HOMES IN THE DUNES

Designed to Preserve

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INTRODUCTION

Michigan's coastal dunes are valued as the beautiful backdrop for the Great Lakes, for the ecological communities they support, and their recreational potential. Ideally, development within the dunes should enhance individual enjoyment of these areas while simultaneously protecting the natural resource assets for future generations.

Many agree that there is no better place to visit or live than the coastal dunes of Michigan. This has created increasing pressure on the coastal environment from more construction, greater residential density, larger and larger houses and more extensive use of the dunes.

To make matters worse, very often during site planning, home design and landscaping little thought is given to how development in the dunes can impair this fragile environment, such as:

- Destabilized dunes caused by construction, grading or overuse.
- Erosion due to wind and rainwater runoff that is made worse by slope disturbance, undercutting the base of a slope, vegetation removal, too steep slopes, clearing of large areas, etc.
- Loss of canopy leading to fragmentation of a natural biosystem.
- Impairment and destruction of native plant communities.
- Introduction and spreading of invasive exotic plants which take over habitat of native species.

This booklet illustrates a number of recommended strategies and methods to protect the dunes and associated ecosystems when building in the critical sand dune areas in Michigan. Its purpose is to:

- Encourage owners, architects, and builders to place increased importance on dune protection.
- Illustrate that it is possible to design beautiful, livable and functional homes while preserving the dune ecosystems.
- Describe selected methods for doing so.

We hope that this booklet is helpful for those planning to build a home in the dunes, as well as those who already live in the dunes.

The sand dunes are valued by many for their aesthetically pleasing backdrop to the lakeshore, for the ecological communities which they support, and for the recreational potential they provide. No one knows this better than those that live and vacation within the coastal dune communities on the west coast of Michigan.

Yet it is this desire to live, work and play in the sand dunes that have slowly degraded natural communities, altered topography and even destroyed these unique features.

The complex and interactant series of events that created the largest of these sand dunes do not exist today, and once lost, these dunes may never be replaced. In 1976 with this in mind, the Michigan legislature enacted the Sand Dune Protection and Management Act. The 1989 amendment gave authority to local units of government and the State of Michigan to undertake specific steps to ensure the wise use and protection of Michigan's sand dunes.

Of the 275,000 acres of sand dunes in Michigan, 70,000 acres were designated as "critical dunes." These Critical Dune Areas (CDAs) were recognized as a "unique, irreplaceable and fragile resource that provide significant recreational, economic, scientific, geological, scenic, botanical, educational, agricultural, and ecological benefits to the people of this state and to people from other states and countries who visit this resource."

With over 70,000 acres of critical dunes along the lakeshore, the idea that an individual action could determine the future and quality of the landscape is almost unimaginable. ***Yet it is the individual lot and individual management activity that will truly determine protection of these rare and fragile ecological systems.***

— Adapted from *How to Protect Critical Dunes: Practical Guidelines for Site Development and Management in Michigan's Critical Dune Areas*

Projects shown in this booklet were taken from submissions to the Critical Dunes Residential Design Awards program sponsored by Preserve the Dunes in 2006 and 2012.

The number under a photograph or diagram keys that illustrates an entry in the list of projects found on page 13.

BUILDING LOCATION

Once a parcel is selected, the most important decision in building a new home is where on the property will it be placed. This decision will determine what can and cannot be seen, and how extensive will the site have to be altered by grading, tree removal and clearing.

a. L**ocate the house near the point of arrival** to the site. Doing so reduces the length of a driveway and reduces the extent of damage to build drives and parking — this is true for any site!

b. **Take advantage of site conditions.** In the project below the architect placed the structure slightly offset from the center of a natural swale and supported on posts. As a result, the flow of rainwater runoff was uninterrupted and the steeper slopes were left untouched. This preserves the native plants, minimizes erosion risk and excavations or fill.

Steep sides of the swale are left natural. Home on more level areas. [4]

c. **Select more level slopes for structures.** Current law prohibits altering or creating slopes greater than 1 foot vertical in 3 horizontal. More gentle slopes are preferable because they reduce the environmental disturbance required to build, and are less expensive to build on.

d. **Remove as little indigenous vegetation as possible.** The objective is to minimize disruption of the biosystems and reduce the chances of invasive species taking root on the site.

- Place the structure(s) in locations with lower density of trees and other vegetation.
- If the home is replacing an existing structure, building in the same area will reduce necessary tree removal and grading. Building on the foundations of an existing building can eliminate excavation for new footings and simplify permitting by the state Department of Environmental Quality.

e. **Build back from the crest of the dune**. Homes close to the crest are in danger of structural failure from sand erosion and movement. Erosion at the foot of the bluff and gravity acting together will cause the crest of the dune to recede. If repairs can be made, the cost will probably be exorbitant.

Bridge from parking to home with native plant community continuing below. [3]

f. **Combine techniques to maximize effect**s. For example, the home shown above combines the use of two stories, and a cantilevered floor to reduce the footprint size. By also siting the home partially in a recessed area, the need for grading was nearly eliminated.

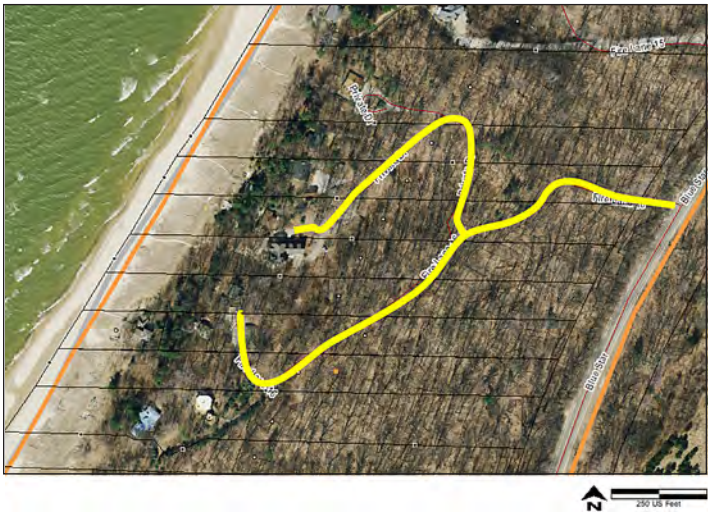
g. **Orient the long axis of the house across the slope** to minimize the variation in elevation within the footprint of the structure. It will reduce the extent of excavations and construction costs, as well.

h. **Consider views from the site**. The dunes often provide views over Lake Michigan, but equally splendid are views of the surrounding highly articulated landforms and landscapes, or through them to distant views of the lake. Responding to these features enhances the design of homes in the dunes and the lives within.

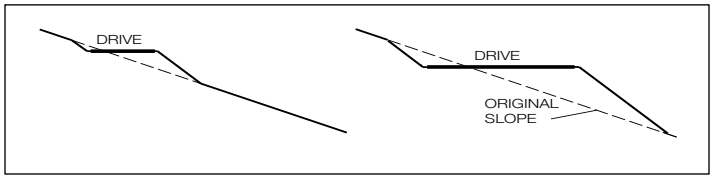
DRIVEWAYS

Automobile access to the site usually disturbs more land area than any other single use. It requires more grading, removal of more trees and native plants, and causes more erosion than any other use. Drives also create edges and routes for invasive plants to move into an otherwise natural area. To reduce the damaging effects of drives on the dunes consider these options:

a. **Share the drive with neighbors.** The eleven homes shown in aerial photo below share an access drive. All the homes are over 1,000 feet from the paved public road. If each home had its own drive, the total length of drives would have been well over 12,000 feet. Instead, the shared drive is only 2,040 feet. The disturbed area could have been about 4½ acres, the area of one and a half lots, but instead it is only ¾ acre.



b. **Build only a single lane drive** with pull-offs for passing if the drive is very long. Wider drives obviously require additional area for the driving surface. However, as the cross-section below shows, when the width of a roadway that runs across a slope is expanded, the required cut and fill is dramatically expanded.



c. **Locate the drive to minimize grading** and changes in the terrain. This will be a combination of the shortest route possible over the least steep slopes.

Steep slopes in the roadway or in the graded shoulders should be avoided to reduce the risk of erosion.

d. **Do not pave drives and parking areas** except with porous materials unless impossible to avoid. It is hard to imagine where or why paved driveways are justified in the dunes. The run-off of rainwater nearly guarantees erosion. Not only does all of the water runoff the paving, it does so immediately, thus creating large volumes of water moving rapidly.

Furthermore, over time, sand that is not fully restrained on all sides will move. This will cause the concrete slabs and bituminous paving to crack and fail, unless expensive roadway construction is used. Even so, permanence is not guaranteed

e. **Use a park and walk approach.** The driveway does not have to extend all the way to the house. Below, a bridge connects the house with the parking area.

All three awarded project used bridges or elevated stairway to get from parking to the building entrance. A submission in 2006 presented a home which is connected to the garage and arrival point with a more substantial 108-foot long covered bridge.

Bridge from parking to the beachfront home. [1]

Also single-car funiculars are often used to ascend steep dunes to reach a lake side home — a sort of park and *ride* approach.

BUILDING DESIGN

After driveways and parking, the building itself, exterior living spaces and ancillary structures account for the bulk of disturbance and destruction on sites. Designing a home involves dealing with numerous interconnected issues. Below, are listed a few considerations that can affect the environment of the house and energy consumption.

Two small floor areas step up the dune. [2]

a. **The house and other structures should have as small a footprint as possible**, thus leaving as much of the native environment undisturbed as possible. Use multiple floors. The house pictured above uses three levels to create a 2,400 square foot home on a footprint of only 809 square feet.

   Smaller footprints also mean smaller impervious areas and thus pose less of a threat of erosion from rainwater runoff while preserving more of the natural environment.

b. **Reusing an existing foundation for a new home** can minimize vegetation removal, and excavation. This home (below left) was built on the foundations of a previous cabin that was destroyed by fire — only the footings and stone foundation walls remained. Rather than follow the plan of the original house, the new home became a contemporary home which meets current needs and supports the family's lifestyle.

A weekend home built on the foundations of a 1970's cabin destroyed by fire. [5]

c. **Acquire adequate land.** The first measure of dune preservation is the proportion of a parcel that is untouched, or left restored with indigenous plants and free of structures. If the lot is too small, it will not be possible to build the house and preserve the natural setting and the beauty of the place.

   To avoid destroying the beauty that draws one to the dunes, be careful to not build "more house" than can be accommodated comfortably on the site.

d. **Use techniques that expand indoor and outdoor living space** without further disturbance of the site.

   - Cantilever floor space or balconies
   - Multi-use rooms rather than many special-use rooms.
   - Smaller bedrooms. At the lake they can be just sleeping rooms.
   - "Think out of the box." For example, a roof deck built in the shade of the canopy can provide views into the woods or gain vistas - without additional disturbance to the site.

Posts used to reduce disturbance near crest of dune. [12]

e. **Use of piers or posts** for structural support to minimize disturbance of the existing habitat. In the house above, a portion of the house and decks rest on posts to avoid extensive excavations close to the bluff.

   Posts can be used to allow uninterrupted flow of rainwater runoff; avoid concentrating that flow; allow the biosystem to continue uninterrupted; or provide shelter for outside activities within the building footprint.

Modular approach used on site with small area of level land. [6]

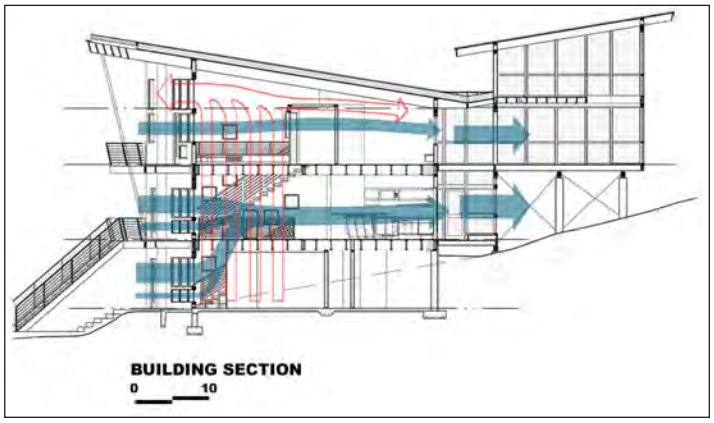
f. **Use modules when building on slopes or highly variable terrain**. With smaller foot prints, placement can be more flexible and adjustable. Modules can be placed to avoid trees and steep slopes or to acquire views with less disruption of the environment. This addition was built as a separate module to avoid nearby steep slopes and existing hemlock trees.

g. **Minimize erosion from rainwater run-off.** Avoid use of single point of discharge (e.g. a downspout or an area drain discharge pipe). A concentrated source can easily deliver water faster than the ground can absorb it and cause erosion. A sheet of water draining from a roof or large paved area is also likely to cause erosion. In both cases, it is necessary to disperse the flow over a wide, flat area so that the water is slowed and a portion absorbed. Or use rain barrels to safely collect runoff.

h. **Take advantage of views from the house with careful window placement.** Houses in the dunes not only provide access to the Great Lakes but, they are located in beautiful places that afford distant views of the lake, near views of dramatic landforms and natural forests. All of these can become a part of the house with careful design.

i. **Use a green roof** to reduce runoff and provide added insulation to the roof, thus reducing energy required for heating and cooling. This is especially beneficial on sunny, shadeless sites. The green roof will also extend the life of roofing materials.

j. **Select building materials and colors that blend with the setting.** Bright and strong colors should be reserved for special settings where it is appropriate to stand out from the landscape and neighboring buildings.



Breezes flow freely through the house. [2-a]

k. **Make use of cross ventilation.** Along the lake there are near constant winds. By placing window openings on opposite (or even adjacent) walls, cross ventilation will be available to eliminate or reduce the need for mechanical ventilation and cooling.

Entry Hall with views to dunes [8]

Dining Room with view to Lake Michigan [9]

Dining Room with view to Lake Michigan [10]

LANDSCAPING

Plants in the landscape stabilize the soil (sand) reducing water and wind erosion, provide habitat for animals, birds and insects, soothe the soul and offer beauty for the observer. Hardscapes such as decks, patios and stairs increase the utility of the site but must be carefully designed and constructed to avoid damaging erosion.

a. **Preserve indigenous plants.** They have adapted to their environment in the dunes. They support other native species and provide habitat for other members of the ecosystem. By preserving these plants, the effects of our intrusions and additions to the ecosystem, as well as erosion are reduced.

   Though they are in different types of habitat, the three awarded projects all preserved the native plants and trees.

b. **Use vegetation native to the ecosystem.** Non-native plants require increased maintenance, soil improvement and more water than native ones — all of which are time consuming and expensive. Any introduced plants should be indigenous to the ecosystem; plants that thrive now in environments similar to where they will be placed.

c. **Re-vegetate in stages** as portions of the site are complete, ideally within 2 weeks after completion. Then maintain vegetation for a minimum of 5 years. Vegetation that dies from natural or man-made causes should be replaced as soon as possible, given seasonal considerations.

d. **Do not clear excessive areas to gain views from the homesite to the beach and lake.**

   The waters edge is open to the general public and neighbors along the lake for walking. It is possible to preserve the beauty of the dunes as seen from the beach and still gain vistas of the lake from homesites in the dunes.

   While sited in a more open dune setting than ideal, the low profile mitigates the intrusion of the house below. The home to the right is nearly hidden by existing trees that have been pruned to maintain a slot of open space and views to the lake.

The low profile lessens the presence of this house at the beach. [3]

e. **Minimize clearing**. Clearing is destructive and can cause further unintended damage inside and outside of the cleared area.

   Clearing land increases the likelihood of destabilizing dunes and causing erosion. Cleared areas inherently become a different ecosystem and type of habitat. They will not return naturally to a native habitat.

From the beach, house nearly disappears due to trees, dark siding & reflections. [1]

f. **Do not create new edges.** Either clearing or loss of canopy will create a new edge. Edges naturally create new ecosystems: one that is in the newly cleared area and a second that is the transition between the cleared and existing ecosystems. It is unlikely that the same biosystems thriving in the existing habitat can thrive in either the newly cleared area or the edge.

   Edges also become pathways for invasive plants to enter the native environment.

g. **Minimize impervious surfaces.** As noted in the discussion of building footprint, roof areas are a large component of impervious surfaces. With 100% runoff, these surfaces are a source of concentrated water flow and a likely cause of erosion. Measures to spread and slow runoff are essential to avoid erosion.

   Decks with spaced boards or a patio made of pavers or stone set with a stone course can provide outdoor hard-surfaces that will not be a source of fast flowing runoff.

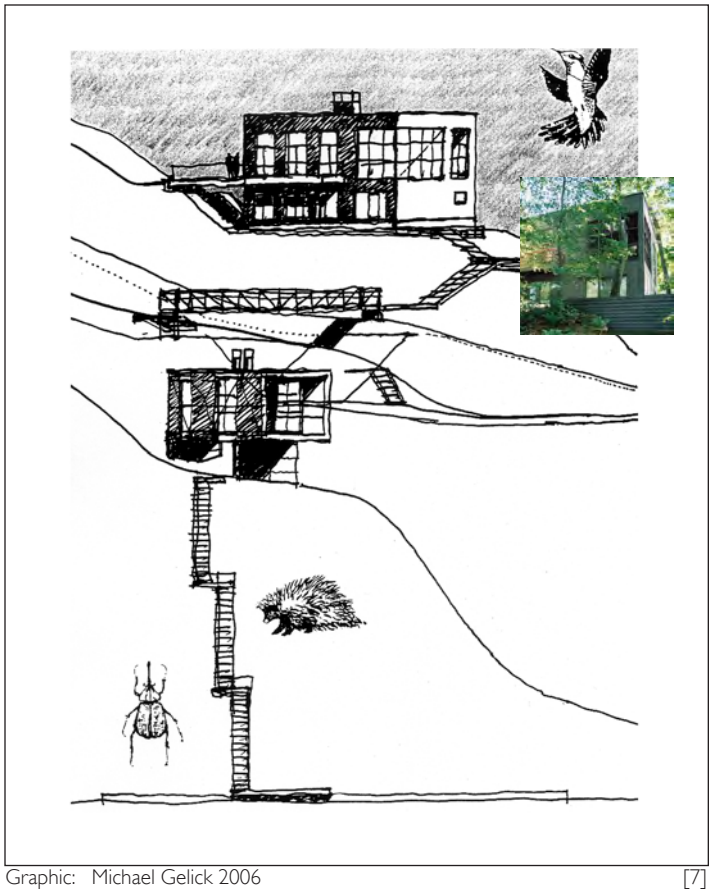
h. **Maintain the forest canopy** in forested dunes. Avoid tree removal that will interrupt the canopy. This will sustain the continuity of the ecosystem, and reduce cooling loads in summer months by shielding the house from the sun and reducing heating loads in the winter by allowing sun to warm the building.

Looking up to canopy continuing across a home. [1]

Garlic Mustard - A noxious invasive weed

i. **Use steps, bridges and ramps mounted on posts to traverse steep or unstable slopes.** A path on a steep slope such as illustrated below would quickly lead to killing the plants, disturbance of the sand or sandy soil, and to erosion.

In this sketch the lower building site was too small for the home and was used for a gazebo/studio. Stairs provided access to the beach. Proceeding up the dune is a combination of steps, paths on flat areas, a bridge across the communal access road and finally stairs to the main house and its deck



Graphic: Michael Gelick 2006 [7]

j. **Remove invasive plants**. Invasives are non-native plants that rapidly expand their coverage. They can take over habitat from indigenous species, and in some cases such as garlic mustard, have toxic effects on native species.

A plan to remove invasives should be developed based on the type and extent of invasive plants, Usually, it requires continuing maintenance.

TERRAIN CHANGES

Altering the terrain of a site creates opportunities for erosion. Here are a few guidelines to minimize the likelihood that changes will directly cause or lead to erosion.

a. Avoid making any unnecessary topographic changes. Disturbing or undercutting a slope is the most common human cause of erosion.

b. Revegetate with native plants all bare areas where topsoil has been removed.

c. Stockpile any topsoil that is removed and redistribute it over any exposed bare sand. The top soil will warehouse seed stock of native plants. Spreading it over exposed sand will spread the native seeds and speed restoration.

d. Avoid making topographic changes in and creating slopes steeper than 1 foot vertical in 3 feet horizontal. This is approaching the maximum slope of sand that will remain stable. Erosion will occur when wind and gravity or flowing water act on the surface.

e. Do not concentrate the flow of runoff or cause it to sheet onto steep slopes by altering the topography.

f. Protect slopes during construction by restricting access and by using temporary slope stabilization.

g. Install underground utilities by directional drilling in steeply sloped areas to avoid destabilizing the slope.

House on top of dune with minimum excavation and vegetation removal. [11]

Trees screen the house and soften its impact on the beach. [12]

Home sited on a level area with views to untouched steep slopes beyond. [13]

BEST PRACTICES

A site can be planned and a home can be designed so that the natural setting is superbly preserved only to have the site significantly and unnecessarily damaged by poor construction practices and methods.

In 2010, a Coastal Zone Management grant funded the writing and production of *How to Protect Critical Dunes : Practical Guidelines for Site Development and Management in Michigan's Critical Dune Areas*. It has excellent coverage of best practices and methods.

It and several related publications are available from county conservation district offices or from the Michigan Association of Conservation Districts' website: https://macd.org/.

Green roof used to moderate heating and cooling, and extend life of roofing. [8]

AWARDS CRITERIA

ELIGIBILITY

An entry had to be a single family residence located within a critical dune area in Michigan. The project had to have been permitted after July 5, 1989 by the Michigan Department of Environmental Quality or by a local zoning body having authority to do so under the Sand Dune Protection and Management Act (SDPMA).

JUDGING CRITERIA

Entries in the awards program were judged for the success with which the project met its individual requirements and made the most of its setting while preserving the dunes. General architectural design excellence will be an important consideration.

The following are special considerations that the jury used in evaluating submissions:

Preservation of habitat: The dunes provide habitat to a wide variety of fauna (year-round resident, migrating and seasonally resident birds, mammals, reptiles, insects) and flora including a number of protected species. The very diverse inhabitants depend on the dunes ecosystem for survival. Diversity of species has been shown to depend on the size of contiguous habitat. For these reasons, it is important to minimize the impacts of our buildings and construction on the dunes.

Measures to control erosion: Physically altering the dunes and adding new structures may endanger the dunes by creating new possibilities for erosion caused by wind and water. The first line of defense is to introduce change in a way that reduces, or at least does not increase, erosion. The second is to include features that mitigate or prevent erosion.

Minimal removal of native plant materials: Native plants are adapted to their environment in the dunes. They support other native species and provide habitat for other organisms. By preserving the existing native plants the effects of our interventions and additions to the ecosystem, as well as erosion are minimized.

Landscaping with native plants and excluding exotics: As a corollary, because exotics can overcome native species, introduced plants should be native to the ecosystem.

Legal constraints: The Michigan Legislature has enacted laws that regulate construction in the critical dune areas. The Sand Dune Protection and Management Act controls construction in the dunes. The Shorelands Protection and Management Act regulates construction in high-risk erosions areas, which include much of the lakefront dunes. Awarded projects must have conformed to requirements of these laws and regulations in force at the time of construction.

Exploit views and setting: The critical dune areas provide views over Lake Michigan and into the surrounding highly articulated landforms and landscapes. Recognizing and responding to these features enhances the design of homes in the dunes and lives within.

Resource-conserving design: Today, in any project, meaningful design response to the environmental costs of construction materials and on-going use is essential. Lakeside settings bring opportunities as well as challenges: taking advantage of lake breezes can eliminate the use of air-conditioning for eight months out of the year; cold winter winds blowing off the lake can increase energy needs for heating.

Clarity of response to immediate environment and program: Though the awards program is intended to identify archetypes for homes built anywhere in the dunes, consideration will be given to a project's response to site specific opportunities and challenges, as well as to programmatic requirements.

AWARDED PROJECTS

On the following pages are photographs and drawings of the three entries that were recognized with awards.

Prior to judging by the design jury, the projects were reviewed and evaluated by a panel of scientists and experts in dune construction. This panel did not consider aesthetic or functional design of the house to meet the owners' requirements. It did rank the projects based on the least negative effects on the dunes and dunal ecosystems. Their findings were summarized for consideration by the design jury.

Each project responds to a unique site and each had a unique set of owner requirements. They are of different styles and design approaches. Yet with this diversity, they all respond very directly to the judging criteria and are examples of projects appropriate to the critical dune areas. These projects were also judged to be of excellent architectural design. As such, they serve as a visual summary of the objectives for "Designed to Preserve."

Hopefully, these projects will be considered to be worthy of emulation.

The awards determined by the design jury were "Winning Entry," "Honorable Mention," and "Commendable Aspects." They are presented in this order on the next three pages.

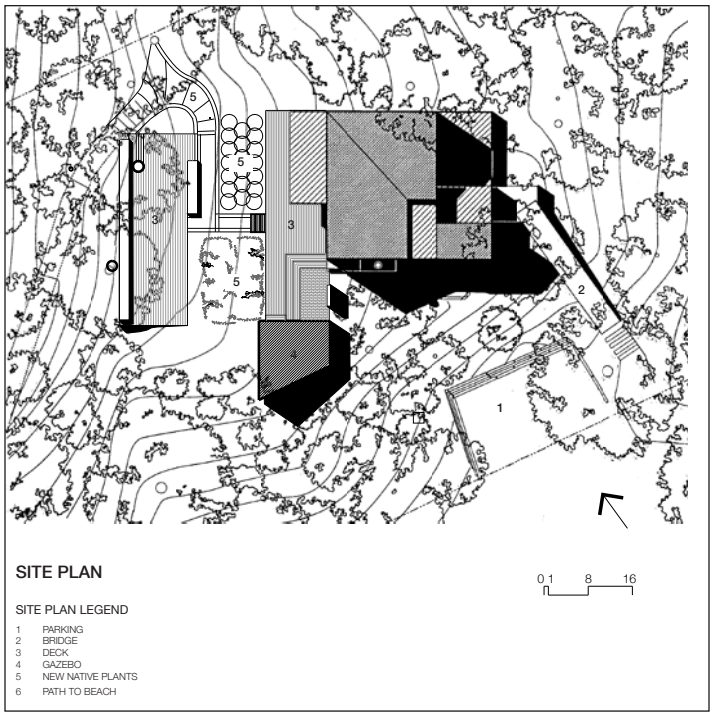
WINNING ENTRY

Lake House in the Woods, Covert by Davis Associates Architects & Consultants, Inc., 53 West Jackson Boulevard, Chicago, IL 60604. (daac.com)

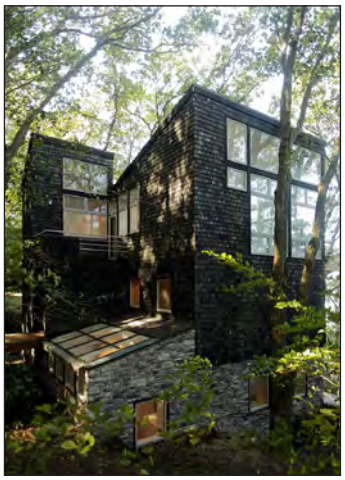
The primary design objectives were to step lightly on the site, to preserve and honor the natural setting and to enable the owners and their guests enjoyment of the natural beauty of the place.

A number of early decisions supported these objectives:

- A three story scheme enabled a small foot print, only 871 square feet, for this 2,200 sf house.
- The maximum disturbed slope is 1 foot vertical in 4 horizontal.
- The driveway is shared with 11 other properties.
- Prior alterations to the site were incorporated into the site plan.
- Only 1 tree larger than 6" diameter was removed providing natural climate control in summer and winter. Even trees within several feet of the home remained.
- Cross ventilation to each space provides comfort with only occasional use of the mechanical system.
- Only the roofs of the house and gazebo are impervious.
- Lower deck, parking area, and path to the beach were left unchanged.
- Care was taken to avoid channeling rain runoff.




View from Southwest


View from North


Dining area and kitchen with sloped glazing


View from Northwest


Master Bedroom - 3rd Floor

Every occupiable space has views to Lake Michigan and the forested dunes that surround the house. The third floor master bedroom is like being in a tree house or on a platform in the tree canopy.

All excavation spoil was redistributed over the site and no new soil was brought onto the site. Excavation was done by hand to avoid the damage that equipment might cause to slopes.

Natural materials that blend with the wooded setting make the house a part of the forest, not apart from the forest.

Except for several rhododendrons, only native plants were used in landscaping. Previously planted non-native, exotic plants have been removed or are being continually monitored and controlled.

The house was completed in 1993 and has delighted the owners

HONORABLE MENTION

House from parking area - steps to left

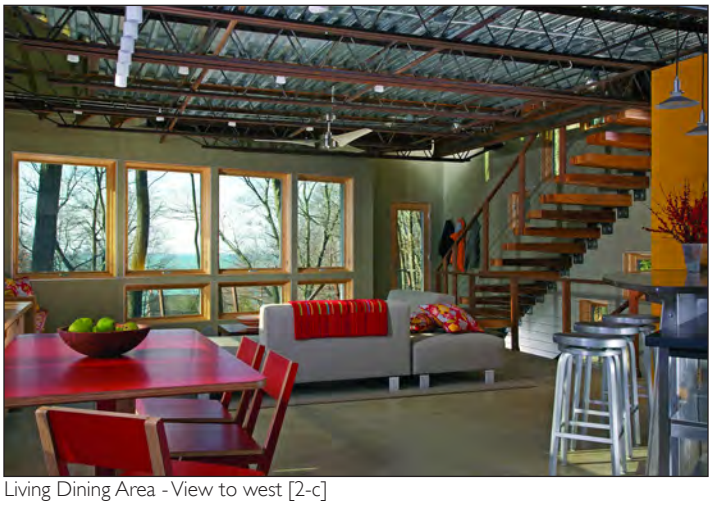
Laketown Residence, Laketown Township, Holland, MI by Allegretti Architects, St. Joseph, MI 49085. (allegrettiarchitects.com)

The 2.41 acre west facing dune offered an approximately (1,200) twelve hundred square foot (30' x 40') MDEQ approved building site. It was the only sizeable area that had a slope less than 1 foot vertical in 3 feet horizontal.

The architect used a park and walk approach because the point of arrival was distant from the home site. A curving stairway on the lake side is used to reach the house. It contributes to the "Swiss Family Robinson-esque" character to the home.

On the opposite side is a two level screen porch on concrete piers that steps up the dune. It is connected to the third level of the home.

Many LEED for Homes driven elements were employed. Natural lake breezes under the forest canopy along with a closed loop geothermal heating system conditions the spaces. Low maintenance cement board and sustainable timber surround a concrete and steel interior. FSC wood, urea-formaldehyde free medium density fiberboard and recycled 1850 blacksmith shop timber cantilevered wood stairs are incorporated in the house. These sustainable products and efficient energy systems make this a seminal LEED Platinum home.



Living Dining Area - View to west [2-c]

View from west - gazebo on right connects at third floor of house

Steps to parking

COMMENDABLE ASPECTS

Beachfront Retreat, Covert, by Booth Hansen, 333 South Des Plaines, Chicago, IL 60661. (http://www.boothhansen.com/)

Preservation of the natural dune habitat was a top priority of this private retreat. Energy conserving design and making the best use of the setting were other driving forces.

- The home is divided into two structures. Smaller separate structures offer flexibility in locating the building to accommodate the existing terrain, trees and vegetation.
- Raised walkways from point of arrival to home entry allowing continuity of the natural habitat below.
- The first floor of the main house cantilevers four feet over the basement to increase the floor area without added site impact.
- Structures are arranged to preserve existing trees and woodland habitat.
- To reduce the risk of erosion, buildings are located only on the low slopes and native dune grasses are restored and extended.
- Clerestory windows over the main living space and bedroom utilize natural chimney effect, allowing hot air to rise up and out of the retreat.

View from the Southwest

- The site was left undisturbed except where essential to accommodate the requirements.
- Views to the lake and to the surrounding natural landscape are exploited and become a part of every room in the home.
- Covered outdoor porches provide shade from hot summer sun and enhances outdoor living.
- Air floor heating and cooling takes advantage of the thermal mass of the concrete floor to hold in heating and cooling.

The building is clad with horizontal galvanized siding. Some might consider a manufactured product with an "industrial" finish to be in contrast with the site, but it blends beautifully with the sand and is, of course, an ideal material for a location having heavy rains and strong winds.

Other exterior materials were also selected for their permanence: stainless steel windows, doors, railings, insulated glazing units, hardwoods, and concrete.

As existing trees and vegetation grow, they will come even closer to the home and garage, and blur the distinction between house and site. Only the materials will distinguish the two aspects.

Bridge to Studio - Garage

Dining Room

Master Bedroom

Living Room

JURY

Professionals with design and planning experience in the dunes were selected as members of the design jury.. They analyzed and evaluated all entries, considered the report of the scientific panel and selected the three homes to be recognized and the designations for each.

Michael Gelick, AIA, *Professor of Architecture at University of Illinois in Chicago and Principal of Michael Gelick Associates.*

Mike Hayes, *Senior Ecological Resource Specialist, Coastal Regulatory Specialist, Cardno JFNew, Grand Haven, MI.*

Peter Osler, RA, FAAR, ASLA, *Assistant Professor of Landscape Architecture, Director Program of Landscape Architecture, Illinois Institute of Technology.*

Dan Wheeler, FAIA, *Professor of Architecture at University of Illinois in Chicago and Principal of Wheeler Kearns Architects, Chicago, IL.*

Mark Wyckoff, FAICP, *Professor and Director, Planning & Zoning Center at MSU; Senior Associate Director, Land Policy Institute, East Lansing, MI.*

SCIENTIFIC PANEL

The scientific panel was composed of environmental scientists, including geologists, ecologist, biologists, and naturalists who work with and in dunal ecosystems. They reviewed, commented on and ranked submissions and their performance in relation to the dunes.

Jeff Auch, *Executive Director of the Muskegon Conservation District and Cochair of the Michigan Conservation District Dune Partnership*

Elizabeth Brockwell-Tillman, *Park Interpreter and Director of the Gillette Sand Dune Visitor Center , P.J. Hoffmaster State Park.*

Edward Hansen, Ph.D., *Professor of Geology, Hope College, Holland, MI.*

Michelle Hohn, *DEQ, Critical Dunes and High Risk Erosion Shorelines, Grand Rapids District Office.*

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INDEX OF PROJECTS

Photographs and diagrams from the following projects are used to illustrate this booklet. The number in brackets below a photograph or drawing keys to the list below.

[1] Davis Associates Architects & Consultants, Inc., 53 West Jackson Boulevard, Chicago, IL 60604. Photography: Architect.

[2] Allegretti Architects, 500 Main Street, St. Joseph, MI 04985. Photography: Steven Davis. [2-a] Architect. [2-b] Jim Yochum

[3] Booth Hansen, 333 South Des Plaines, Chicago, IL 60661. Photography: Steven Davis

[4] Kathryn Quinn Architects, Ltd., 363 West Erie St., #300W, Chicago, IL 60610. Photography: Karant + Associates, Inc.

[5] Kulinski + Rappe Architects, 1915 West Division Sty., Chicago, IL 60622. Photography: Doug Snower Photography

[6] Mikkel R Hansen, AIA, 112 Hilltop Road, Black Mountain, NC 28711. Photography: Lars Hansen.

[7] Michael Gelick Associates, 494-2 Sheridan Road, Evanston, IL 60002. Photography: Architect.

[8] Von Weise Associates, 311 West Superior #216, Chicago, IL 60654. Photography: Michelle Litvin, Inc.

[9] Charles Fill Architects, LLC, 1021 East 48th Street, Chicago, IL 60615. Photography: Korab Hedrich Blessing

[10] DesRosiers Architects, 36330 Woodward Ave., Suite 100, Bloomfield Hills, MI 48304. Photography: Bruce Buck.

[11] Nagle Hartray Architecture, 30 West Monroe, Chicago, IL 60603. Photography: Bruce Van Inwegen.

[12] Mealy and Heindel Ltd., 732 Ashbury Ave., Evanston, IL 60202. Photography: Architect.

[13] Davis Associates Architects & Consultants, Inc., 53 West Jackson Boulevard, Chicago, IL 60604. Photography: Architect.

The Beech: Designed to Conserve Photograph: Charles F. Davis. III

Preserve the Dunes is a non-profit organization founded by local citizens of Van Buren & Berrien Counties of Michigan in 1997. It now counts supporters from the surrounding states and across the nation.

Purpose To protect the sand dunes and adjacent duneland ecosystems in southwest Michigan from impairment and destruction by sand dune mining, over-development and inappropriate use.

Central Values The dune areas of Michigan are "a unique, irreplaceable, and fragile resource that provide significant recreational, economic, scientific, geological, scenic, botanical, educational, agricultural and ecological benefits to the people of Michigan and to people from other states and countries who visit this resource." [Taken from findings of the Michigan State Legislature in the Sand Dune Protection and Management Act]

Vision of Future All designated dune areas of Michigan are free of sand mining; expanded and improved legal protections of these areas have been enacted by the State and local governments; and the citizens of Michigan support limiting use and development of these areas to only those that will preserve the dunes, the dune ecosystem, and other special qualities of this beautiful and unique land-water formation and resource.

Financial assistance for this project is being provided, in part, by the Michigan Coastal Management Program, Department of Environmental Quality (DEQ), through a grant from the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce.