

Energy Pitfalls and Interpretive Opportunities in Regional House Museums

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ENERGY PITFALLS AND INTERPRETIVE OPPORTUNITIES IN REGIONAL HOUSE MUSEUMS

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Summary

Developing an historic property into a house museum involves a complex relationship between the curatorial approach and eventual energy consumption. Two house museums in New Orleans demonstrate the costs and benefits of using climate-responsive architectural features in their interpretive programs.

"Living in New Orleans reminds me of trying to swim in molasses or ride a bicycle in the sand: you sweat a lot; if you work real hard you might get somewhere; but mostly you get real tired so you stop and have a drink."

(Leslie Smith, singer)

For buildings as well as people, the climate of New Orleans poses a difficult problem. Potential passive responses to the summer's heat and humidity are few, while the comfortable transitional seasons make one wish there were no buildings at all. Contrary to popular belief, the winters are cold and damp enough to cause high heating bills in houses designed for summer conditions. (Fig. 1)

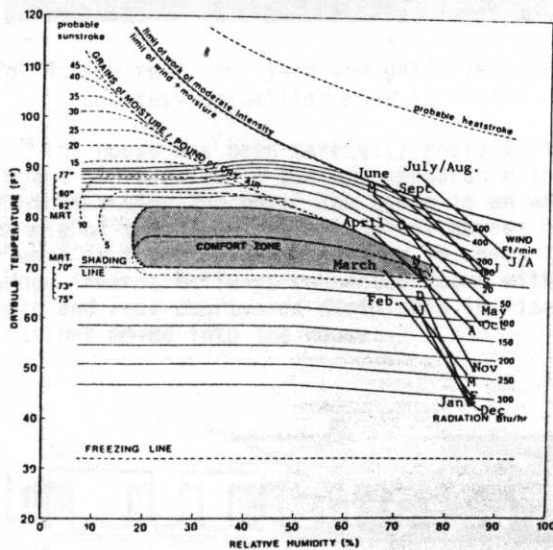


Fig. 1 New Orleans climate data plotted on Olgyay's Bioclimatic Chart.

With architecture students from Tulane University we have researched the climate responsive design and performance of six historical houses in the New Orleans area: Destrahan Plantation (1790, wings added 1810, remodeled 1840); the Masson House, an early Creole cottage (1805); Sun Oak, a Creole cottage in Greek Revival style (1836); Oak Alley Plantation (1939); Gallier House (1857); and the Twitchell House, a wood frame shotgun (1890). Our findings confirm that until the mid-twentieth century houses were designed to maximize the thermal comfort of the occupants by recognizing the changing climatic conditions outside. A wide range of architectural and lifestyle-related strategies were incorporated into designs of many styles. These were relied on for thermal comfort rather than the mechanical systems and fossil fuels which are used today.

Developing an historic property in the New Orleans area as a house museum, therefore, involves a set of decisions with significant implications for energy consumption. Two basic approaches - the conservatorial and the interpretive - are exemplified by two of the houses studied: Gallier House and Destrahan Plantation, both currently operating as house museums. A comparison of the two illustrates the complexity of the relationship between energy use and the assumed role of a house museum.

Gallier House

Designed in 1857 by the local architect James Gallier, Jr., this early Victorian is located on Royal Street in the French Quarter of New Orleans.

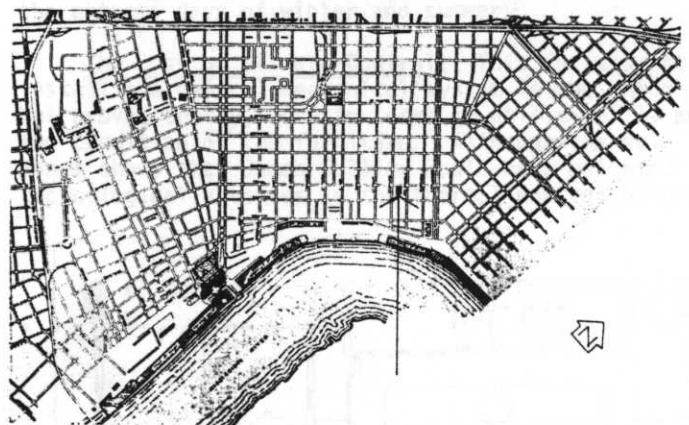


Fig. 2 Location of Gallier House in the French Quarter, New Orleans, Louisiana

The two story house has carriage access to a courtyard behind with flanking slave quarters to the northeast (Figs. 3 & 4), and served as Gallier's own residence as well as a showcase of his talents for potential clients.

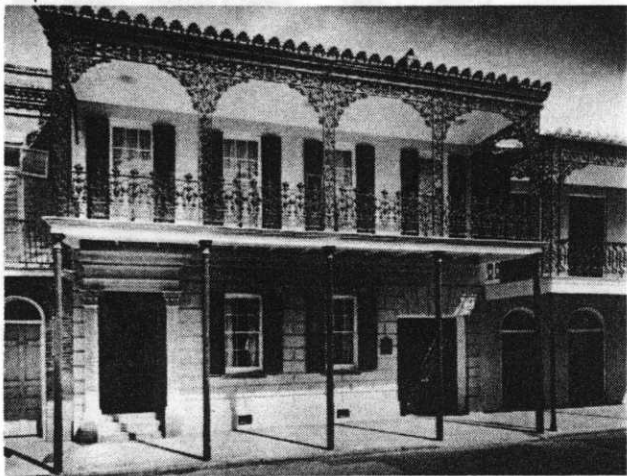


Fig. 3 The Royal Street elevation of Gallier House (Photo courtesy of Gallier House)



Fig. 4 The rear courtyard and galleries (Photo courtesy of Gallier House)

The house has been carefully restored to the elegant mid-nineteenth century appearance and furnishings inside and out. The house is an early example of the "Americanization" of houses in New Orleans in the nineteenth century in which the homes turned inward; hallways connected rooms within the house and rear courtyards diminished in size as the functions moved into the house.

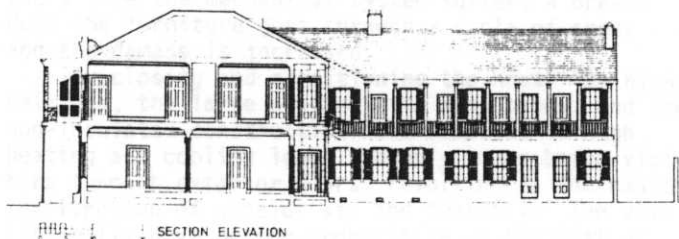


Fig. 5 Section through main house and courtyard

In establishing the direction of the museum, the accurate restoration and preservation of the extensive decorative arts and furnishings were identified as a priority. Part of this decision of the 1960's was to install a mechanical system to control the humidity as well as the air temperature within the house. The system operates in two zones: the main house and the service wing. The adjacent site provides administration and exhibit spaces, a gift shop and parking for staff and visitors, thus allowing the Gallier House to be restored throughout.

Winter and Summer Dress. As part of the emphasis on the interpretive role of the decorative arts, the museum has developed a program of changing the house from "winter dress" to "summer dress" (Figs. 7 & 8) as the seasons change, much as the original occupants of this and other New Orleans houses did until the turn of the century. The heavy drapes and wool carpets which retain warmth in the winter are taken up and replaced with sheer curtains on the windows and grass mats on the floors. The upholstered furniture is covered with light muslin slip covers and mosquito nets are hung over the beds. The chandeliers and mirrors are draped with netting to prevent discoloration from flies. Rocking chairs are moved onto the galleries and the awning on the courtyard galleries are lowered for shade. Potions are mixed and set out on the galleries for mosquito control. The visitors can thus begin to understand the power of the changing climate in the daily lives of those who lived in the city before air conditioning.

In part, the extensive change from winter to summer dress is possible because the fabrics and the wallcoverings are protected from exposure to the seasonal changes in temperature and humidity and from the dirt and soot which would otherwise be carried into the house through open windows. The museum has calculated they would have to hire at least one additional staff member to clean and to operate the awnings, shutters and windows if the house were not kept closed and conditioned. The fabric, carpet and wallpaper reproductions would also require periodical replacement costing a great deal.

Additional benefits from the decision to totally condition the house are increased security and control over access to individual rooms. The thermal comfort is welcomed by both staff and visitors on the extreme days of winter and summer.

The Cost of Climate Control. This decision to install the central mechanical system is one which has proved costly, both in terms of utility bills and the condition of the furniture. Although the evidence shows that James Gallier would have welcomed technological advances in the thermal control of his

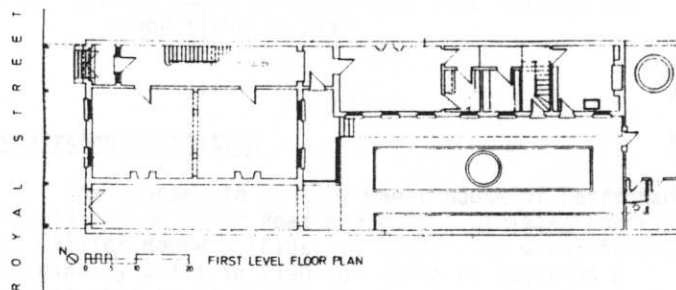


Fig. 6 Plan of ground level with courtyard



Fig. 7 Front parlour in winter dress (Photo courtesy of Gallier House)



Fig. 8 Front parlour in summer dress (Photo courtesy of Gallier House)

house, his 1857 design was based on the control of site energies such as sun and wind and the use of fireplaces for heat. In both plan and section the house could be configured so that winds on Royal Street would pull air from the courtyard through the rooms. (Figs. 9-11) The overheated air was exhausted by both cross ventilation through the front windows and stack ventilation provided by ceiling vents in the master bedroom and an operable skylight in the central upstairs hall. Every room in the main house was equipped with a coal burning fireplace for winter comfort.

The wood furnishings in the house spent over one hundred years under these variable conditions, and with the installation of the central system the lower relative humidity caused serious deterioration and damage to the glues and veneers in the furniture. Every time the mechanical system suffers a breakdown the furniture goes through a cycle of shock and the damage is increased.

By closing and conditioning the house the high ceilings, the large windows with many panes, and the non-insulated construction have resulted in high heating and cooling loads. Hourly tours bring visitors through exterior doors, resulting in increased infiltration of outside air and humidity. The utility bills have become prohibitive as the cost of electricity has risen since the 1960's when this

curatorial policy was established. New Orleans is facing a further increase in rates estimated between 40% and 400% as the Grand Gulf nuclear reactor comes on line in the fall of 1984.

Alternatives. In exploring opportunities for reducing the utility bills the director of the museum and the student team looked at ways of expanding the interpretive emphasis to include the dynamic response of the house to the changes in sun, wind, temperature and humidity during the year. Schedules for reducing heat gain using the louvered shutters and gallery awnings were developed. On low humidity days in the spring and fall the windows and doors are now opened to reveal another quality of this overdressed Victorian as the breezes lift the lace curtains and connect the interior with outside.

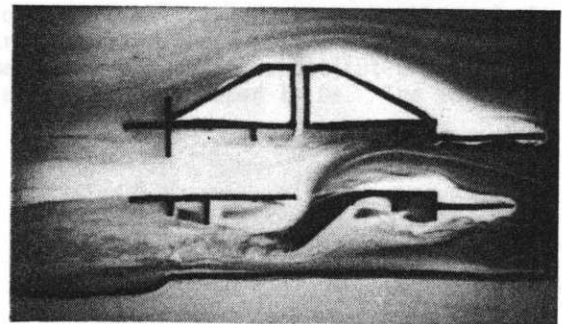


Fig. 9 Flow table study of wind flow in section, front door open

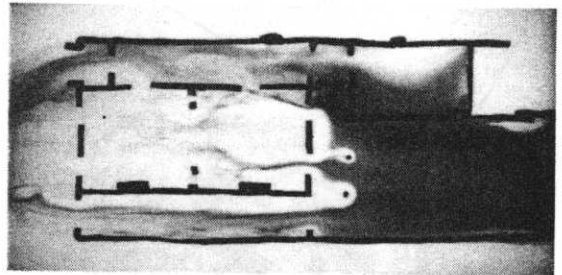


Fig. 10 Flow table study of wind flow through the ground floor in plan, front door open

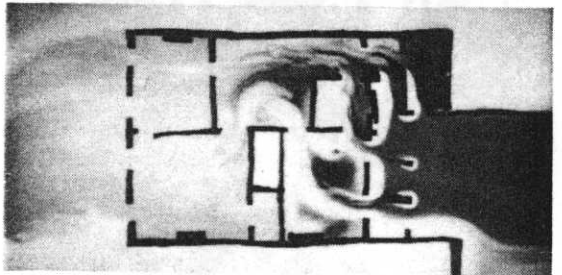


Fig. 11 Flow table study of wind flow through the upper floor in plan

Destrahan Plantation

The eighteenth century manor house of Destrahan Plantation on River Road presents a striking contrast to Gallier House. (Figs. 12 & 13) The manor house, originally built in 1790 for Robin de Logny as a classic Creole plantation house, faces the Mississippi

River to the southeast. Four corner rooms share the chimney masses with a large central room on each level. There are no interior hallways. Access to each room is via french doors off a 12 foot wide gallery. The rooms and gallery are covered by the large roof, enclosing an attic which acts as a thermal buffer zone. Four dormers encourage stack ventilation within the house.

By 1810 two garconierres were attached to the east and west galleries to provide additional bedroom, office, and cooking space. Also early in the nineteenth century the north gallery was enclosed to create an entrance foyer with a double interior stairway. (Fig. 13)

The River Road Historical Society faced a thoroughly different situation in the decade since 1974 than the Freeman family which restored Gallier House. The rural rather than urban site, the nature of the house itself, the history of renovations and additions, and the financial basis of the museum itself require a different curatorial approach.

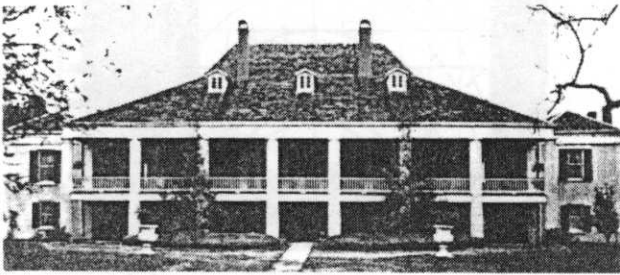


Fig. 12 Destrahan Manor, south elevation

The house is an extroverted house, designed as the heart of an extensive working plantation. The original Creole concept of a house was closely tied with an attitude of multiple uses for each room; sleeping, eating and visiting could and did occur in any room of the house which was thermally comfortable at the time. Daily and seasonal migration from inside to the galleries, between the first and second floor, and between the flanking and the central spaces on each floor were a means of accommodating the daily and seasonal changes in temperature, humidity, sun and wind on the site.

During overheated months the house was opened up, beds and furniture were changed to summer dress and moved onto the galleries to take advantage of the breezes off the river. (Figs. 14 & 16) Mosquito netting was hung between the columns along with linen roll blinds. The massive fireplaces stayed cool by wicking water from the high water table and transferring excess heat to the ground while being shaded in the interior of the house.

In transitional seasons the residents moved back inside the flanking rooms and adjusted the windows and shutters as conditions changed outside. On cooler days the south gallery provided sun for warmth while blocking the colder north winds (Fig. 15) allowing this outdoor room to be used longer than one would expect in this climate.

During colder months the house dress became heavy in a manner similar to that of Gallier House in order to retain heat. Wood was burned in the large fireplaces and activities moved into the large central rooms. The galleries were hung with canvas blinds to block the winds and to add a buffer space between inside and out. Access to rooms was inter-

nal rather than through the galleries.

Interpretive Strategy. Careful restoration and complete reconstruction and reproduction of the interiors such as Gallier House has accomplished poses problems for Destrahan. First, the museum is publicly owned and has limited funds available. If the money were available, however, how would one decide which room is a bedroom when any of the rooms could have well served that purpose in the past? The period and quality of the additions complicate the choice of one date to which the house should be restored.

The 1982 development plan for the museum has recognized that these are issues which can be raised for visitors rather than settled for them one way or the other. Similarly, with the problem of climate control the experience of the house responding to climatic changes can be substituted for simply looking at the way life used to be. The administrative

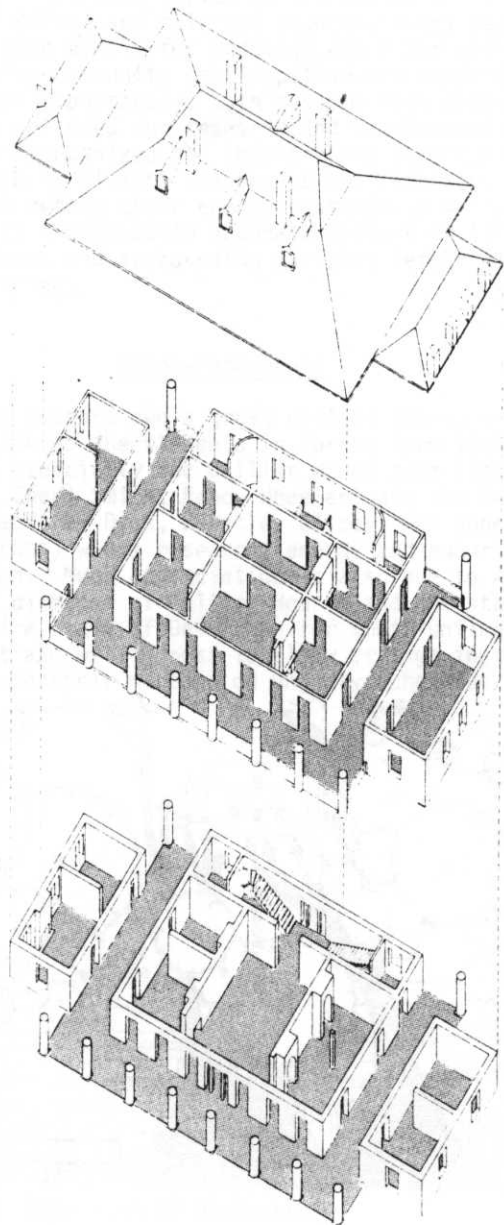
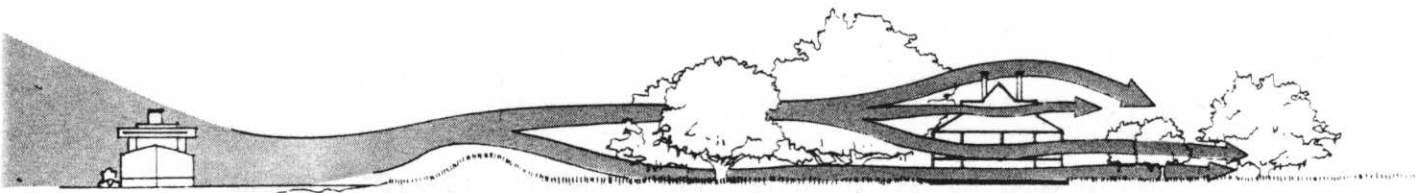


Fig. 13 Exploded axonometric



office and the gift shop in the east and west gallerieres are fully conditioned. The rest of the house is opened up daily during the spring, summer and fall, allowing visitors to pass in and out between rooms and galleries. In the winter the rooms are closed and will be heated with high velocity electric resistance heaters aimed at the fireplace mass. As the museum can afford them, mosquito netting and canvas blinds will be added to the galleries and hung during appropriate seasons.

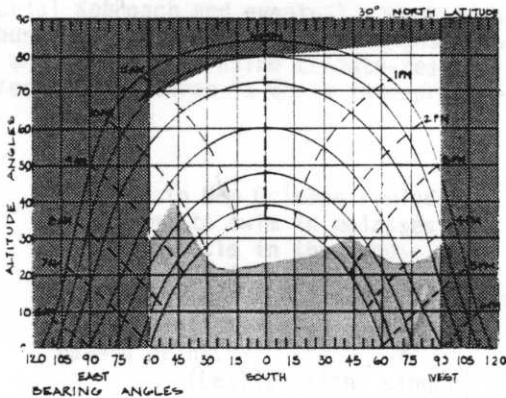


Fig. 15 Solar transit analysis of south gallery, upper level

Costs of an Open Building Strategy. This open approach to the internal temperature and humidity is not without conservatorial problems. Fabrics and wallpapers, when purchased, will require frequent cleaning and periodic replacement. The house interior itself must now be cleaned more often when the house is opened to the outside air, dust and pollution. The hard freeze of January 1984 taught that the house must, as a minimum, be kept as though someone were living in it when the paintings became covered with ice.

Conclusion

The interpretive approach chosen for each of these houses was shaped largely by the period in which the curatorial policy was made and by the financial resources available. However, the nature of the houses and sites play a strong part in the success of each choice.

Gallier designed his house for an intensely urban site and used new technologies to provide interior comfort for the occupants. The Victorian interiors contain such a profusion of articles it would be impossible from a security standpoint to allow visitors to pass through the rooms and onto the front galleries. However, there still remains the question of whether the maintenance and replacement of fabrics caused by opening the house in the summer might be paid for by the decreased electrical bills. Reducing the cooling load through scheduled

use of the shading devices might be accompanied by the addition of a non-intrusive radiant shield (such as aluminum foil) in the attic.

Conversely Destrahan, which celebrates the connection between inside and out, faces a high winter heat load no longer satisfied by burning wood for insurance reasons. The opening and closing of the house seasonally and the freedom of visitors to walk through the rooms limits the choice of fabrics, rugs and interior furnishings. This less formal attitude is in keeping with the comfortable and welcoming character of the house itself and allows greater flexibility for the role of the museum in the community. Destrahan serves as the emphasis for a program of gifted and talented students every year, and can be used easily for weddings and other gatherings, increasing community participation and support.

Most importantly, both museums have enthusiastically welcomed our research and recommendations and have recognized the interpretive opportunities available in climate responsive architecture. They may even reduce their energy consumption while providing an historically accurate picture of life in New Orleans and surrounding parishes before air conditioning.

Acknowledgements

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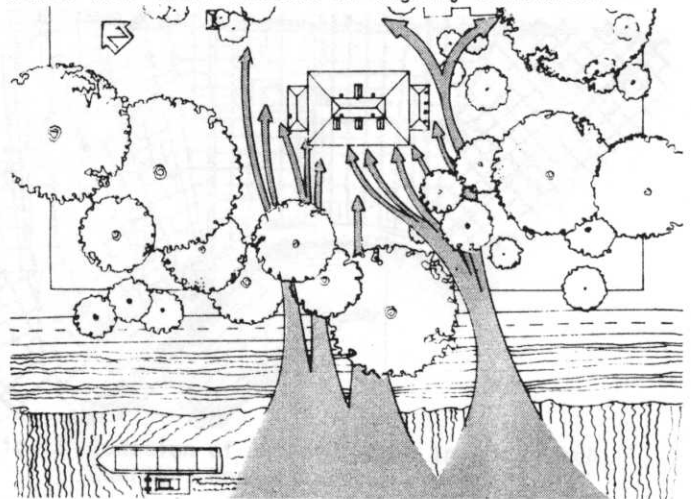


Fig. 16 Site plan of Destrahan