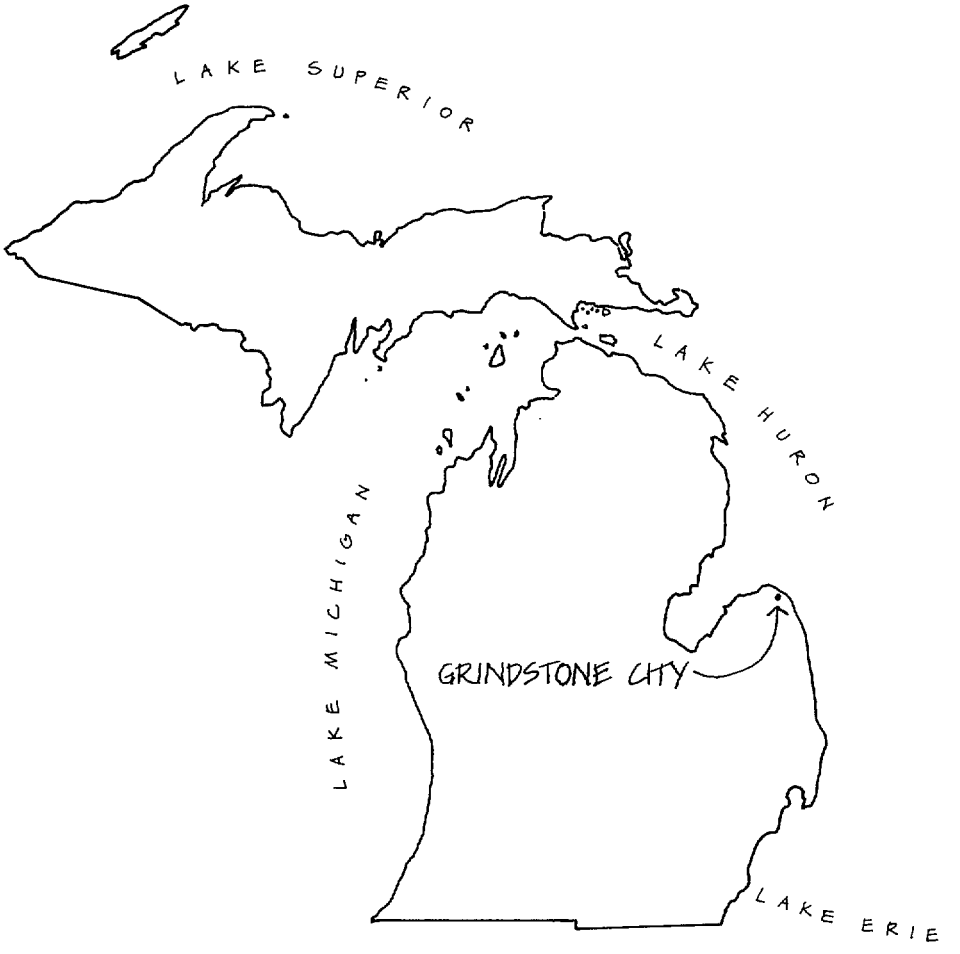
Grindstone City has also been designated an **Area of Particular Concern** (APC) by the Coastal Management Program of the Land Resources Programs Division of the Michigan Department of Natural Resources (MDNR). The Michigan Coastal Management Program is funded through its participation in the National Coastal Management Program. The National Program is a result of the Federal Coastal Management Act of 1972, P.L. 92-583. This Act established a national policy "to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations." Through federal grants, it encourages States to exercise effectively their responsibilities in the coastal area by the development and implementation of management programs to achieve the wise use of the land and water resources of the coastal zone.

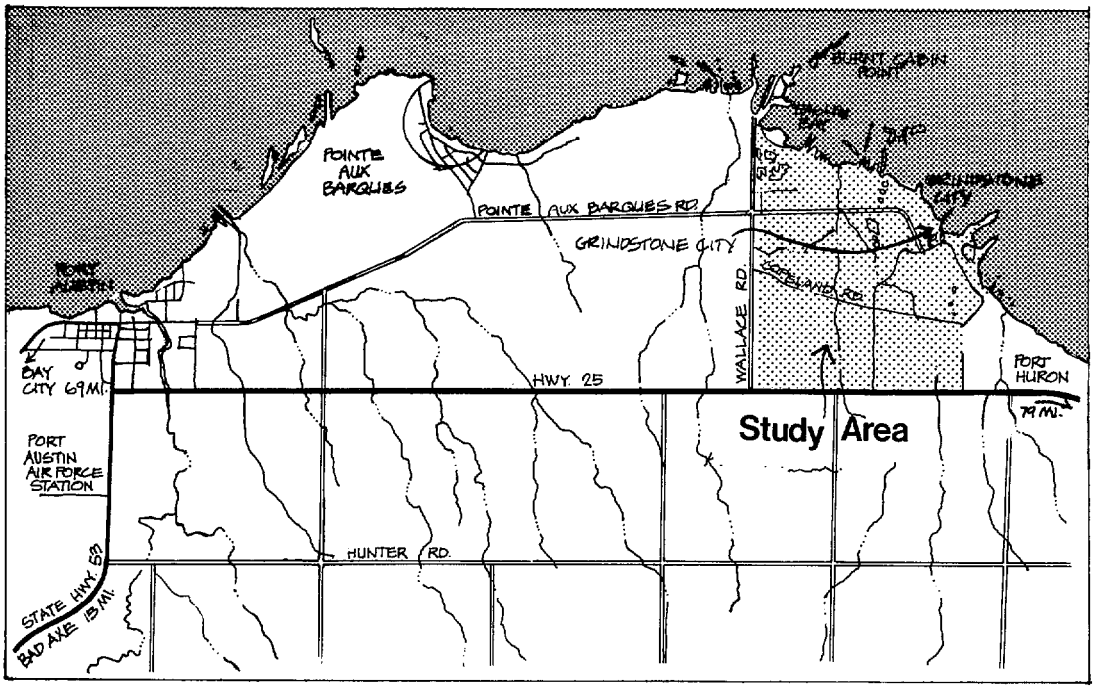
The Area of Particular Concern designation was granted after Grindstone City was nominated for such a designation by private citizens and by the East Central Michigan Planning and Development Region (Region 7). Because of the scarce and unique nature of Grindstone City's historic, cultural, and industrial resources, it was selected as a high priority Area of Particular Concern. This provided the impetus for studying the problems and opportunities available to protect the valuable coastal resources of Grindstone City.

This study addressed the need for a Comprehensive Management Plan for the Grindstone City coastal region. Within the Plan, an emphasis was placed on three primary tasks that were identified: to investigate the possibilities of preserving historic Grindstone City resources; to investigate the water supply and waste disposal problems experienced in Grindstone City; and to investigate issues relating to the continued erosion of the man-made north jetty located in the Grindstone City harbor. This report presents the findings and recommendations of the Grindstone City Coastal Management Study.

Format of the Study

The study was performed in two stages. The first stage involved preliminary fact-finding and analysis; the second involved the development of conceptual alternatives and determination of final recommendations. In conducting the first stage of analysis, a series of field trips to the Grindstone City area was made. During these field trips, aerial and land photographs were taken, and initial interviews were held with community members and representatives. Previous studies on Grindstone City were also reviewed.


LAKE SUPERIOR
LAKE HURON
LAKE MICHIGAN
GRINDSTONE CITY
LAKE ERIE


POINTE AUX BARQUES
POINTE AUX BARQUES RD.
GRINDSTONE CITY
WALLACE RD.
SEELAND RD.
PORT AUSTIN
BAY CITY 69MI.
HWY. 25
PORT HURON
79 MI.
Study Area
PORT AUSTIN AIR FORCE STATION
HUNTER RD.
STATE HWY. 53
BAD AXE 15 MI.

The preliminary analysis served to identify the major resources available in the area, and the constraints preventing their full utilization. In particular, the analysis identified: citizen resistance to successful implementation of any potential improvements; the nature, condition and quality of the historical remnants in the area; the recreational and environmental potential of the coastal area; and the economic, administrative, and fiscal resources available to the Grindstone community for successfully implementing a strategy of revitalization and resource management.

The preliminary analysis also identified the major factors which limit or direct the development and use of the resources in the Grindstone City area. The major physical constraints identified and examined were area water supply problems, waste treatment and disposal problems, and the erosion of the north jetty.

The first phase of the study was concluded with the first of three public workshops held in Grindstone City. The first workshop was used to identify the goals of the community and ensure community participation in the Coastal Management Study. Our preliminary observations were presented and an open session was held to confirm that our information and observations were correct. At the workshop, the observations were broadened and modified and other issues and concerns were raised. The first workshop served to help establish a set of performance criteria used to develop conceptual alternatives to manage Grindstone City resources.

Following the first workshop session, several conceptual alternatives were developed for the study area. These alternatives addressed possible solutions to the water supply and waste treatment problems as they affect the Coastal Zone and Historic District, and the preservation of the historic resources, including the relics, jetties, and quarries of the Coastal Zone and Historic District. The alternatives are discussed in Chapters III, IV and V of this report.

The alternatives developed were presented at the second Grindstone City workshop. In the second workshop session, the alternatives were evaluated and those not favored by the community were eliminated. Modifications were made to the remaining proposals to more clearly reflect the community's goals. The result of the session was a direction for the further development of one of the alternatives into a plan for physical improvements and resource management. Following the workshop, the selected alternative was further refined and modified. Preliminary engineering designs and estimates of the costs of specific improvements for jetty stabilization, historic preservation and site improvements were prepared.

At the final workshop, the refinements of the alternative selected by the community at Workshop II were presented and reaction noted. Following the workshop, preliminary plans and engineering designs for site improvements were finalized and illustrated with graphics and this report summarizing the recommended actions and improvements was produced.

II. Summary of Management Recommendations

Overview

The overall objective of the Coastal Management Study was to develop a comprehensive Management Plan for Grindstone City. The Plan addresses all aspects of the coastal region including water supply and waste disposal problems, the problems associated with tourist flows in the area, the problems of shoreline erosion, and the preservation and presentation of historic resources. The study team has worked closely with officials, representatives, and community members in an attempt to devise a plan which would take advantage of the area's resources.

After investigation and analysis was carried out the final proposals were presented at the third workshop. Concerns regarding the proposals were raised by some local residents. The concerns expressed focussed on the fact that local matching funds would be needed to support the proposed improvements and the likelihood that any improvements to the area would increase tourist traffic flows. Some residents felt that the proposed improvements did not warrant the expenditure of any local funds. The prospect of increased traffic flow also brought further doubts about the proposal since residents associated noise, litter and vandalism with tourism. It must be noted, however, that at all three public workshops interest was expressed that some action should be taken. Improvements to harbor facilities were endorsed by many. Interest in the historic preservation proposals was also present but somewhat less evident. Overall, the interest expressed for the proposals was, however, less than unanimous. Therefore this study recommends that the Coastal Management Program should not actively pursue the proposed program of improvements at this time.

If local support and cooperation does become clearly evident then we believe that the Coastal Management program should support and assist in the implementation of the study proposals. With sufficient evidence of local commitment we would recommend that the following series of actions be taken.

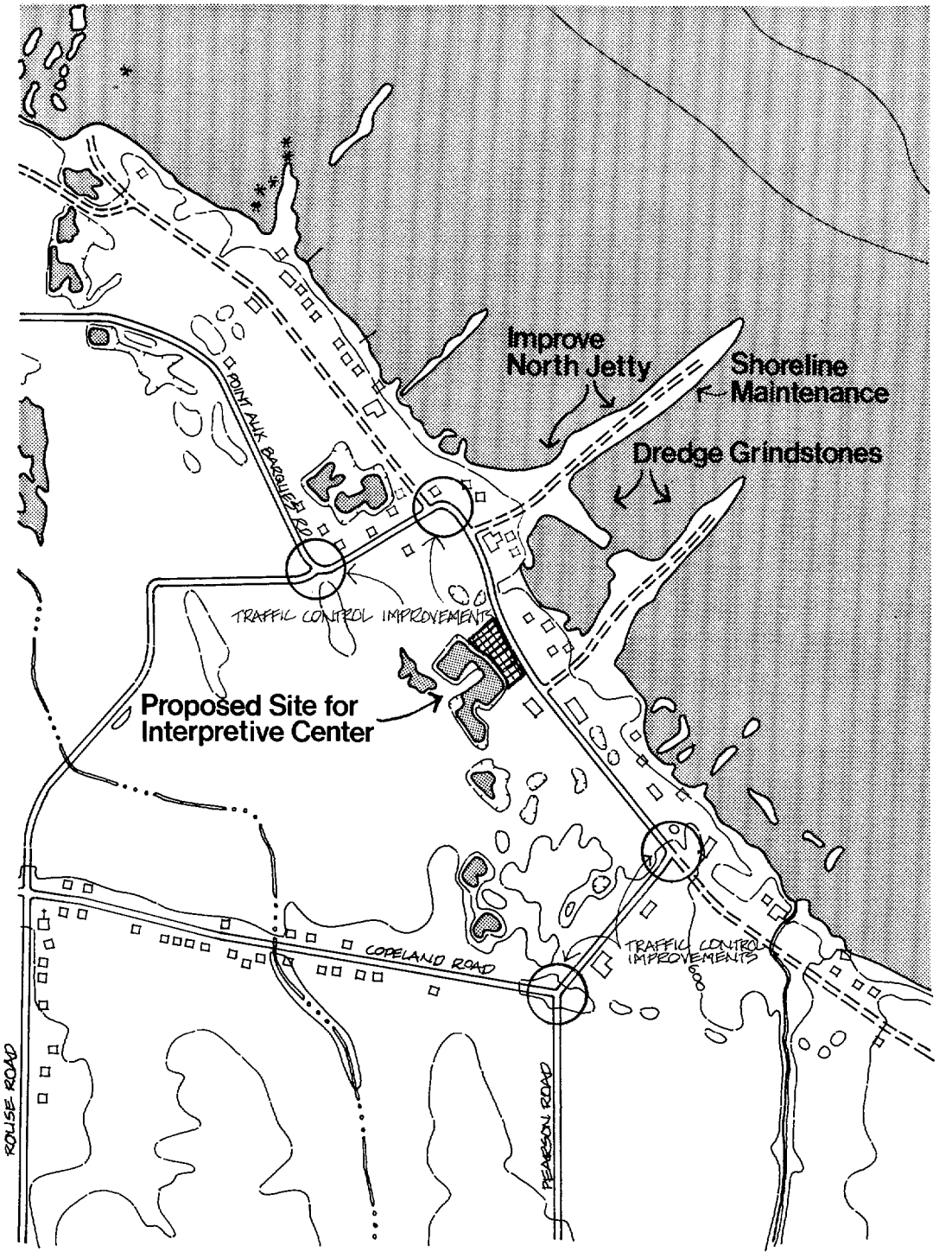
Recommendations

The recommendations that follow address the resource related issues investigated during the study. The basis for these recommendations are discussed in Chapters III, IV, and V of this study. The recommendations are presented in detail in Chapter VI of this study.

The historic resources of Grindstone City are in need of identification and protection. In attempting to preserve grindstones and other quarry remnants, this study recommends the development of the third historic preservation proposal, the Grindstone City Interpretative Center. Weighing the advantages and disadvantages of this proposal against the other posposals has led to this recommendation. This proposal is fully described in Chapter III and the cost estimates and design specifications are provided in the Appendix, Section B. At a development cost of approximately $45,000 (exclusive of land acquisition costs), it is felt that this proposal will adequately achieve the goals of the historic preservation project in a cost effective manner.

A plan of improvements and actions relating to the Grindstone City harbor area is also being recommended for consideration and implementation.

The series of recommended improvements to the north jetty is designed to achieve many objectives. This study recommends that an underwater survey of the location and extent of grindstones in the harbor be made, and where feasible, the stones should be hauled to the sides and top of the existing north jetty. This action would improve navigation in and out of the harbor area, preserve the grindstones, and provide protection to the jetty and harbor area. This study would recommend an annual minor shoreline maintenance effort, composed primarily of filling-in blow-out points and repositioning displaced grindstones. A major shoreline maintenance effort is recommended for every five to ten years, or, after a season of severe weather conditions.


Improve
North Jetty
Shoreline
Maintenance
Dredge Grindstones
POINT AUK BARGE RD
TRAFFIC CONTROL IMPROVEMENTS
Proposed Site for
Interpretive Center
CODELAND ROAD
TRAFFIC CONTROL
IMPROVEMENTS
ROUSE ROAD
PEARSON ROAD

Recreational improvements to the north jetty are felt to be warranted and justifiable. The package of improvements recommends regrading the roadway on the jetty and the laying of a gravel roadbed. Two parking areas with a total capacity of 56 cars are recommended. The tip of the jetty would be improved to provide additional fishing opportunities. Improvements would include the construction of a floating fishing dock on the inner harbor side of the jetty. A picnic area with tables and benches is proposed at the base of the jetty. This would serve all visitors and users of the north jetty and Interpretative Center. Finally, landscaping and signage improvements are recommended for the north jetty. Design specifications and cost estimates are provided in the Appendix, Section A.

In response to local complaints of frequent tourist intrusions and tresspass into residential areas, the study recommends certain traffic control improvements to be implemented. The study envisions Pearson and Pt. Aux Barques Roads as the major access routes in and out of the Grindstone City area. From Route M-25, signs directing traffic to Grindstone City and the Grindstone City Public Access Area indicate the use of Pearson Road. This study would recommend no alteration in location. If the development of the Interpretative Center is completed, then entrance signs should also be placed at the Intersection of Route M-25 and Pearson Road.

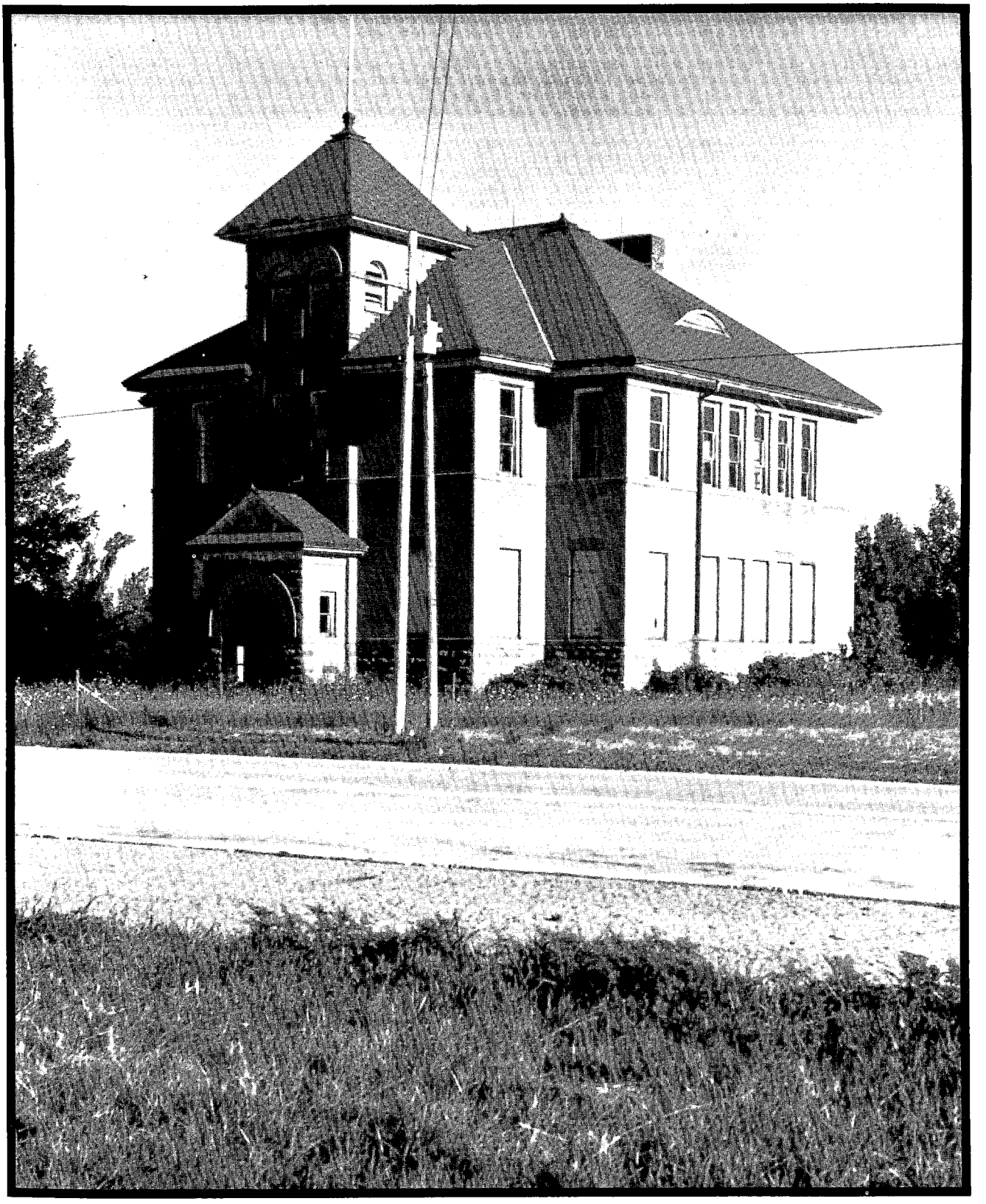
For traffic in Grindstone City, a series of traffic control signs is proposed. Signs indicating "NO THROUGH TRAFFIC" would be posted on Copeland and Pt. Aux Barques Roads at their respective intersections with Pearson Road and on Rouse Road at Pt. Aux Barques Road. A sign indicating "NO THROUGH TRAFFIC – DEAD END" would be posted on Quarry Road at Pt. Aux Barques Road.

The study recommends that no present action be taken concerning potential water supply or waste disposal services. Our investigations indicate that any solutions would be so costly as to preclude their implementation.

Obtaining protection for the Grindstone City School would be a worthwhile effort for local concerns. This could be accomplished by applying for recognition of the structure on the State and Federal Historic Register. This would also make funds accessible for the purchase and preservation of the Grindstone City School House. The structure is currently for sale.

The study recommends an increased law enforcement effort in the Grindstone City area. This effort shuld be jointly shared by local residents and law enforcement officials. Efforts should be made to reduce vandalism. Pilferage of grindstones and artifacts can be better controlled. This study also recommends increased enforcement of existing local zoning ordinances. In order to preserve the coastal resources of the Grindstone City region, enforcement of the local zoning ordinances is a necessity. This study recommends that local interests "watch dog" for zoning violations and other unlawful acts and report occurrences to the proper enforcement agents.

III. Historic Preservation



Background

As indicated by its name, Grindstone City was, at one time, host to a thriving grindstone industry. The operations of the industry are well documented by local residents, many of whom worked in the quarries or witnessed the operations. Written histories, postcards, photographs and 16mm movies are available to reconstruct and document much of Grindstone City's past.

Physical evidence of the quarry industry is prominent throughout the Grindstone City area. Old quarries in various phases of development still exist. Some are dry, some water-filled. Numerous slag heaps of quarry stone wastes can be found. Grindstones of all sizes and in various phases of completion are observed throughout the region. In addition, artifacts of the mining industry have been collected by some of the local residents, and include many tools used in the operations.

Few structures remain from the period when the grindstone industry was still active. After the shutdown of the industry, many houses and buildings were moved away from the Grindstone City area. The Grindstone City Railroad Depot was moved to Port Austin where it now houses the Port Austin Township Fire Department. Those buildings used by the last quarry operators, the Cleveland Stone Company, were either removed, or demolished and the ruins sold. Only four structures of major historical significance remain today. These are the Grindstone City School House, the Wallace Mill building, the A. G. Peer building, and the Methodist Church. The A. G. Peer building and the Wallace Mill building were built in 1884 and 1887, respectively, and are both located in the Grindstone City Historic District. Both buildings are currently in use and are privately owned.

A primary overall objective of any historic preservation project is to document, preserve and make available for interpretation historic resources. Through discussions with local residents and officials, area planners, representatives of the MDNR, and the first public workshop, other objectives were identified. Of immediate concern to local residents were issues relating to traffic control, vandalism, and trespass on private property. These problems already exist in Grindstone City and throughout the upper thumb area. Residents were opposed to any development which would increase the likelihood of occurrences of these disturbances to the local lifestyle. Accordingly, the planning effort took these concerns into account.

Issues and Proposals

The result of the planning effort was the creation of a set of criteria sensitive to local needs and concerns, while attempting to preserve and protect the historic resources of the old grindstone industry. These criteria became the basis by which four historic preservation proposals were formulated.

The criteria utilized are the following:

1. Scale of Development: Any development should strive to maintain the character of the area. The development should not promote a dramatic increase in tourist flows through the Grindstone City area which may serve to disturb the character of the area. The development should be suitable to accommodate present tourist flows and to serve the additional tourism indicated by long-term growth patterns. The development should be in scale with the character of the area.

2. Protection from Vandalism: Local vandalism should be considered a problem. Any development should be protected from vandalism. Any development should be carefully planned so as to not promote further vandalism in the area.

3. Strengthen Community Image: Any development should help to centralize Grindstone City. The area is dispersed and additional development should attempt to unify an image as opposed to promoting the further spread of the central Grindstone City.

4. Traffic Control: Any plan should address tourist traffic control through the Grindstone City area. A plan should attempt to reduce stray traffic intrusions into residential areas. Recommendations for road and signage improvements should be addressed.

5. Safety: The issue of safety becomes acute when quarry interpretation is considered. Any proposal should give full consideration to personal safety when quarry interpretative activity is contemplated.

6. Costs: Any proposal must be cost effective. Expenditures need to be justified by tourist usage and realizable benefits. A proposal should be cognizant of possible and probable funding sources.

7. Management and Maintenance Requirements: Any proposal should address but minimize necessary management and maintenance. A proposal should include realistic and feasible management and maintenance considerations.

8. Historic Preservation: Each proposal should ultimately document, preserve and make available for interpretation the historic resources of Grindstone City and the Grindstone Quarry Industry.

Using the eight criteria, the following four proposals were developed and presented at the second Public Workshop. These four proposals are briefly described below:

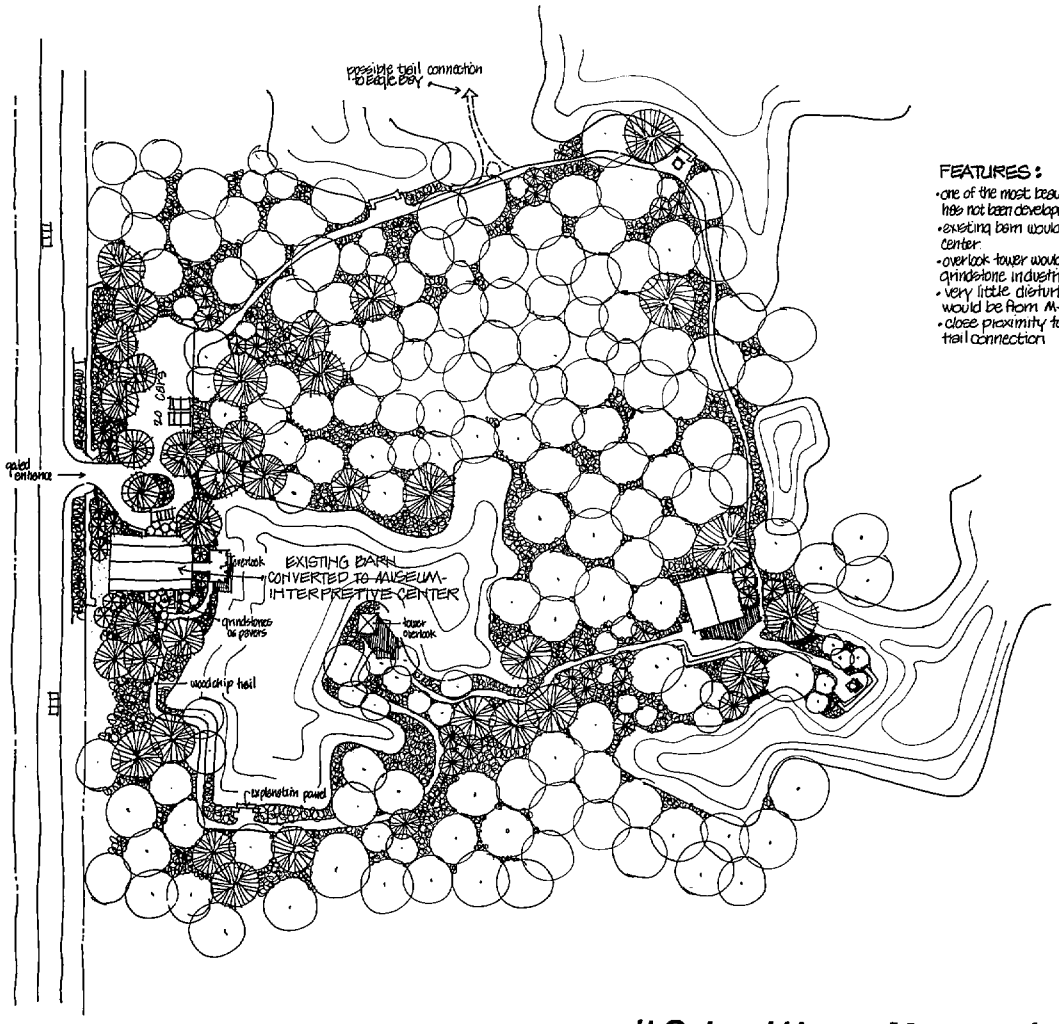
The proposal involves the renovation of an existing barn structure located on Wallace Road. The barn is situated on one of the more beautiful quarries in the area. The proposed development would be composed of two phases. This would help to spread the costs over a longer period of time and allow for the development to more evenly match the growth in regional tourism. The first phase involves the renovation of the existing barn facility into a museum/interpretative center. The structure would house exhibits, displays, and artifacts. The first phase would also provide for the construction of a 20 car parking area and an overlook deck situated on the quarry. The estimated cost of the first phase is $94,500.

The second phase proposes the construction of a lookout tower and trail system. The lookout tower would provide views of Lake Huron, Grindstone City, and the surrounding countryside. The trail system would circle the quarry and link the museum/interpretative center to the lookout tower. Possible future additions would link the trail system to the Eagle Bay Public Access Area, less than one-quarter mile away. The estimated cost of the second phase is $25,000.

The project would ultimately require access to, or acquisition of, approximately 11 acres of land. The costs of land acquisition are not included in the cost estimates provided. The total two-phase project is estimated to cost $119,500, exclusive of land acquisition costs.

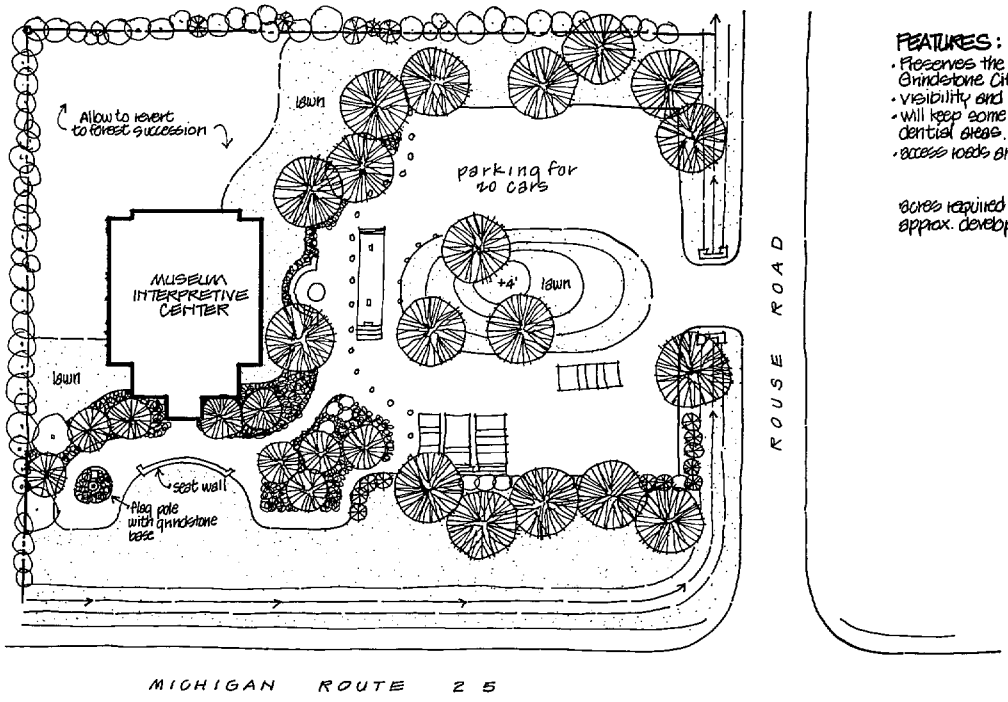
The major advantages of this proposal are minimized impacts to residential areas and close proximity to the Eagle Bay Public Access Area. The proposed location has exceptional visual qualities and would support and increase usage of the Eagle Bay Public Access Area. The major disadvantage is that its location does little to enhance the central Grindstone City tourist/recreation area. The exposure to the quarry also raises potential safety concerns. Ground maintenance and upkeep costs are a consideration, especially with the development of a trail system. It is also contemplated that a half-time management position would be required.

I. Eagle Bay Quarry Interpretive Center



FEATURES:
- one of the most beautiful grindstone quarries in the area that has not been development oriented.
- existing barn would be converted to museum-interpretive center.
- overlook tower would provide visitors with an overview of grindstone industrial sites and the harbor area.
- very little disturbance to existing residents - access would be from M-25 along Wallace road.
- close proximity to Eagle Bay access area - possible trail connection

II. School House Museum Interpretive Center



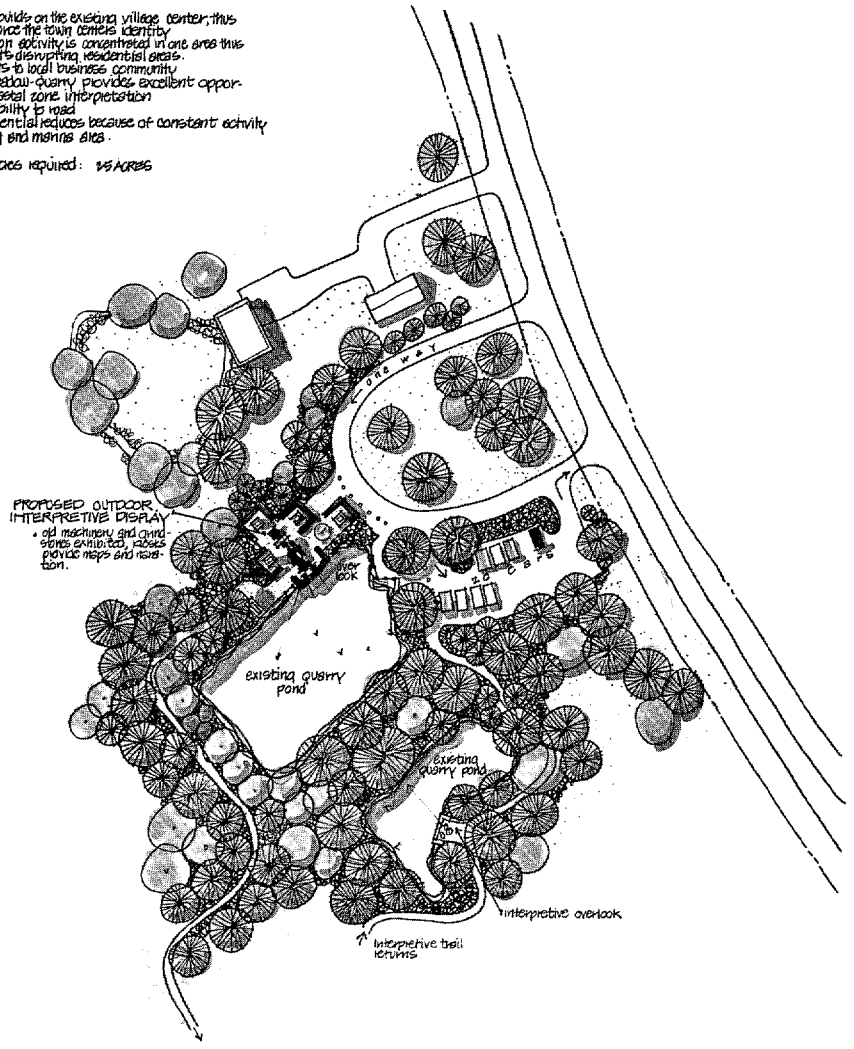
FEATURES:
- Preserves the architectural heritage of the old Grindstone City School
- visibility and access along M-25 excellent
- will keep some traffic from roving through residential areas.
- access roads and site preparation costs minimal

acres required:
approx. development cost:

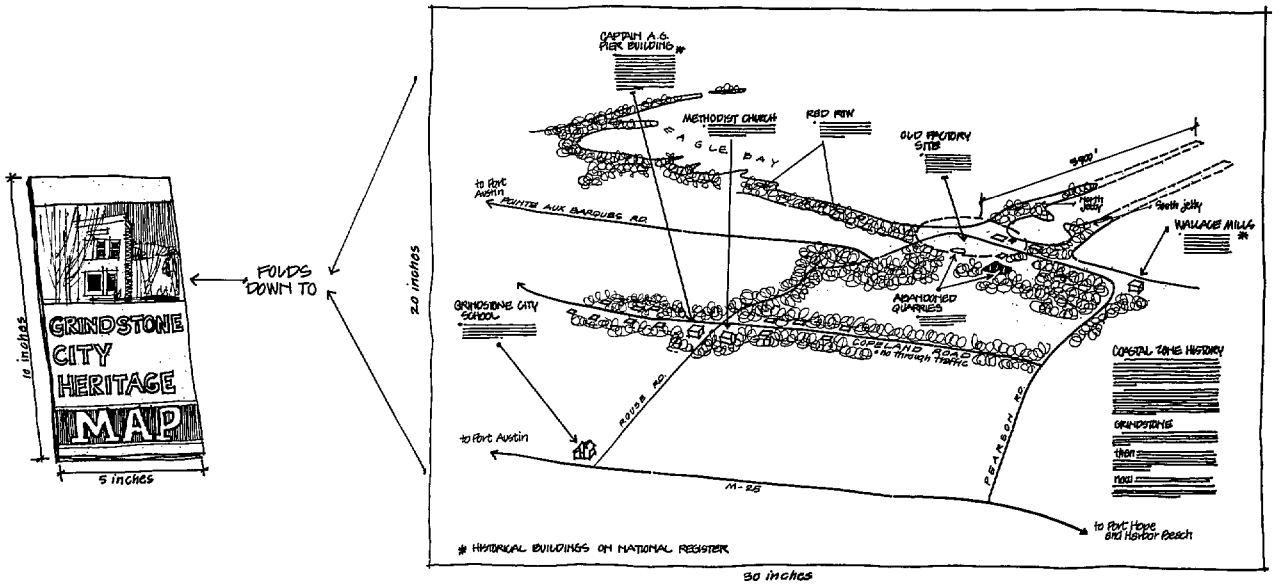
III. Grindstone City Interpretive Center

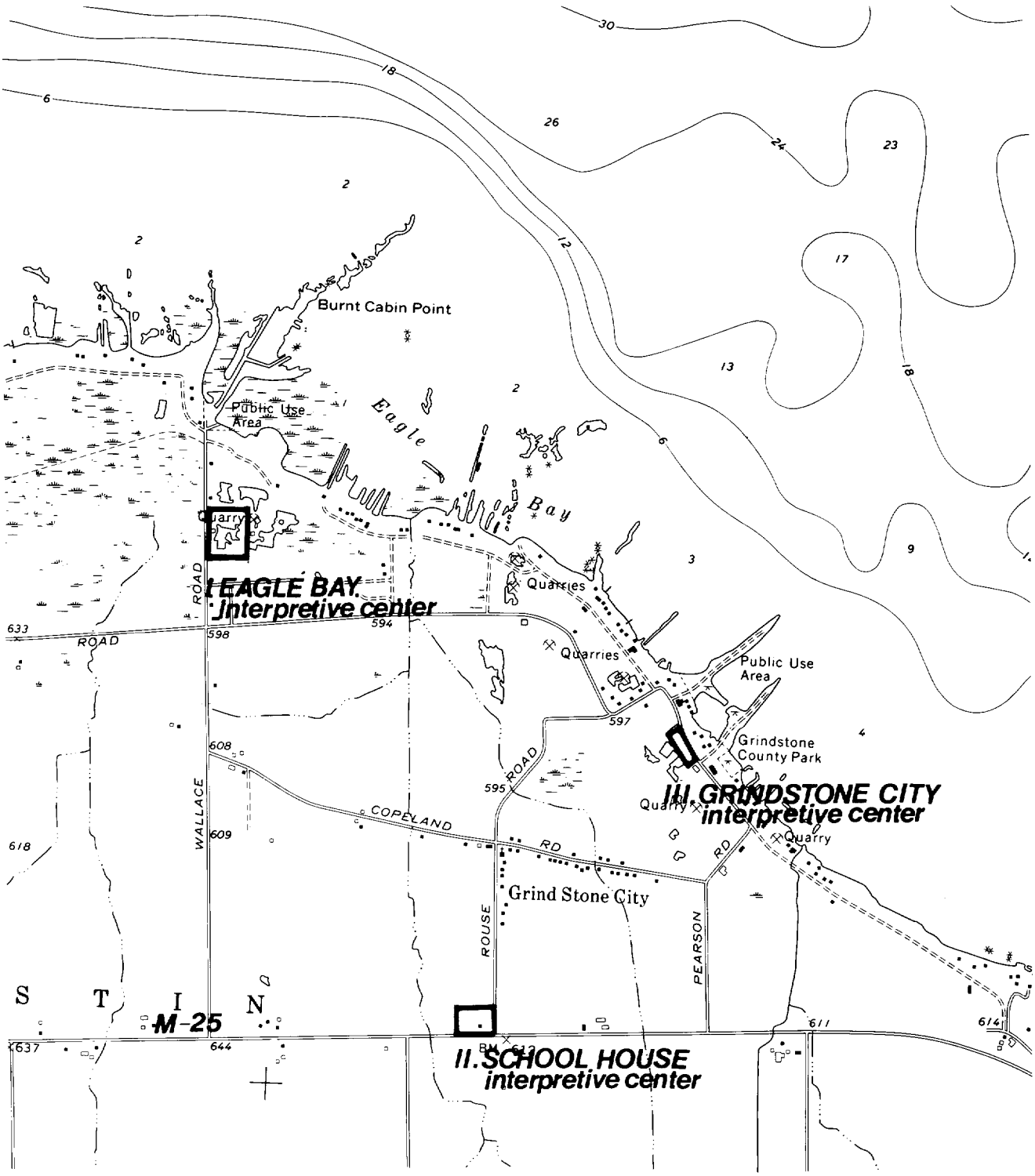
FEATURES:

- This alternative builds on the existing village center; thus helping to reinforce the town centers identity
- Tourist/recreation activity is concentrated in one area thus reducing tourists disrupting residential areas.
- Obvious benefits to local business community
- Trail through meadow-quarry provides excellent opportunities for coastal zone interpretation
- Excellent visibility to road
- vandalism potential reduces because of constant activity around camping and marina area.
- Approximate acres required: 25 ACRES



IV. Minimum Development Proposal




Burnt Cabin Point
Public Use Area
Eagle Bay
Quarry
I EAGLE BAY interpretive center
ROAD
633
598
594
Quarries
Quarries
Public Use Area
597
608
595
ROAD
Grindstone County Park
III GRINDSTONE CITY interpretive center
Quarry
Quarry
COPELAND
RD
RD
618
WALLACE
609
Grind Stone City
ROUSE
PEARSON
S T I N
M-25
637
644
611
614
BM 612
II SCHOOL HOUSE interpretive center
30
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II. School House Museum Interpretative Center

This proposal suggests the renovation and adaptive re-use of the old Grindstone City School House. The School House would be completely renovated, featuring a two-story central space with a loft corridor along the inside of the building's outer walls at the second level. Artifacts and large equipment, including turning lathes, would be situated on the ground floor. The second level loft corridor would be used as a gallery; the walls would contain displays, photographs and exhibits. The center of the second floor would be open, revealing a topside view of the first floor displays. This proposal also includes outdoor displays and a parking area for 20 cars.

The vast majority of the cost involves the renovation of the School House. The outside facade would be left intact, preserving the architectural heritage of the structure. The development of this proposal would be completed in one phase. The total development cost, exclusive of property acquisition, is estimated at $241,000. Approximately one acre of land would need to be acquired.

The positive features of the School House proposal particularly involve its location. Situated on Route M-25, the School House provides excellent visibility to Grindstone City, its heritage, and its lake access. The School House Museum would allow for better information and direction of traffic flows, thereby, reducing unnecessary intrusions into residential areas. The School House structure also provides physical protection for the displays and artifacts. This proposal would also serve to protect one of the few architectural remnants of the old Grindstone City heritage. The School House proposal minimizes exposure to liability, since direct quarry access is not provided.

The primary constraint of the School House proposal is high building renovation costs. This proposal also does little to enhance or reinforce the central Grindstone City recreation/tourist area. The School House Museum would provide few natural interpretative opportunities. Initial site development and ongoing maintenance costs should be low. However, seasonal management would be necessary, involving a half-time management position.

III. Grindstone City Interpretative Center

The proposed center would be located on Pt. Aux Barques Road in the present-day central Grindstone City area. The Center would be situated between the north and south jetties, allowing for a conceptual linkage of the three opportunity centers. The development would involve an outdoor open air shelter for Grindstone artifacts and displays. The facility would provide encased displays showing various artifacts, grindstones, photographs, and written text describing the ecology of the coastal region, the history of the quarry industry, and the grindstone manufacturing process. Grindstones, large artifacts, and large machinery would be anchored in the ground. The open air shelter would help to protect the exhibits from extreme weather conditions. Information kiosks would be located around the shelter.

The information kiosks would explain the history of Grindstone City and the Quarry Industry, quarry operations, and coastal region history and ecology. The displays would allow for the viewing of grindstones and artifacts. The encased displays would protect the artifacts from theft and weathering. Larger artifacts, including grindstones and turning lathe equipment, would be anchored to the ground to prevent theft. The main displays would be protected by an open air canopy.

The location would provide visual access to a water-filled quarry and would be within a short walking distance to either the north or south jetties. A parking area for 20 cars is provided for in the proposal. The estimated cost of improvements, exclusive of land acquisiton costs, is $45,000. Approximately 1 or 2 acres of land would need to be acquired.

The advantages of the Grindstone City Interpretative Center are location and costs. The location permits the conceptual linkage of the Interpretative Center to the north and south jetty developments. These jetties are an important part of the Grindstone history and the location of the three sites within a short walking distance should serve to strengthen the appeal and importance of all three developments. This allows visitors to the area to enjoy varied experiences. The location of

toilet facilities on the north and south jetties avoids such an expense for the Interpretative Center development. The parking areas located at all three sites would provide overflow capabilities for each individual site. The location of the Center within walking distance to the jetties serves to reinforce the historical significance of the man-made jetties.

The location of the Interpretative Center in the existing Grindstone City recreation/tourist center should improve traffic flow, strengthen the image of the Grindstone City center and support local business establishments. The proposed location would not promote more dispersion within Grindstone City. The location also permits visual and physical access to grindstone industry quarries and to the coastal area.

This proposal involves a minimum of development costs, $45,000, exclusive of land acquisition costs, while accomplishing the primary historic preservation goals: documentation, preservation, restoration, and interpretation of the coastal region history. The proposed Interpretative Center would involve no management efforts because of its open air design. An ongoing maintenance effort would be essential. Maintenance requirements would include grounds maintenance, garbage removal, and the periodic upkeep and maintenance of the displays.

The constraints relating to the proposal involve the potential safety hazards of locating near the quarries and the maintenance efforts required. The design does take into account safety measures; however, by providing exposure to a water-filled quarry, the likelihood of accidents increases. The open air shelter provides minimal opportunities for vandalism, but does not provide the full degree of protection to the artifacts and displays that an enclosed, lockable facility would provide.

This proposal addresses those criticisms expressed against more intensive plans. The minimum development proposal has two components, a system of roadside historic markers and the creation of a Grindstone City Heritage Map. The primary goal of the Minimum Development Plan is to document the history of Grindstone City and to make it available to the public. Seven historic markers would provide pertinent text on the history of the Quarry Industry, its relation to the coastal region, and the industrial techniques of the grindstone industry. The Heritage Map would locate the historic markers and provide a more complete but generalized historical account. The historic markers were proposed for the following locations:

1. Captain A. G. Peer Building.
2. Grindstone City School.
3. Methodist Church.
4. Location of Red Row.
5. Wallace Mills Building.
6. A suitable old quarry site.
7. Entrance to north jetty.

The most attractive feature of the minimum development proposal is cost. Total development cost is estimated at approximately $15,000. No property acquisition is proposed. Exposure to liability is eliminated, as are management and maintenance costs.

The deficiency of this proposal is its failure to provide direct interpretative opportunities. This proposal would not preserve or protect any physical features or artifacts of the Grindstone heritage. Without a location in which to interpret local history, the proposal would increase traffic flows through the major road system but should help to reduce undirected side excursions into the residential areas.

IV. Jetty Erosion

Summary of Findings

The following information was developed as part of the study team's investigation of the conditions and usage of the Grindstone City Harbor and jetties. The two jetties, protruding from the Grindstone City harbor, were initially designed to form a roadway which was used to transport the finished grindstones to ships anchored offshore in deep water. The construction of the original jetties utilized native materials, discarded grindstones, and quarry wastes.

The existing jetties or piers were constructed of cribs of wood filled with stone extending into the lake a distance of 2,900 feet providing a permanent and safe anchorage for lake craft. Upon these piers were laid rails which conveyed the grindstones and salt manufactured in the village.

At the present time, the piers extend approximately one-half their original recorded length, or 1,800 feet. The erosion is most noticeable at the ends of the jetties which are being exposed to the open lake. Based upon this information, there has been a reduction in jetty length of approximately 50 percent during a period of 50 to 75 years, suggesting that erosion has been rather constant, accentuated by periods of small, moderate or heavy storm years. Our investigation did not reveal any concise or factual information in this regard. Also, to be considered is maintenance work, stabilization of the side walls and roadway construction, which has been performed on an irregular basis by local and state agencies.

Over the years, there has been continuous erosion of the north and south jetties, primarily due to ice pressure and intensity and frequency of Lake Huron storms. A major lake storm has a potential to produce 8-foot high waves and 11-foot runup from incident waves. The lake levels are subject to cycles of high and low water elevations, varying as much as 2 feet in a single year. The highest lake level was recorded in June of 1886 and the lowest was recorded in March of 1964; the differential was 6.60 feet.

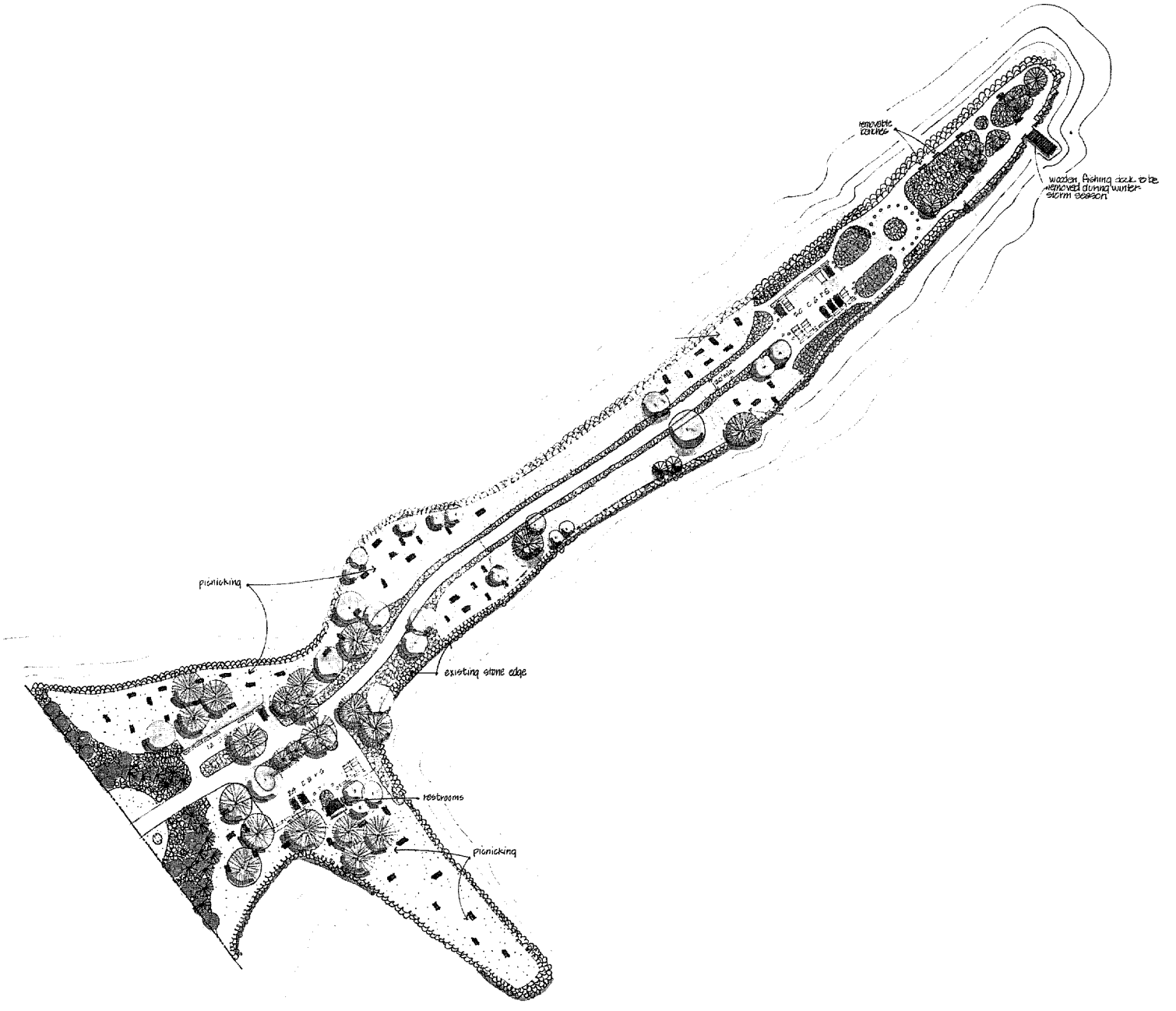
Additional erosion is due to the displacement and shifting of the bottom sand. As a result of many years of undermining and movement from both storm ice pressures, periodic maintenance is required to maintain an existing roadway at the top of the jetties, approximately 6 feet above the lake level.

The lake bottom surrounding the jetties is normally approximately 4 to 6 feet in depth, having a thin layer of sand over and extensive sandstone formation. The rock bottom presents expensive solutions for dredging, however, it does provide a stable foundation for the jetties.

The investigation of jetty erosion problems led to observations on the condition of the other harbor facilities. The south jetty appears to be in good condition. A combination of factors may be responsible. The protection afforded by the north jetty, along with mild storm activity over the last years, has contributed to the stability of the south jetty. The armoring of the south jetty with large rock material has been very beneficial. The MDNR launch ramp, parking facilities, and pit toilets were also in good condition. The walkway and, in particular, the retaining wall along the inner harbor are somewhat hazardous and in need of repair. The walkway and retaining wall are privately maintained.

Discussion with individuals in the area provided the following comments on the harbor area. The MDNR boat launch ramp was too shallow. Launching of large boats is difficult. The harbor and harbor channel are shallow and need dredging. The outer channel needs better marking. Underwater quarry material and grindstones need to be removed. Some reports of boat damage were heard. The validity of these claims, regarding the navigation in and around the harbor, needs further investigation.

Discussions also indicated that the harbor facilities are well utilized. Reports of insufficient slips and parking space were heard. This was witnessed during visits made by the study team. Capacity usage was evident during both peak and off-peak periods. Mention was made of the need to add another boat launch ramp. This did not appear warranted during the study team's visits.


removable railing
wooden fishing dock to be removed during winter storm season
picnicking
existing stone edge
restrooms
picnicking

Alternate Plans for Jetty Use

It would appear that there are three alternates available for future jetty use considerations:

1. Discontinue all present methods of maintenance and allow the jetties to erode.

2. Continue a limited, non-regular maintenance program, such as presently employed.

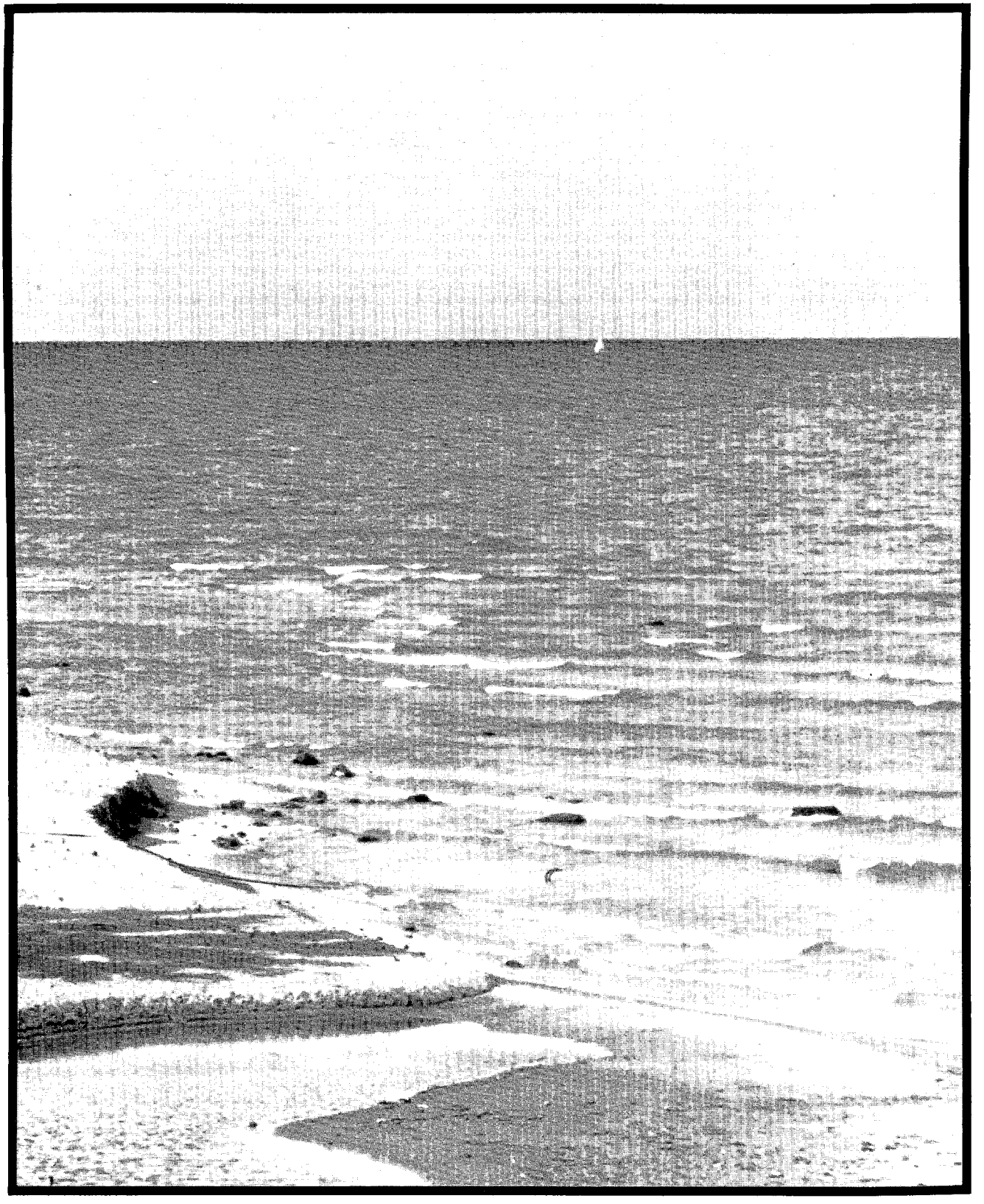
3. Construct a breakwater able to resist all major lake storms and to serve as a harbor of refuge for small power and sail boats.

The discontinuance of all maintenance is not a practical solution because of the historical importance and recreational usage.

Continuance of the present maintenance policies would possibly maintain the level of present services and use but would not provide for any future expansion of recreational facilities.

The construction of an adequate breakwater and small boat harbor would provide for future recreational facilities but would be costly. A breakwater for Grindstone City was included in a report prepared in 1974 and its cost was estimated in excess of one-half million dollars at that time.

V. Water Supply and Waste Disposal



As part of a comprehensive study of coastal resources and the factors affecting or constraining their use, the water supply and waste disposal problems experienced in the Grindstone City area were investigated. The extent and nature of the problems were investigated and are identified in this report. Possible solutions and recommendations follow the Summary of Findings.

Water Supply Findings

Grindstone City has experienced problems in obtaining an adequate supply of potable water due to the nature of the underlying drift and sandstone strata and its relative isolation from other areas which have developed independent sources of water supply. Water supply in Grindstone City as it exists today is not acceptable for the basis of any public system. For the present, the existing systems are being "tolerated" by the Huron County Health Department. Water from the old quarry areas is not of high enough quality to be used. Some drillers in the area have encountered salt brine where they drilled. The only "successful" wells are shoreline wells with some filtering being accomplished by the beach sand and crock or cistern-type wells. Quality and quantity are here again marginal.

Sedimentary rocks constitute 5% of the earth's crust but contain about 95% of the world's groundwater. However, any type of rock — sedimentary, igneous or metamorphis, whether consolidated (hard rock) or unconsolidated (sand & gravel) may be an aquifer if it is sufficiently porous and permeable. Sedimentary rock such as the sandstone bedrock under Grindstone City can possess excellent water-bearing properties. The presence of sandstone indicates a near-shore deposition in an ocean environment. It is principally silica (quartz) which is usually colorless. The wide range of colors seen in sandstone is due to the various agents that cement the grains together to form the hard rock. Sandstone develops from sands which have been transported by ancient streams and deposited in the sea. As layer upon layer of these sands were laid down, the weight of the upper materials upon the layers below compacted the sands. Deposition of cementing materials in the voids of the sand layers during and after compaction hardened them into sandstone. The water yielding characteristics vary widely because of the degree of cementation.

Partially cemented or fractured sandstones yield the largest amounts of water. Explosives are sometimes used to shoot rock wells such as a firm sandstone as a means of trying to develop capacity in a new well. A common method has been to shoot about a pound of dynamite per foot of hole throughout the most permeable portions of a formation. The purpose is to spall off the face of the open rock borehole, thereby removing any rock flour and chips which may be plugging the face of the bore or any existing fractures or crevices in the formation. Another method is to set off very heavy charges at predetermined points. This will fracture the formation radially outward from the borehole. Because of the many unknown factors, it is difficult to tell in advance whether the shooting operation will do any good.

The Grindstone City area has an average drift thickness of approximately 18 feet and wells installed in this drift are not recommended because of the probability of surface contamination. Design criteria as established by the Health Department authorities also dictates minimum depths, dependent upon the conditions encountered.

The drift is underlain with the Marshall Sandstone. The water is fresh above 80 feet but below 80 feet, salt water is encountered. A shale material acts as an acquiclude between the upper Marshall Sandstone and the overlying drift. Well yields in the Marshall Sandstone have not been good, averaging between ½ and 2 gallons per minute per well. Caseville has increasing brine problems to where they have gone down 230 feet and cased off the brine between 80 feet and 130 feet. Fresh water is apparently encountered again below the brine layer. There remains a possibility that fractured sandstone can be discovered or perhaps blasting can be employed to increase formation yield.

Infiltration gallery type wells along the lake shore are not protected from surface contamination and the "beach sand" may not be good water-bearing (flowing) sand so yields will not be spectacular. In addition, surface treatment would probably be required.

The following are possible sources of potable water supply in the Grindstone City area:

1. Deep rock wells in Marshall Sandstone.
2. Tubular wells in new river – Willow Creek Valley.
3. Infiltration gallery type wells along Lake Huron shoreline with ultra-violet purification or chlorination required.
4. Lake Huron deep-water intake (extending beyond the shallow water around Grindstone City) with a packaged water treatment plant.
5. Import water from Port Austin by tank truck with storage tank and booster pumps at Grindstone City.
6. Construct a six mile long transmission main from Port Austin to Grindstone City.

Reverse osmosis of brackish well water is not a viable solution because there is no convenient place (other than costly reinjection well) to dispose of contentrate (brine).

Grindstone City had opportunities in 1960 and 1970 to join in a municipal system. They could have gone in with Port Austin but chose not to at the time.

The only real feasible solution to the areawide problems would be to form a municipal service district or utilities association. The influx of new development might make such an endeavor appear to be financially attractive. However, much caution would need to be exercised since population demand can quickly out strip design capacities of a newly-organized public service utility. Consequently, initially a complete water-resource evaluation for the region would need to be undertaken which would require a great deal of detailed data and study. Such a survey has been started in part by the Huron County Health Department. They have identified the water problem sites and are in the process of gathering well log and pumping quantity and water quality documentation at each site. In addition, many well logs or existing private wells in the area are in their files and can be inventoried. When sufficient data has been compiled, a test well drilling program should be initiated to help locate proposed individual wells or well field locations. The study would be time-consuming and expensive, with no positive guarantee of being able to develop a potential water supply. However, the estimated cost of each stage of reconnaissance can be determined fairly accurately before hand and the project could be administered as a long-range, continuing project, thereby tailoring the annual costs for budgetary purposes.

For purposes of comparison, a presentation of area water conditions and systems in operation at the present time, is as follows:

- Grindstone City has a few deep wells, but most of the water is obtained from crock-type wells which are individually pumped and chlorinated. Excessive chlorides begin at about the 80 foot depth.
- Sleeper State Park has its wells in sandstone 120 to 150 feet deep and found that chlorides increase with depth.
- Caseville wells penetrate the shale where increasing chlorides necessitated casing off the upper 50 feet of the well. Hydrogen sulfide gas was also a problem.
- Port Austin wells were drilled to 150 feet when it encountered increasing chlorides. The wells were abandoned in favor of a lake intake.
- Port Hope has a 12-inch Lake Huron intake 1,365 feet in length and 10 feet deep.
- Huron Township - Lighthouse Park has a 4-inch Lake Huron intake 300 feet into Lake Huron and 7 feet deep.
- Point Aux Barques has a 6-inch Lake Huron intake 1,000 feet into Lake Huron 8 feet deep.

Waste Disposal Findings

The Grindstone City area has serious problems of waste disposal due to the nature of the underlying strata which consists of an average drift thickness of 18 feet underlain with Marshall Sandstone. The drift is fractured allowing surface contaminants to penetrate into the rock with seepage into Lake Huron. The present sanitary disposal systems employ the use of septic tanks which were constructed 20 or more years ago. The systems have operated beyond their design potential and do not meet present Health Department Standards, however, no action is being taken at this time to enforce improvements. The construction of new or improvements to existing private property septic tank system is not currently permitted by the County Sanitarian.

For purposes of comparison, a presentation of area waste disposal systems currently in operation are as follows:

- Sleeper Park has a sewage lagoon, 120 x 105 feet x 3 feet deep (5 foot maximum) with an overflow and sand filter bed.
- Eagle Bay has holding tanks.
- Port Austin is constructing a sewage lagoon system.
- Bad Axe has a waste water treatment plant but does not accept septic waste.
- Sandusky has an oil flush system for sanitary wastes.

It is noted that the south jetty has a public boat launching site and a 500 gallon pit type toilet which is maintained by a private contractor, The Trisch Company of Caro, Michigan. The entire jetty is State owned and maintained by the Michigan Waterways Commission. Pumpage and haulage of sanitary waste from State owned property is permitted by the County Sanitarian.

An additional problem encountered is that Grindstone City has no management group or established political entity which would be necessary for communications with Health Department authorities. All civil and legal affairs are directed by Port Austin Township or Huron County officials.

An investigation was made into the possibility of joining an area-wide system for the treatment of local sanitary wastes. This year the local populace of Grindstone City voted against participating in the Port Austin EPA 201 facilities plan program. This program, if implemented, would pay for part of the cost for the collection and treatment of sanitary wastes.

One of the main reasons why participation in an area-wide system is not feasible is simply that such systems do not exist within an acceptable distance. The cost of connecting the Grindstone City area to an area-wide system is prohibitive at this time.

Cost considerations would dictate that treatment of sanitary wastes would be located within the Grindstone City area based upon individual treatment or community treatment, subject to methods and treatment approved by the Health Department authorities.

Possible Improvements

The following description of sewerless methods of household waste disposal is provided. These systems could be implemented on an individual or communitywide basis. However, the adaption of any of these systems would need to be based upon an engineering and economic study, and approval of the Huron County Health Department.

a. *Incinerating Toilets:* In an incinerating toilet, high temperatures reduce waste to a sterile ash. Estimate of cost – $4,000 per household.

Advantages:
No contaminating water effluent. Can be used where water-flush systems prove economically prohibitive.

Disadvantages:
Dependence upon an energy source. High energy maintenance costs. Highly automated and require service. Some release of odors and gases to the atmosphere.

b. *Biological Toilets:* The operation of a biological toilet is based upon biological principles of waste digestion: body wastes are broken down by the action of enzymes and both aerobic and anaerobic bacteria. Estimate of cost – $3,000 per household.

Advantages:
No energy source is required. (May require a heating element in cold weather.) No carrier water is required. A compact unit.

Disadvantages:
Potential for odors. Weekly addition of freeze-dried packages of enzymes and bacteria. One quart of disposable effluent is generated each week. Renewal of charcoal filter beds.

c. *Recirculating Oil-Flush Toilets:* The principle underlying the oil-flush toilet is that urine and feces readily sink in oil to permit easy separation of the waste material from the carrying medium. Estimate of cost – $20,000 per household.

Advantages:
A family of 4 will generate a total volume of 400 gallons of waste each year utilizing 52,000 gallons of water as a conventional water-flush toilet. The oil-flush toilet uses no water and can be installed anywhere.

Disadvantages:
High initial cost. Energy and maintenance costs. Cost of periodic pumping.

d. *Composting Toilets:* In a composting toilet, human waste and kitchen wastes are decomposed by aerobic microorganisms to yield a humus-like material. Estimate of cost $6,000 per household.

Advantages:
The system uses no water. Small amount of humus generated may be applied to the ground. No moving parts, nor requirements for energy or chemicals. Maintenance free.

Disadvantages:
Aesthetic problem due to visible accumulated waste. An exhaust system and ventilating fan is required. Large holding tanks are required.

An alternate method of providing sanitary waste service to a community would be by providing a large common holding tank and a sanitary sewer system serving many households. Further considerations would include individual drains from each residence as part of the cost to the owner. Contracts for periodic sanitary waste pumpage and haulage would have to be approved before this method could be considered.

Further considerations for a community system would include a series of common holding tanks, use of grinders and force mains all designed to meet Health Department criteria and approval. Sanitary connections to individual dwellings would require an extensive investigation and would be expensive to construct. All construction, repairs, maintenance and operation would be administered by a governing body. An estimate of cost for this work would be dependent upon the area served.

The disposal of sanitary wastes at Grindstone City could be accomplished by construction a small prefabricated wastewater treatment plant. This system would be costly (in excess of one-half million dollars) and require the services of a trained licensed operator. In addition to the plan, a sewer collection system must be developed with connections made to each user thereof. An

effluent outfall into Lake Huron would be required. Annual charges would include chemicals and maintenance charges.

Conclusions

Our findings would indicate that there are viable solutions to the problems encountered with water supply and sanitary waste disposal, However, the estimate of cost is very high and the number of services is very small. Compounding the problem is the extremely poor soil conditions encountered in the area. Before any solutions are considered, it is imperative that the community establish a management group or political representation which would communicate with Health Department authorities. Engineering and economic studies would have to be made to provide a feasible and practical approach to the problems encountered.

VI. Conclusions and Recommendations

On the basis of the planning effort and the input received during the three public workshops, a set of recommendations has been synthesized. The recommendations comprise a Comprehensive Management Plan for the Grindstone City coastal region. The recommendations have been made after careful consideration of all of the issues raised and all of the public input received during the three workshop sessions. At each of the workshops, varying degrees of skepticism and hostility were expressed towards the planning effort and the recommendations made. It was evident that both support and opposition existed for each finding and statement made. At the final workshop, the major Coastal Management Study recommendations were presented. The objections most frequently voiced were in regards to local funding requirements and the probability of attracting more tourists through the area.

At all three public workshops, interest was expressed for some kind of action to be taken. Improvements to harbor facilities were endorsed by many. Workshop attendees recognized the need for the recommended harbor improvements and appeared willing to initiate local action for their implementation. Interest in the historic preservation proposals was also present, but less evident. Most participants endorsed the concept of historic preservation, but significant opposition was voiced against the expenditure of local funds for any historical preservation project. Some concern over additional tourist flows, resulting from physical improvements, was also expressed at all of the workshops.

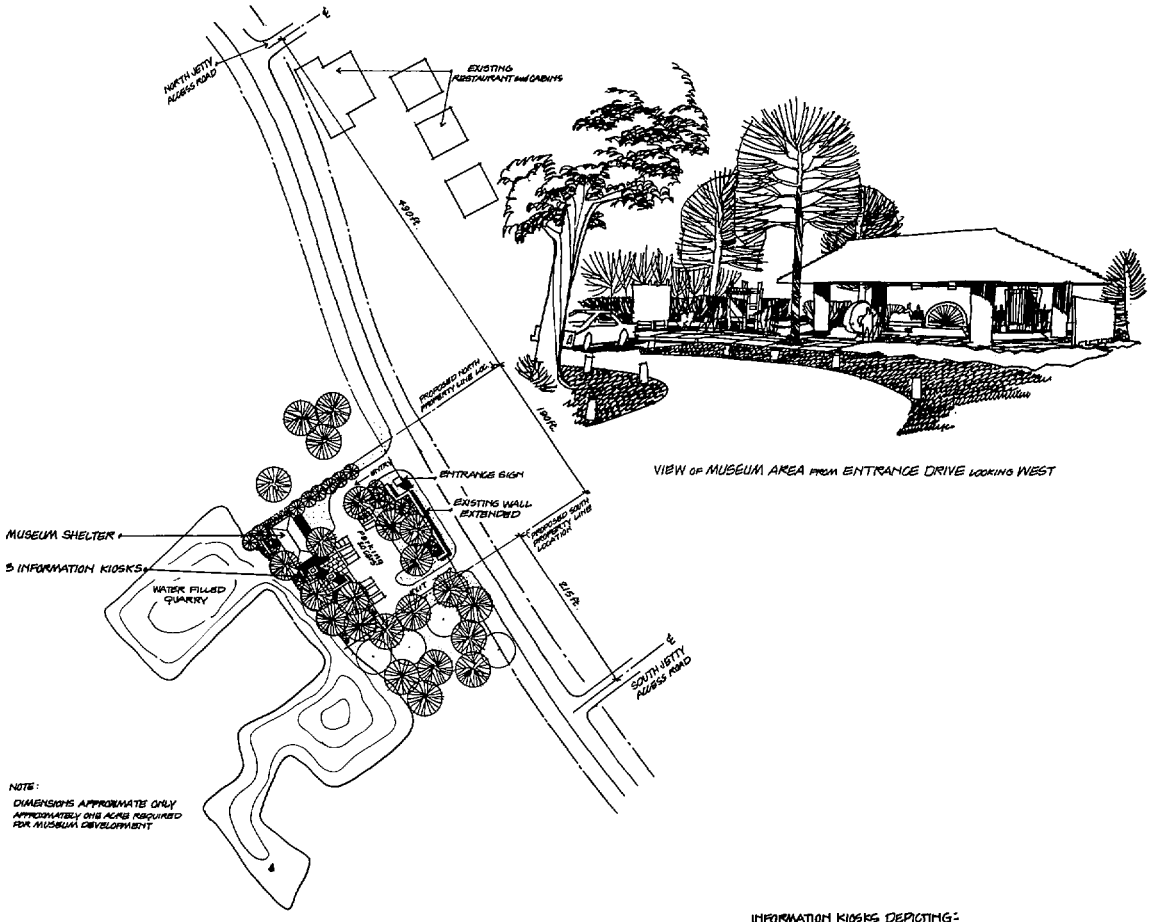
The study team has found it impossible to devise proposals which satisfy the primary objectives of preserving history and improving interpretative and recreational opportunities in the coastal area, while at the same time, meeting the design criteria, involving no cost or commitment to local interests, and excluding or preventing increased tourist interest. We believe our recommendations are sensitive to the concerns expressed and present the most sensible compromise.

Since the proposals were not overwhelmingly endorsed and since opposition to the study team's recommendations was evident, we recommend that the Coastal Management Program should not actively pursue any program of improvements in the Grindstone City area at this time. We believe that the Coastal Management Program should support and assist in the implementation of the study recommendations, but only if local cooperation and initiative are demonstrated. However, we feel that the evidence of local commitment, in the form of local government resolutions and with in kind or monetary support, should be locally initiated and pursued. If sufficient local support does develop and is demonstrated, then the Coastal Management Study would recommend that the following series of actions be taken.

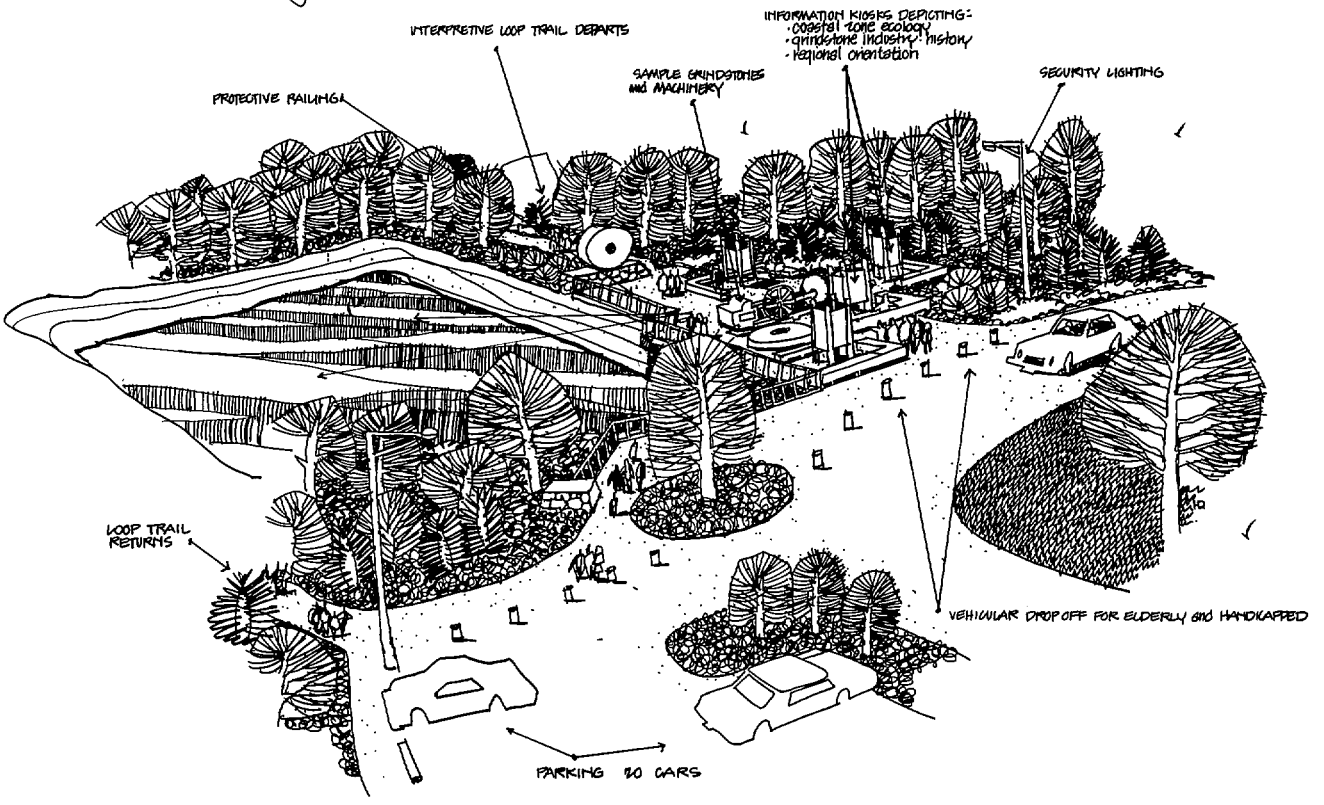
Recommendations:

1. **Historic Preservation** : Grindstone City's historic resources are in need of identification and protection. Only four major structures of historic significance remain: the Grindstone City School, the Wallace Mill Building, the Captain Peer Building, and the Methodist Church. The Wallace Mill Building and the Captain Peer Building are a direct link to the industrial activity and history of the area. Except for the Grindstone City School, each of these structures lies within the Federal Historic District. This provides legal protection to the architectural character of the structures, but suitable protection can only be insured if a concerted enforcement effort is maintained. An enforcement effort should be initiated by local interests concerned with the protection of the historical and architectural character of these structures.

Significant structural modifications have already been made to the Wallace Mill Building, subsequent to the granting of a Historic District for Grindstone City. An improved enforcement effort could prevent further diminuation of its historic and architectural character. Obtaining protection for the Grindstone City School could be a worthwhile effort for local concerns. This



VIEW OF MUSEUM AREA FROM ENTRANCE DRIVE LOOKING WEST



could be accomplished by applying for recognition of the structure on the State and Federal Historic Register. This would also make funds accessible for the purchase and preservation of the Grindstone City School House. Some residents fear that the structure may be torn down for its substantial scrap value. Currently the building is not in use and is for sale. It has been frequent target for vandals.

The pilferage of the main feature of the grindstone industry, grindstones, continues at a rapid rate. Grindstones located on the shoreline, jetties or underwater are the property of the State of Michigan and are protected by law. Stealing of smaller grindstones probably cannot be prevented but removal of the larger grindstones, especially by tow trucks and and other vehicles, can be reduced with adequate surveillance and enforcement. In attempting to preserve grindstones and other quarry remnants, this study recommends the development of the third historic preservation proposal, the Grindstone City Interpretative Center. Weighing the advantages and disadvantages of this proposal against the other proposals has led to the recommendation of the Grindstone City Interpretative Center. Significantly, this proposal received the most support from the local residents when judged against the other historic preservation proposals.

It is believed that the Grindstone City Interpretative Center would preserve the remnants, artifacts and history of the grindstone industry and would provide unique interpretative opportunities to area residents and visitors alike. At a development cost of approximately $45,000 (exclusive of land acquisition costs), it is felt that this proposal will adequately achieve the goals of the historic preservation project in a cost effective manner. The Interpretative Center will provide a location where local history can be organized, protected, and made available to the public.

A series of seven historic markers was proposed for the Grindstone City area. This concept was presented at the second Grindstone City workshop as part of the Minimum Development proposal (See Chapter III), but did not receive strong support. The system of markers was seen as increasing traffic disturbances in the area, while failing to adequately perform the function of interpreting local history. This system of markers is not recommended for implementation at this time. If the Interpretative Center is not developed, and/or if local attitudes become modified, then a system of historic markers should be fully considered once again.

During the final public workshop, the possibility of placing historical displays on the State-owned north jetty was raised. This suggestion was forwarded as an alternative to the recommended Grindstone City Interpretative Center. The major advantage of such a proposal is that the site is already State-owned. This would eliminate the need for land acquisition and would reduce project costs. Locating on State property would also reduce the need for local matching funds.

The study team found this to be a second best solution in comparison to the other alternatives investigated. The base of the north jetty would be the only feasible location on the jetty, but would not provide sufficient area for an interpretative facility. The location of displays, artifacts, and structures on the jetty would be subject to the extreme weather conditions prevalent on Lake Huron. It would, however, be possible to locate a series of removable displays. These displays would contain the same information proposed for the Interpretative Center. Displays could provide text, covering the coastal zone evolution, the history of Grindstone City, the grindstone industry and the grindstone quarry process. The displays would be removable, such that they can be stored during the winter months. If it becomes apparent that local support does not materialize for the historic preservation recommendations, then the possibility of locating a series of displays at the base of the jetty should be further investigated.

2. **Harbor-Related Recommendations:** A plan of improvements and actions relating to the Grindstone City harbor area is being recommended for consideration and implementation. Recommended improvements to the north jetty are designed to achieve many objectives. There remains a considerable amount of waste grindstones and quarry waste rock below the lake surface in the areas surrounding the original jetty length.

This study recommends that an underwater survey of the location and extent of these stones be made, and where feasible, the stones should be hauled to the sides and top of the existing north jetty. This action would improve the jetty's resistance to storms and ice by protecting the smaller stones and materials in the existing foundation. It would also reduce hazards to small boats approaching the jetties by improving water depth. This action would also improve navigation in and out of the harbor area. This action would serve to protect the south jetty and inner harbor area by maintaining the position of the north jetty as a breakwater for the predominant wave action emanating from the northeast. A continuance of the erosion of the north jetty would eventually lead to the exposure of the inner harbor and the south jetty to direct wave action from the northeast.

The placement of harbor grindstones onto the north jetty would serve to protect and display the grindstones, and would help to restore the historical integrity of the north jetty. Both jetties located in the Grindstone City harbor were manmade of grindstones and quarry waste materials. The maintenance of the north jetty, utilizing the grindstones, would help to restore and preserve the historical nature of the jetty.

It should be recognized that shoreleine maintenance is only a temporary solution to the continous erosion process. This study would recommend an annual minor shoreline maintenance effort, composed primarily of filling-in blow-out points and repositioning displaced grindstones. A major shoreline maintenance effort is recommended for every five to ten years, or, after a season of severe weather conditions.

Recreational improvements to the north jetty are felt warranted and justifiable. The north jetty is currently being utilized, in an unimproved condition, for fishing and picnicking and as overflow parking for the south jetty. It is believed that the recommended improvements to the north jetty will alleviate the pressure at the south jetty and serve a larger population overall.

The package of improvements recommends regrading the roadway on the jetty and laying a gravel roadbed. Two parking areas are recommended. One parking area of approximately a 20 car capacity would be located at the end of the jetty; this would service fishing activity. A removable, floating fishing dock is also recommended for the end of the jetty. A parking area for approximately 36 cars is recommended for the entrance area of the jetty. This parking area would service a picnic area at the base of the jetty. The entrance parking area would also serve as an overflow for parking at the south jetty, which is frequently full, and as additional parking for the proposed Interpretative Center.

A picnic area with tables and benches and a set of restrooms is contemplated at the base of the jetty. This area would serve all visitors and users of the north jetty and Interpretative Center. Finally, landscaping and signage improvements are recommended for the north jetty.

Design specifications and cost estimates are provided in the Appendix, Section A.

3. **Traffic Control Recommendations:** In response to local complaints of frequent tourist intrusions and trespass into residential areas, the study recommends certain traffic control improvements to be implemented. The study envisions Pearson and Pt. Aux Barques Roads as the major access routes in and out of the Grindstone City area. From Route M-25, signs directing traffic to Grindstone City and the Grindstone City Public Access Area indicate the use of Pearson Road. This study would recommend no alteration in location. If the development of the Interpretative Center is completed, then entrance

signs should also be placed at the intersection of Route M-25 and Pearson Road.

For traffic in Grindstone City, a series of traffic control signs is proposed. Signs indicating "NO THROUGH TRAFFIC" would be posted on Copeland and Pt. Aux Barques Roads at their respective intersections with Pearson Road and on Rouse Road at Pt. Aux Barques Road. A sign indicating "NO THROUGH TRAFFIC – DEAD END" would be posted on Quarry Road at Pt Aux Barques Road.

It is expected that these traffic control signs will help to alleviate the problems currently experienced, although not eliminate them completely. These measures will be increasingly beneficial as traffic flows through Grindstone City and the thumb area inevitably increase.

4. Water Supply and Waste Disposal Recommendations: The study makes no present recommendations for action concerning potential water supply or waste disposal services. Currently, these problems are restricting any new development from occurring in the area. Our investigations indicate that any solutions would be so costly as to preclude their implementation. The costly nature of the solutions have two primary causes. First, any solution involving water supply or waste disposal would require exotic, and therefore, expensive solutions. This is because of the location of Grindstone City and its geological ground formation. The second cause is the low population density of the target area. By spreading the relatively high costs over few households, the per/household cost simply becomes prohibitive. It is possible that future solutions may become available. Population growth in the areas surrounding Grindstone City may help to spread development and operation costs over more households. More likely is the possibility that future technological progress will be able to lower the cost of small scale water supply and particularly, waste disposal systems, so as to make them attractive to the Grindstone City residents. At this time, however, no cost effective solution has been identified. Therefore, this study recommends that no action be taken at this time regarding provision of water supply or waste disposal services. However, individual efforts as outlined in Chapter V could be adopted, if desired.

5. Local Enforcement Recommendations: The study recommends an increased law enforcement effort in the Grindstone City area. This effort should be jointly shared by local residents and law enforcement officials. Efforts should be made to reduce vandalism. Pilferage of grindstones and artifacts should be better controlled.

Finally, the study recommends increased enforcement of existing local zoning ordinances. During our investigations, zoning violations were found to exist and no noticeable efforts were identified to correct or prevent their occurrence. In order to preserve the coastal resources of the Grindstone City region, enforcement of the local zoning ordinances is a necessity. This study recommends that local interests "watch dog" for zoning violations and other unlawful acts and report occurrences to the proper enforcement agents.

Implementation Strategy

The study recommends the implementation of the above described recommendations. The implementation should only be carried through if local support and endorsement of the proposals are evident. A necessary requirement of the Coastal Management Program is a sign of official support in the form of a resolution by the local governing body. With a resolution of support, local efforts could begin to secure the local match funds that would be necessary. Since conclusive support is not evident at this time, this study recommends that the Coastal Management Program take a passive role in pursuing any development in the Grindstone City area. When, and if, local support is indicated by official resolutions and evidence of local match sources, then it would be appropriate for the Coastal Management Program to again become actively involved and pursue, with local sponsors, the implementation of the Coastal Management Study recommendations.

The political status of Grindstone City does present some problems for the implementation of any type of development. Grindstone City is an unincorporated community without direct political representation. The governing body for Grindstone City is Port Austin Township. Grindstone City also receives representation by Huron County. However without direct political representation, implementation of projects in Grindstone City inevitably faces some difficulty. If sufficient local support develops, and township or county resolutions are adopted in favor of the recommended Coastal Management Program, then this study would recommend the establishment of some form of "Grindstone City Advisory Committee." This committee could be appointed at the Township or County level. The committee would have no legal status, but would act in an advisory or advocacy position to the local governing bodies.

It is contemplated that the committee would have the overall responsibility of setting policy goals, making recommendations for action, and ensuring that the necessary steps are taken to implement and oversee the development of any proposal. This report suggests that the Grindstone City Advisory Committee be charged with the following responsibilities:

1. Reviewing the Coastal Management Report.

2. Adopting or modifying the Coastal Management Report goals and recommendations.

3. Obtaining public acceptance for the committee's adopted goals and recommendations.

4. Seeking funding for implementation of approved goals. This responsibility would include securing local match funds or in kind services as required.

5. Providing needed citizens' input during the implementation of committee goals.

6. Providing an ongoing citizens' watch dog and advisory role for the management recommendations included within this report.

Possible Funding Sources

During the course of this study, many possible funding sources were identified. These funding sources could be utilized to finance the majority of the recommended improvements. In any event, some local matching funds will probably be required. Local match fund requirements could be satisfied in many ways. Cash grants from the Township and/or County is one expedient method. Donations of property interest in fee simple, or less than fee simple, as well as donation of historical artifacts and remnants satisfy local match requirements. The donation of in kind services, including construction services, management assistance, and property maintenance services, count towards match requirements. These donations can be provided by public bodies or private citizens. The donation of public services, including road maintenance, police and fire protection, may also be utilized in meeting local match requirements.

Possible sources of funds to be used for the major financing portion of the recommended improvements include the following:

1. Historical Preservation Grant-In-Aid: These grants are administered by the United States Department of the Interior. Projects are limited to properties located within National Historic Districts or listed on the Historic Register. Funds may be used for survey, planning, acquisition, preservation and project development.

2. Michigan Coastal Management Program of the Michigan Department of Natural Resources. Funds may be used for minor construction activities, feasibility studies, and minor improvements.

3. Michigan Land and Water Conservation Fund administered by the Michigan Department of Natural Resources. Funds may be used to acquire facilities and/or property, as long as the project relates to recreation.

4. Michigan Recreation Land Trust Fund (Kammer Fund) administered by the Michigan Land Trust. Funds are limited to land acquisition for projects which provide access to the Great Lakes; or preserve and enhance unique or fragile areas or resources; or provide educational/ recreational opportunities.

5. Michigan Waterways Funds administered by the Michigan Department of Natural Resources. Funds may be used for harbor, dock, or public access site improvements, feasibility studies or facility development.

6. National Register Grant Program administered by the Michigan History Division of the Department of State. Funds may be used for acquisition and restoration involving sites on the Historic Register or within Historical District boundaries.

The Grindstone City Advisory Committee could act in behalf of the Township and/or County in gathering information on funding sources and in preparing grant applications. The Michigan Coastal Management Program would be able to assist local interests in the coordination of funding sources.

The preparation of this report completes the Feasibility and Coastal Management Study initiated by the Coastal Management Program of the Michigan Department of Natural Resources. It is hoped that this report may be used by local interests as a guide for pursuing the implementation of recommendations made in this report. Any questions or comments regarding this report, or any assistance concerning funding or the implementation of study recommendations should be forwarded to the Director of the Coastal Management Program of the Land Resources Programs Division of the Michigan Department of Natural Resources.

VII. Appendix

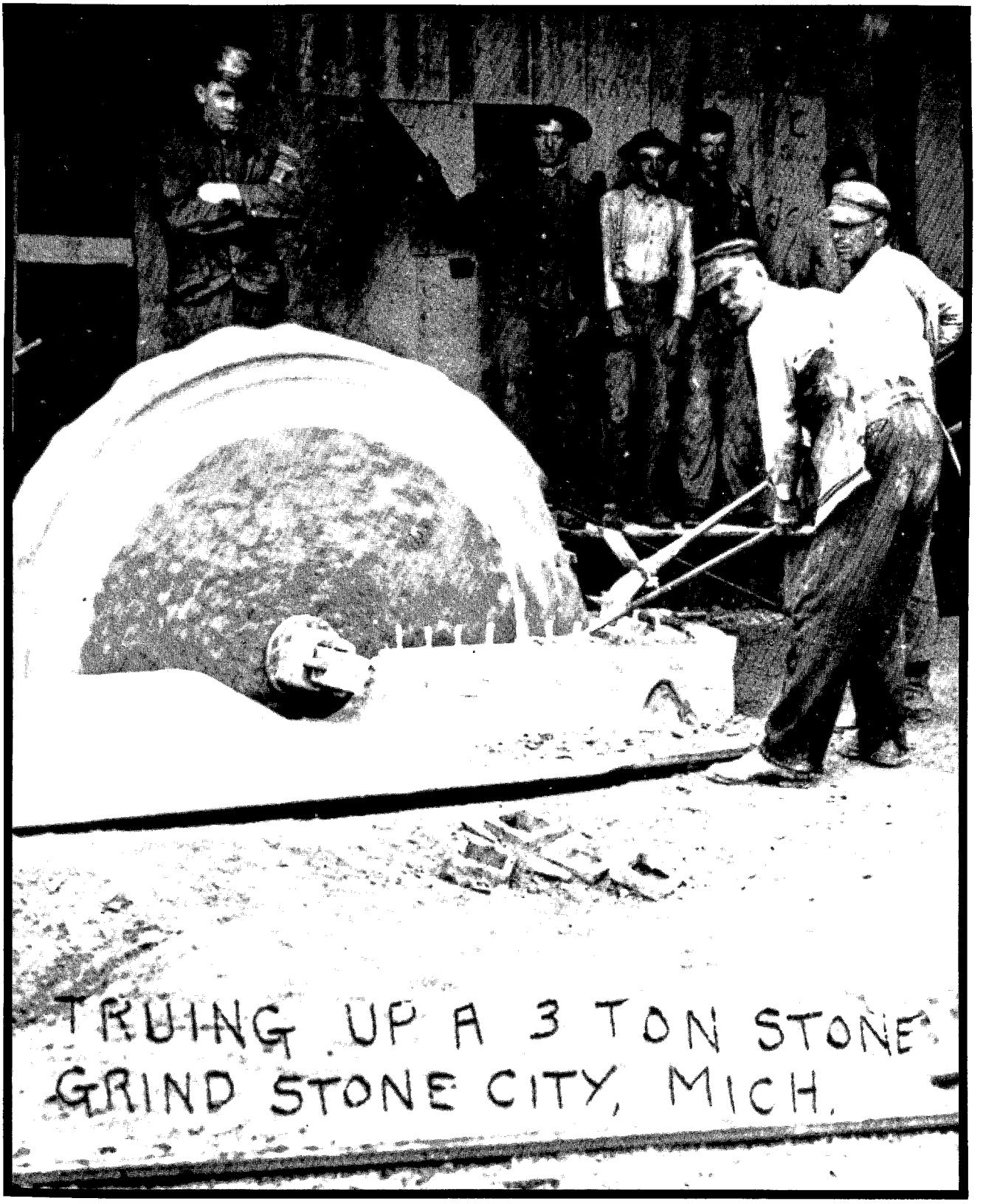
The appendix is divided into the following sub-sections:

A. Outline Specifications and Cost Estimates for Harbor Improvements

B. Outline Specifications and Cost Estimates for the Interpretative Center

C. Public Workshops and Local Involvement

D. Supplemental Information on Grindstone City



A. Outline Specifications for Harbor Improvements

General:

The plan of improvement is divided into the following components: shoreline maintenance, fishing area, picnic area and general site improvements. Each component is designed to accomplish certain objectives. Together, they comprise a comprehensive plan of improvement.

Shoreline Maintenance:

A crane is proposed for pulling out grindstones from harbor areas and the area around the north jetty. These grindstones should be placed around the jetty in a manner which will help protect the jetty from wave and wind erosion. Filling of blow-out points with composite materials is also contemplated.

Fishing Area:

Improve the northern 1/3 tip of the jetty to facilitate fishing activities. A wooden fishing dock should be located on the inner basin side of the jetty. The fishing dock should be floating so as to adjust to changing lake elevations. The fishing dock should be removable during the winter months. A gravel walking area would link the fishing dock to a gravel parking lot. The parking lot would have a capacity of 20 cars. The rest of the northern tip would be landscaped.

Picnic Area:

The base of the jetty will serve as a picnic area and also serve the needs of recreation users from the south jetty, Interpretative Center, and fishing area. The area would have small open spaces for picnic activities. Twenty picnic tables would be dispersed throughout the area. A set of sealed vault pit toilets would be located in the picnic area. A parking area of 36 car capacity is also proposed. Information displays could also be located in the picnic area.

General Site Improvements:

Paving: parking entrance drive and access road will be gravel, well compacted.

Wood bollards: will conform to State Park Design Standards.

Entrance sign: will conform to State Park Standards.

Refuse containers: will conform to State Park Standards.

Picnic tables: will conform to State Park Standards.

Plant materials: all disturbed areas are to be re-seeded. Proposed trees will be native to the area. Maintenance and vandalism will be prime considerations of plant selection. Entrance planting will include evergreen trees of 8' – 10' in height. Smaller shrubs and trees will be used to fill in area. Some suitable canopy trees, small trees and shrubs will be used to landscape fishing area.

Harbor Improvements Cost Estimate

Item	Quantity	Cost per Unit	Total
Shoreline Protection	LS	$17,000	$ 17,000
Entrance Signage	1	1,500	1,500
Picnic Tables	20	250	5,000
Fishing Pier	1	12,500	12,500
Restroom	1	25,000	25,000
Bollards	35	150	5,250
Car Bumper Stops	56	20	1,120
Picnic Area Seeding	1,600 SF	0.07/SF	112
Picnic Area Small Trees	13	350	4,550
Picnic Area Evergreens	15	200	3,000
Fishing Area Seeding	6,850 SF	0.07/SF	480
Fishing Area Small Trees	20	350	7,000
Fishing Area Canopy Trees	4	1,000	4,000
Hard Surface Paving	600 SF	1.50/SF	900
Gravel Parking Area & Roadway	28,465 SF	0.40/SF	11,386
Gravel Walkway	3,500 SF	0.40/SF	1,400
		SUBTOTAL	$100,198
		20% Contingency	20,040
		TOTAL ESTIMATED COST (9/78)	$120,238

B. Outline Specifications for the Interpretative Center

General:

The idea of creating a Museum-Interpretative Center involves a balanced physical design motif which, on the one hand emphasizes the unique character of the grindstone industry, while, at the same time, honoring the DNR's design format for the State's recreation facilities. Therefore, the design will consist of a mixture of these two motifs. The following is a description of each of the elements to be included in the Center.

The Main Shelter:

This open air structure will provide the main emphasis of the grindstone industry motif. It will consist of a steeply pitched metal roof (2 feet horizontally to 1½ foot vertical) that is approximately 30 feet x 50 feet in dimension. The roof structure will be supported by eight 36" diameter concrete columns. A 10 ft. dripline overhang is proposed. The floor of the structure will be scored concrete with large grindstones set randomly in the paving. The central feature of the shelter will be the grindstone lathe that will be centered between the columns and running the long dimension. Exposed wood beam framing will be used for the roof structure with can lights used to provide security lighting. Other exhibits included will include grindstones at various stages of completion and hand tools. Explanatory (self-guiding) notes will supplement the exhibits. These notes will be permanently fixed in place. Considerations of potential for vandalism and low maintenance will be incorporated in the detailing of these exhibits.

Landscape Setting:

Information Kiosks: These elements will be approximately 8 - 9 feet high and will be used to exhibit photographs, maps and text explaining the following interest areas:

1. Coastal Zone Evolution: A graphic history depicting the ecological and geological history of this coastal zone region. Key environmental problems will be highlighted with a summary of the DNR's Coastal Zone Management Program.

2. Grindstone City: A history of the community and the colorful characters of its past.

3. The Grindstone Manufacturing and Shipping Process: Photographs, diagrams, and sketches will reproduce the process from lathe operation to shipping.

4. The Grindstone Quarry: This kiosk would be located on the quarry side of the shelter and include photographs, sketches, and text explaining the quarrying operation.

The kiosks are to be primarily of wood with marproof plexiglas protecting all graphic materials. The kiosks will not be lighted in order to discourage nighttime loitering.

Seating: Square "U" shaped seating areas will be made of 12 x 12 inch timbers that are oriented to the kiosks, thus creating a border for the center. These areas are shown on the drawing and are primarily to the south of the shelter. Sandstone paving will be used in these heavy traffic areas.

Grindstone City Interpretative Center
Cost Estimate

Item	Quantity	Cost per Unit	Total
Outdoor Facility	1,500 SF	$ 15/SF	$22,500
Security Lights	3	1,500	4,500
Back Retaining Wall	1	500	500
Kiosks	3	1,000	3,000
Entrance Signage	1	1,500	1,500
Wooden Bollards	8	150	1,200
Bumper Stops	20	20	400
Hard Surface Paving	11,400 SF	0.40/SF	4,560
Seeding	7,500 SF	0.07/SF	525
Large Shrubs	16	20	320
		SUBTOTAL	$39,005
		20% Contingency	7,801
		TOTAL ESTIMATED COST (9/78)	$46,806

Lighting: Three security lights are proposed. One to be located in the parking area and two in the museum shelter area. Poles and fixtures will conform to State Park Design Standards.

Paving: parking and entrance drive will be gravel, well compacted.

Wood bollards: will conform to State Park Design Standards.

Entrance sign: will conform to State Park Standards.

Refuse containers: will conform to State Park Standards.

Plant materials: all disturbed areas are to be reseeded. Proposed tree will be native to the area. Maintenance and vandalism will be prime considerations of plant selection. Scotch pines will be planted along the northern property line as a buffer to adjoining property uses. Larger trees are recommended 4½ - 6' caliber to create an immediate effect and to resist damage from vandals.

An integral part of the study effort was the three public workshops held in the Grindstone City area. These workshops were invaluable in providing the study team direct public input throughout the planning process. The public workshops also provided a forum by which local residents and officials were able to keep informed with the findings and recommendations of the study as they were formulated. The series of workshops ensured that the final recommendations would be sensitive to local conditions and needs.

As mentioned previously in the description of the study format, each of the three public workshops was scheduled at critical decision points during the study. The first workshop served to introduce the study and study team members to local residents and officials. At that workshop, preliminary findings and observations were discussed. Community feelings and fears were identified, as were key problems which needed to be addressed in any proposed action. The four historic preservation proposals along with a No Action possibility were presented and discussed at the second workshop. The Grindstone City Interpretative Center proposal was selected for further development along with the plan for north jetty improvements. The engineering study on water supply and waste treatment problems was also presented at that time. The refined proposals and final recommendations were presented for public commentary at the final workshop.

A mixture of support and opposition to the recommendations was present at the final workshop. The recommended harbor improvements appeared to receive the most support and least opposition, although some participants expressed opinions that absolutely no action should be taken. The historic preservation proposal received somewhat less interest and support but the same "do nothing" opposition was evident. The final workshop was also used to clarify the role that local interests should pursue to have any project implemented. The Department of Natural Resources also indicated that it would be available, if requested, to lend assistance to local efforts.

WORKSHOP ONE
Grindstone City Coastal Zone Management Study
August 4, 1978
9:30 a.m.

Thank you for coming!

The purpose of this morning's meeting is to provide you with an opportunity to tell us what you think ought to be done here, or perhaps what ought not be done. Also, we've made some preliminary observations of the opportunities and problems, and we'd like to share those with you and get your reactions to them.

We hope to conclude this meeting in about two hours, and then begin working on some of the things discussed here today. We'd like to be able to get back in touch with you in the next month or so for the next workshop sessions. If you'd like to participate in those workshops, just fill out the bottom half of this page, tear it off, and give it to one of our people. If you'd like to have others invited to the next sessions as well, just have them contact us at the address below. We'll take it from there. Again, thank you for your help.

Johnson, Johnson, & Roy/inc.
303 N. Main St.
Ann Arbor, Mich. 48105
313-662-4457

(tear off here)

_____ Yes, I'd like to attend the next workshop. Please notify me.

Name _____

Address _____

Phone Number _____

The best days of the week for a workshop for me are _____

I could not attend a workshop on _____

(Mornings / Afternoons / Evenings) are the best times for me.

I'd like to talk with you in detail about _____

_____

_____

_____. Please call me.

Grindstone City
Coastal Management Study
Workshop II - 29 August 1978

AGENDA

1. Introduction
2. Review of Workshop I
3. Presentation of Proposals
   a. Eagle Bay Quarry Interpretative Center
   b. Grindstone City Interpretative Center
   c. School House Museum Interpretative Center
   d. Historic Markers and Map
   e. Harbor Improvements
   f. Do Nothing
4. Report on Water Supply and Waste Disposal Findings
5. Open Discussion
6. Conclusions and Next Steps

Grindstone City
Proposal Evaluation Sheet

For each of the proposals listed below, please indicate how you feel about them. If you are in favor of a proposal (would like to see it occur), place a "2" next to it. If you are indifferent (do not care either way), place a "1" next to it. If you are opposed to a proposal (would NOT like to see it happen), place a "0" next to it. You can be in favor of one proposals, more than one, or none of the proposals. After evaluating all of the proposals, you can write in any comments you might have.

Score	Proposals
_____	Eagle Bay Quarry Interpretative Center
_____	Grindstone City Interpretative Center
_____	School House Museum Interpretative Center
_____	Historic Markers and Map
_____	Harbor Improvements
_____	Do Nothing

COMMENTS:

Grindstone City
Coastal Management Study
Workshop III - 4 October 1978

AGENDA

1. Introduction
2. Coastal Management Study Recommendations
3. Citizen Responses
4. Conclusions

This is the last in a series of Workshops that is being held to discuss proposals on the preservation of the historic resources of Grindstone City and on possible improvements to the Grindstone City Harbor area. Possible funding sources and other management issueswill also be discussed. This Workshop is a part of and effort made by the Coastal Management Program of the Michigan Department of Natural Resources to directly involve the public in the Michigan Coastal Management Program.

The firm of Johnson, Johnson, & Roy/inc. of Ann Arbor, Michigan will be presenting their recommendations at this Workshop. The purpose of the public workshops is to solicit public opinion, suggestions, and public support for the proposals. Comments or inquires may be voiced at the meeting or can be sent to Mr. Chris Shafer, Coastal Management Program, Land Resources Programs Division, Stevens T. Mason Building, Box 30028, Lansing, Michigan 48909.

PRELIMINARY RECOMMENDATIONS

The preliminary plan of improvement proposes improving the harbor facilities at Grindstone City and developing an outdoor center for the preservation of historic Grindstone City resources. The total cost of the development of the recommended plan of improvement is estimated at $165,000. This is exclusive of any land acquisition costs.

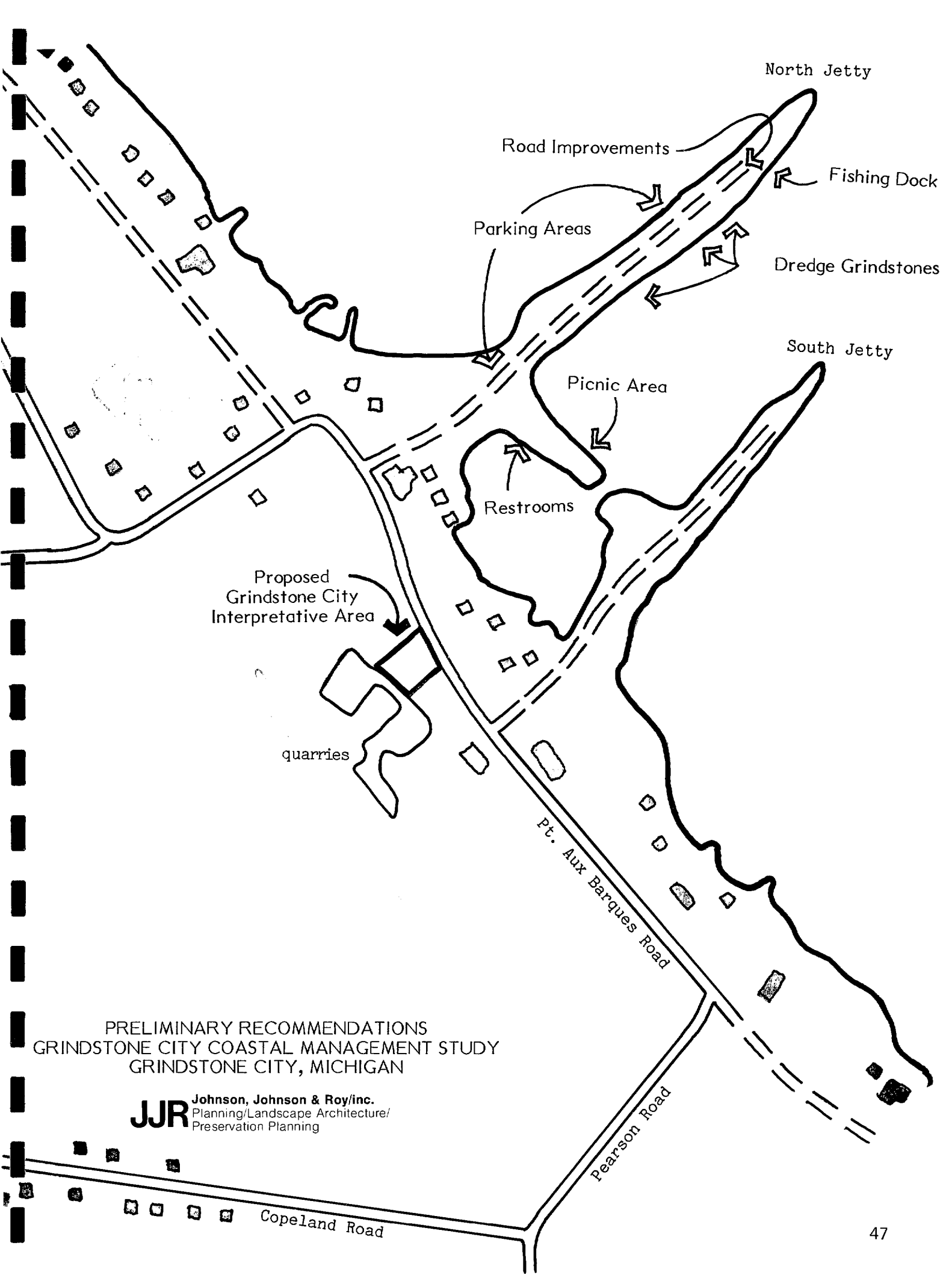
Harbor Improvements

Recommended improvements to the Grindstone City Harbor serve many purposes. The plan of improvement proposes the filling in of blow-out points along the North Jetty. The plan also recommends removing the grindstones from the harbor for placement on the jetty. This project is designed to improve the navigational safety of the harbor while protecting and improving the North Jetty. The reinforcement of the North Jetty with grindstones will reduce jetty erosion and also provide protection to the harbor area and South Jetty. The placement of grindstones on the jetty will also serve to display them and help to restore the historical significance of the jetty.

Further recommendations involve the development of picnic and fishing areas on the North Jetty. This includes construtcton of a parking area, picnic benches, tables, removable fishing docks, and toilet facilities. The total cost of North Jetty improvements is estimated at $120,000.

Grindstone City Outdoor Interpretative Center

The proposed Grindstone City Outdoor Interpretative Center would be located on Pt. Aux Barques Road in the central Grindstone City area. The Center would be situated between the North and South Jetties, allowing for a linkage of the three activity centers. The development would involve an outdoor open air shelter for Grindstone artifacts and displays. The location would provide views of a water-filled quarry and would be within a short walking distance of either the North or South Jetties. The facility would provide encased displays showing various artifacts and written text. Grindstones, large artifacts and equipment would be anchored in the ground. The entire display would be protected by an open air canopy. A parking area for 20 cars is provided for. The estimated cost of improvements, exclusive of land acquisition costs, is $45,000. Combined with the Interpretative Center Development, this brings the total project cost to $165,000, exclusive of land acquisition costs.



PRELIMINARY RECOMMENDATIONS
GRINDSTONE CITY COASTAL MANAGEMENT STUDY
GRINDSTONE CITY, MICHIGAN

JJR **Johnson, Johnson & Roy/inc.**
Planning/Landscape Architecture/
Preservation Planning

Brief History of Grindstone City:

In 1834, during a severe lake storm, Captain A. G. Peer, with his schooner, the Rip Van Winkle, was forced to take shelter at what is today known as Grindstone City. While he was anchored, he recognized the quality of the grindstone rock. In 1835, a company was formed to produce grindstones. In 1836, Captain Peer acquired 400 acres of land here and began taking stone out immediately. The first stone was used entirely for buildings. Initially, the stone was turned by hand; later, a mill was built using water power. In 1852, an upright engine was procured. The engine used was the first steam engine ever built in Detroit and had been used in the first steamer that travelled between Port Huron and Detroit. The grindstone industry was established and was beginning to grow.

For a brief period of time, a salt mining operation existed in the Grindstone area. The mine survived on the abundant layer of salt brine lying under the upper thumb area.

A mill was built to make whetstones and scythe stones, in addition to grindstones. The stones made varied in size and weight from small kitchen stones, six to twelve inches in diameter, weighing 3½ to 10 pounds, to large grinding stones weighing 3½ tons or more. The largest stone ever turned out weighed 6,600 pounds.

By 1865, a yearly total of 3,400 tons of stone were manufactured, docked and shipped out of Grindstone City. At its peak, Grindstone City's annual production reached 7,500 tons of grindstones and 7,500 tons of scythe or whetstones. These stones found a ready market in Canada, Germany, Russia, Africa, in the diamond mines and many other parts of the world, as well as all over the United States. At its height, the grindstone industry provided employment for over 200 individuals. At that time, Grindstone City enjoyed a population of between 500 and 600 residents.

In 1888, the Cleveland Stone Company purchased all the property and quarries around Grindstone City and became sole proprietor of the local industry.

The first step in quarrying is stripping the area to be worked. This was usually done in the fall and winter by removing the topsoil and shale rock. Usually 3 or 4 inches were left until spring to prevent the stone from freezing and cracking. In the spring, the final stripping was done and the work of getting out the stone was begun.

There were two grades of rock, light and heavy; the light rock was from 12 to 15 feet deep and the heavy rock five to teen feet deeper. The rock lies in strata varying in thickness from 2 to 3 inches to six feet. The lighter top stone was usually cut in squares of the approximate size wanted by a steam or gasoline drill; then the sections were loosened and lifted by picks, bars, and wedges, after which a hoist lifted them to the top of the ground. The large heavy stones were cut in the same manner but often had to be loosened by charges of dynamite, strategically placed so not to damage the stone. They also were lifted to the top of the ground by a steam hoist and set down, where the pick men roughly rounded the stone and cut a square eye in the center with their picks. Then the stones were hoisted on low flatcars and hauled by dinky engine to the mill. The company had their own tracks, cars and engine for this purpose.

At the mill, the stones were put on mandrills run by a system of belts and operated by steam engines, while turners finished the stones. Two men worked on each stone, one on each side, smoothing and shaping the stone with crowbar-like tools which had to be frequently sharpened to keep their cutting edge. They maintained their own blacksmith shop for this purpose. The finished stone, which had to be true and evenly balanced, was then weighed, marked and piled ready for shipment.

Two docks were built and ran out a distance of 2,900 feet to deep water. Rails were laid on these docks over which the Company conveyed the grindstones and salt to waiting scows which carried them to lake steamers to be carried all over the world. Later, when the railroad came into the town, this operation was discontinued. The docks were then used as a place to pile the stones to await shipment. The first railroad came into Grindstone City in 1892 and from then on, most of the stone was shipped by rail. The railroad was discontinued between Port Austin and Grindstone City in 1930.

Due to carborundum taking the place of grindstone, the quarries could no longer be operated at a profit, so were discontinued in 1930. All of the good machinery was sold. The wornout materials were broken up and sold as scrap iron.

The Cleveland Stone Company built, owned and rented to their employees, small houses of about 4 rooms, most of them painted red, from which was derived the street name, "Red Row." Some of these houses were sold and moved away but many were torn down. Captain Peer lived at the extreme north end of the town. He built the large stone building called the "Peer Building" on the corner of Grindstone and Copeland Roads in 1884. This building still remains today. The first grist mill and elevator was built by Robert Wallace. The elevator, built in 1887 of grindstone rock, still stands, a memory of imperishable stone. It was used for a time as a stock barn on the farm when owned by the Cleveland Stone Company.

This history was summarized from *History of Grindstone City, Eagle Bay, and New River;* written by Mabel Cook.

Selected Sources of Historical Information on Grindstone City

Listed below are some of the potential sources of historical information on Grindstone City and the Grindstone Quarry Industry:

1. *Annual Reports of the Bureau of Labor and Industrial Statistics,* (Michigan).

2. Michigan History Division of Michigan Department of State.

3. *History of Grindstone City, Eagle Bay, and New River* by Mabel Cook. Copy in Port Austin Public Library.

4. Michigan State Library.

5. Interview with Mabel Cook of Grindstone City, Local Historian.

6. Interview with Mrs. Ada Jackson of Bad Axe.

7. *Portrait and Biographical Album of Huron County,* reprint by Walt Rummel, Sebewaing, Michigan.

8. Huron County Historical Society.

Building Inspection Report

Identification

Building: A. G. Peer Building 1884
Wallace Mill 1887

Location: Grindstone City Historic District
Huron County, Michigan

Description:

Grindstone City is now a nearly abandoned village populated mainly by summer vacationers. The historic district is comprised of the abandoned quarries and adjacent structures formerly owned by the sharpening stone firms which operated in the area. Most of the pits have now been filled in with rubble from the quarrying operations. Slabs of sandstone up to eight feet square are piled at random over the landscape with a profuse stand of paper birch trees growing among them. The stone itself is variegated in color, ranging from blue to bluish-grey with a greenish cast. The two jetties that extend about three thousand feet into Lake Huron are built of cribs filled with stone slabs and rejected grindstones and covered with earth. More large rock slabs and grindstones are used for erosion protection along the sides of the jetties. Additional grindstones up to about five feet in diameter are found scattered along the shoreline and in the lake.

The buildings constructed of native stone remain in the district. One two-story building 28 feet by 50 feet displays prominently on its facade a tablet reading "Built by Captain A. G. Peer 1884." Peer was one of the earliest settlers of the area and founder of the first grindstone quarry and mill in the area. This business was established by 1850.

The building has been maintained to a large degree as it was originally. The ground floor, a large open space, was originally a store. Above this is a residence accessible from a stairway at the back of the building. The first floor store front is three bays wide separated by cast iron pillars supporting a simple cornice. The double doors are set back, located in the center, and flanked by large store front windows on either side. The second floor windows are narrow and long with heavy stone hood moulds. The cornice, which encircles the flat roof, is pressed metal with closely spaced brackets. The quoins are of smooth cut ashlar.

The Wallace Mill building is a crude rough-cut ashlar building, three stories in height. All fenestrations are unadorned and regularly spaced. The cornice is made up of varying courses of stone. The parapet is castellated.

Significance:

Both the Wallace Mill and the A. G. Peer buildings are of two-fold significance. They constitute the only remaining architectural evidence of the peak years of the grindstone industry. As such, they provide valuable historic evidence contributing to our understanding of both the grindstone industry and life in Grindstone City in the late nineteenth century. This is particularly significant in that industrial sites have not always received the attention warranted by their importance to the Michigan's historical development.

Apart from their associational value, these buildings are of unusual architectural character. The use of locally quarried stone as a building material, the formal plan and simple facade treatment (especially that of the Wallace Mill) distinguish these structures from others in this area of the state.

Acknowledgements

Johnson, Johnson, & Roy/inc. expresses appreciation for the able assistance and cooperation provided by the Michigan Department of Natural Resources, the East Central Michigan Planning and Development Region and officials of Huron County and Port Austin Township. Johnson, Johnson & Roy thanks the residents of Grindstone City and Pt. Austin Township for their assistance and honesty in providing direction during the study effort.

In particular, we acknowledge the special contributions made to the study by the following individuals:

Chris A. Shafer	Project Coordinator, Coastal Management Program, Michigan Department of Natural Resources
Gordon Anderson	Michigan Department of Natural Resources
Karen Brillhart	Michigan Department of Natural Resources
Timothy Ervin	Michigan Department of Natural Resources
Lawrence Finfir	Michigan Department of Natural Resources
Tom Goergen	East Central Michigan Planning and Development Region
Marvin Goretski	Port Austin Township Supervisor
Murray Hagen	Huron County Roads Commission
James Hane	Michigan Department of Natural Resources
William Jennings	Huron County Health Department
Ronald Knoblock	Huron County Board of Commissioners
Joseph Lams	Huron County Historical Society
Joe Mazzoni	Grindstone City
Lori Mazzoni	Grindstone City
Ann Mikolowski	Grindstone City
Walt Poyet	Michigan Department of Natural Resources
Maria Quinlan	Michigan Department of State
Mr. Ruark	Grindstone City
Mrs. Ruark	Grindstone City
Mae Whalen	Grindstone City
Asa Wright	Michigan Department of Natural Resources

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