Light, Form & Place: 
A Texas Hill Country Winery

by

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A THESIS SUBMITTED IN 
PARTIAL FULFILLMENT OF THE 
REQUIREMENTS OF THE DEGREE 

Master of Architecture

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HOUSTON, TEXAS

MAY 2004
ABSTRACT

Light, Form and Place:

A Texas Hill Country Winery

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A design for a Texas Hill Country winery and exhibition center. The design is developed from investigations into: the use of natural light in architecture; form-making in response to natural light; perception of space; establishment of place; the commercial nature of such a placemaking; the process of wine making; and the culture of winemaking locally and worldwide.
Acknowledgements

My love and deepest thanks to my parents, Eddie and Judith Garland, who have supported unfailingly my peculiar academic career.

My thanks also to:

Gordon Wittenberg for patiently watching me ignore much of his sensible advice to my unfailing detriment;

David Brown for his tremendous support for all the thesis students;

Pat Seed for giving me the opportunity to turn a hobby into a métier;

John Casbarian and the administration of the School of Architecture for making it possible for me to complete this degree despite my tribulation.
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Evolution of the design thesis

Theme

The initial field of investigation for this project was natural light: its use in buildings and the shaping of buildings in response. Leading on from this is the resultant contrast between light and dark and how it is exaggerated or suppressed. Some buildings are awash with light and some are obscured in gloom. The most skillfully realized use the one to heighten the impression of the other. At this stage the research addressed a further duality of our experience of light as a phenomenon both physical and philosophical or spiritual and how the two sides of the experience are connected. For example: the extent to which light, particularly natural light, operates in the realm of the sublime rather than as a sign (a readable and understandable invoker of meaning). Also, how much of our reaction to the play of light in and over a building can be attributed to acquired cultural and historical models (e.g. light from above as conventionally divine) and how much to our subconscious or even physiological responses (e.g. to shadowless light). To what effect is the “gut reaction” mediated by culture, knowledge and experience?

Program

Despite the accomplished exercises in the manipulation of light in smaller scale structures such as the single-family house, it is in larger buildings that a variety of approaches can be realized. The best opportunities lie in buildings that are effectively an expression of collective will and culture: in a school, library, art collection,
church, closed religious community or government organ. The development of the theme led to the selection of a program, or rather a pair of interrelated programs, which could emphasize these contrasts within a single building: a winery and a gallery, within the same building. The pairing has certainly been conceived of, designed and constructed before. The historic wine making châteaux of France are repositories of fine art. New wineries in California, such as the Hess Collection and Clos Pegase, celebrate wine and art on the same premises. Yet the interpenetration of the two programs in these cases tends to be parenthetical: wine drunk in front of paintings in display areas or lonely works of sculpture planted in vineyards and cellars. This is understandable considering that paintings and vines or wine have distinctly different environmental preferences. In this project however, as light is the key, winery and exhibition space are related visually rather than intertwined physically. In a wider sense, an agricultural and an artistic community are present: Apollo and Dionysus conjoined. There is a contrast between discipline and abandon within each part just as there is a contrast between the two parts and a contrast between darkness and light.
Site and client

With this design brief in mind there arose further choices of criteria, such as site and client. These are considerably less influential on the final design in this particular case than they would be in a real project but they do set some important guidelines. The site is a southwest facing slope near Wimberley, Texas. The project was placed in the Texas Hill Country because of the real potential for expansion shown by the Texan wine business and the opportunity to conduct an actual site visit and discussions with local wine growers.

The climate is warm temperate: summer heat is intense and winter frosts are infrequent though sharp. The theoretical client is less real: a recently rich technology specialist who has acquired a small expanding winery in the Texas Hill Country and possesses a growing collection of wine related art and artifacts which she wishes to incorporate into a gallery and public center for the study of winemaking on the site. (Such a client—the programmer with money to spend and a collection to house—seems improbable now, but the species was identifiable in 1999 in the major wine growing regions of the USA: Microsoft stock options paid for wineries in the Pacific Northwest, Silicon Valley refugees funded the Napa Valley property price explosion, and "Dellionaires" moved out of Austin and into the Hill Country west of Austin.) Within the limitations of site and aspect, the client requests predominantly natural light for both gallery and production facilities, as appropriate, and a gravity-
feed fermentation and aging system. However, it is assumed that cost and ground conditions do not permit the excavation of subterranean cellarkage on the site. Therefore the wine production and storage facilities are to occupy the lower levels and the upper levels are dedicated to the winery business, exhibitions and retail facilities.

Research

The function and location of the project and the nature of its inception led to investigations into the wine making process, the history of winemaking both worldwide and within this region, and the nature of “place-making” in both poetic and commercial senses. Grape cultivation and wine production have a long embattled history in the State of Texas but the wider culture of the state has been growing more appreciative of world foods. As “blue laws” are relaxed, wines and spirits are becoming available to a greater customer base. The expansion of the winery is planned to capitalize on this trend; the growing appreciation of American wines from parts of the country outside California; and the maturation of a local viticultural expertise. Farming is financially high-risk and operates in opposition to heavily subsidized industrial agriculture. A small holding benefits from a secondary income source for stability as a business while galleries and museums rely increasingly on traveling or rotating exhibits to boost attendance.

This commercialization has inspired such neologisms as “Agritainment” and “Infotainment”. In preparation for designing the facility, the site was documented through site visits and aerial photography. The present owner and others in the
area were interviewed for their general plans for the area and specific plans for their own wineries or vineyards. At the same time, a series of computer modelling studies were conducted in Form-Z to test the lighting conditions under the various roof systems considered for the top-lit exhibition spaces.

Design process

Initial concepts for the design were explored with sketches and sketch models to identify a particularly suitable design type: a series of pavilions arranged down the side of the hill, with exhibition space open to diffuse light from above on the upper floor and sheltered wine production and storage facilities below. These were then modelled in foamcore at scale on a site contour map. Once the viability of the concept was established it was transferred to Form-Z for an approximate arrangement of spaces, areas and connections. This model was in turn drawn in Vectorworks to resolve dimensional issues in plan and section and returned to Form-Z to produce renderings. At this stage the design was realized in wood for jury review.
Light

Texts

Light in art and architecture has been used in ways both sublime and mundane, or rather with both intentions, illuminating spiritually and practically. In the works of artists for whom light is a theme in itself, from Delatour to Turrell, it is a powerful tool that instills in the viewer a range of responses. In built architecture, the reailness of the manifestations of form and light would seem to skew this response spectrum away from the purely poetic. When all the senses can be engaged, is our response to the visual attenuated in some way, the effects becoming more or less subliminal? Husserl, Heidegger and Merleau-Ponty, the phenomenologists, offer a philosophy based on what our senses tell us. In their tradition, other writers have addressed the specifics of space, place and the senses: Bachelard’s “Poetics of Space” is bedside reading for most architects (even if it should perhaps be called “Space of poetics”...). From these, from Eliades’s on “The Sacred and the Profane”, and Kepes on light, one draws a sense of light and a sense of place that combine in such a way as to make duck and shed concepts seem ever shallower. Of particular interest are the Japanese traditions and architectural practices relating to natural light. Henry Plummer’s works on the history and current practice of architecture in Japan and the specific case of Tadao Ando are comprehensive studies that complement Tanazaki’s short appreciation of “The Nature of Shadows”. Tanazaki explores and explains the concepts of wabi and sabi: very loosely meaning tranquility and patina.
There are works that express exactly the sense of “dappled shade” that this project is struggling with. Wright’s command of light at Johnson Wax is exemplary.

Soane’s house in London, which gradually expanded into the neighboring houses as his collections increased, layers light down into the rooms buried deep in the interior. It leaks light into the edges of ceilings and pours it through light wells.
Tadao Ando’s manipulation of shadow, in keeping with those traditions of Japanese architecture, barely allows light to creep into the rooms of some of his buildings. The Koshino House is set into the side of a hill and its form is stripped so bare that without furniture (which photographers always remove) it is appears almost tomb-like.

Indeed, in comparison with another simple yet carefully lit project, Luis Barragan’s Capuchinas Chapel, it seems more austere than the nunnery. Ando’s restricted palette of wood and concrete is a sharp contrast to the painted stucco that enlivens the light entering the chapel, which remains chaste but rich.
Combining the two effects in one place, Le Corbusier laced the chapel of the monastery at La Tourette with shafts of clear direct light and fields of reflected color. Here in the same light as the medieval Catholic cathedrals there is not so much restfulness as a spiritual chill. The materials seem incapable of aging gracefully, instead cracking and staining. The philosophically cooler Purism had more soul.

Strong sunlight has traditionally required shielding that led to distinct contrast. Arabic and Indian screens present the inside viewer with bright fields of light points against the invisibly dark material of the screen itself. At the Alhambra palace in Granada, Spain, cool and dark halls are punctuated by bright courts.
Texas is considerably further south: Houston is on the same latitude as Tripoli. Here two northern architects have designed galleries that use the same courtyard device and extensive diffuse light from above: Kahn’s Kimbell Art Museum in Fort Worth and Piano’s Menil collection in Houston. Both employ simple modernist vocabularies: Kahn favoring the monumental and monolithic, Piano the futuristic and contextual. It is difficult to approach this project and its stated aims without these two works at the front of one’s mind.
Site

When asked about plans for building at their own wineries, the Texas winemakers interviewed had a common answer: when dealing with the realities of their business, a steel shed was all they needed or could afford, but when they won the lottery they would be re-creating a Tuscan hill town. Given the closer similarities between the Hill Country and Provence, they might have chosen a more apt source for inspiration. (Those with knowledge of the origins of Rice University will remember the Byzantine roots of the original campus architectural theme.) But this peculiar commonality of aspiration indicates a certain level of cultural cohesion within the region and the business. There is a taste for the established model of wine culture from Europe. How might architecture address this desire without aping the old forms? A real local site with a (sadly) fictional client would be needed to drive the design.

The selected site is Bella Vista Ranch, near Wimberley, southwest of Austin, Texas. The ranch is a retirement project. The owners grow olives and a variety of cane fruits (berries) and citrus fruits. They sell fruit, preserves and cold-pressed olive oil, which are produced on site. Quantities of all these items are limited and supplemented by off site production. The owners would like to start growing grapes in the near future and start wine production when the vines are well established.
Bella Vista Ranch

House and farm office

Citrus and olive saplings
Local wineries

The closest operating winery to Bella Vista Ranch is the Driftwood. The owners are of course acquainted with Bella Vista and have acted as mentors to its owners. Driftwood also grow their own grapes and the winery is on a striking cliff-top site overlooking the vineyards in the valley beneath. The simple facilities include a steel shed for all the wine processing and storage, and a customized trailer for an office and tasting room. Adjoining the tasting room is a large deck where visitors can eat and drink. It is also rented out for wedding parties. The simplicity of the facilities is typical of wineries worldwide. Only a few manage to commission custom designs for any part of their operation.

The relationship to the natural surroundings here is carefully treated: visitors park by the winery shed and walk through a screening zone of cedar trees to the open space at the edge of the cliff. (Unusually for Texas the area attracts cyclists, who must dismount to walk through the woods.) The procession and the changing views are dramatic surprises and their effects on visitors is very close to the intention of this project. There is a memorability that attaches both to the place as itself and the place of Driftwood wines.
Driftwood Winery

Winery building

Press area
Driftwood Winery

Vineyard viewed from winery

Cedar scrub at tasting room
Panoramas (locations on page 19)

View towards Bella Vista Ranch

View of fruit plantings at ranch
None of the historic town of Wimberley is on this photograph: It lies just off the south edge. The expanses of subdivisions around the north side of the town, principally dormitory suburbs for Austin, are still being built out.
Mount Sharp
USGS 1998

Bella Vista Ranch

Panoramas

The area around the ranch remains rural. No house is visible from any other. Neighbors begin to impinge on views just at the vantage point of the wider panorama shown here. (i.e. the view south shows houses.)
Ranch land use
USGS 1998

Area under olive & cane fruit cultivation in 2003
Wine

Wine production is a business with an enormous body of accompanying history and custom. The scientific methods of vine cultivation and wine making that were developed mostly over the last one hundred years have raised the standard of even the cheapest wines produced to levels unattainable over the previous millennia for any but the finest. The mystique of the top wines, which still keeps them expensive, was in part generated by the traditional skills of those handling the grapes and the wine, skills based purely on their experiences with wine rather than externally acquired knowledge. Farmers of Europe and the Middle East who relied on learning within the family followed their rules with the resources available, even as their countries urbanized or some of them emigrated. The wine-making immigrants to the United States formed a class of citizens sufficiently large to be able to demand preservation of their wine-making rights throughout Prohibition: a 200 gallon per household home-brew allowance, as it is today.

There is now therefore a comprehensive body of knowledge and instruction that assures success for wine-makers at any scale or level of aspiration. Grape-growers are less fortunate, as their dependence upon the weather makes any guarantees impossible.
Winemaking

CRUSHING

FERMENTATION

PRESSING

AGING & FINING

BOTTLING & AGING

MACERATION

FERMENTATION

PRESSING

MALOLACTIC FERMENTATION

BARREL AGING

FINING FILTERING

BOTTLING

DRINKING!

Champagne

SECONDARY FERMENTATION

BOTTLE AGING

Harvest

CRUSHING

Red

White

PRESSING

FERMENTATION

FORTIFICATION

Port

Sherry

Madeira

Phylloxera

The wine business divides the world’s grape species into two groups: Vitis vinifera (the “winemaker”) and the rest. Most of the latter are native to North America and it is the profusion of wild grapes across the continent that lends credence to the Viking claim of discovering North America, for they named it Vinland. The distinctive flavor of grape juice and jelly comes from these native grapes. The taste is well loved by Americans, who are familiar with it, but Europeans rarely enjoy it, being unfamiliar. This strangeness probably accounts for the fact that the wines made from these grapes have never achieved wide acceptance. They are described as “foxy” tasting, although no-one can quite define this term.

These “ignoble” grapes however saved the Old World’s wines. The phylloxera root louse is also native to North America, and the local non-vinifera vines are resistant. When the bug reached Europe at the end of the Nineteenth Century, it attacked the local vines and nearly destroyed all Europe’s wines. Grafting of European vines onto American rootstock (particularly Texan) ensured the survival of the traditional centers of winemaking.

There was no phylloxera problem west of the Rocky Mountains until very recently. When Spanish settlers established the Mission trail, from Mexico to the northernmost outpost at Sonoma, they planted vinifera vines with consistent success. At the end of the twentieth century, those vines too were threatened:
phyloxera had spread to California. Replanting with grafts to native American rootstock from east of the Rockies has saved California’s vineyards as those of Europe had been saved one hundred years before. However, a new bacterial threat, Pierce’s disease, is now attacking vines in southern California and it has no cure. Growers in the rest of the country are familiar with the disease but their prescription may prove unusable, for they establish cordons sanitaires around their vineyards: buffer zones with no plants growing at all. This would be untenable in Napa because of the expensive land.

These diseases figure so greatly in the study of wine production because their control is the principal ongoing problem of any grape grower, once the initial tasks of planting and irrigation sources have been addressed.

Prohibition

The phyloxera problem in Europe could have given the American wineries a competitive advantage if they had not suffered the restraining influence of the prohibitionists. Instead of capitalizing on the weakness of the Europeans and establishing a world trade dominance in American wines, winemakers had to decrease production, tear up wine grapes and plant table grapes. The temperance movement probably kept the US wine business behind for a century.
West of the Rockies

Phylloxera was absent until the 1990s.

This enabled the early establishment of vinifera vineyards at the Missions and the development of "classical" wine styles in the 1800s.

These long-unaffected vinifera are now under attack and being replaced.

East of the Rockies

Phylloxera is endemic.

Native vines have always been phylloxera resistant: They may carry infestation but do not die off.

Newly introduced vinifera grafts and clones must be supported by native rootstock.
World viticulture

Vines are grown and wine made chiefly between the 30th and 50th parallels: the 42nd is believed to be the "sweet spot." This happens to coincide with the approximate extent of the Roman Empire, whose producers and consumers left the most extensive early records of wine production and consumption: though known in Mesopotamia and Egypt, wine was not a staple for all levels of society or widely produced until approximately 2500 years ago. This may be a historical coincidence, but it is at these latitudes that the genus Vitis flourishes in both its European Vinifera species and its American cousins. The spread of viticulture across the world has therefore been along bands at these latitudes.

Notably, of the 36 species of grapes growing, at least 15 are known to be native to Texas. It is Texas derived rootstock that supports nearly all the world's wine industry.
American wine

There are wineries in all 48 of the continental states. From the cult wines of Napa to the jug wines of the Central Valley, sales of California wines dwarf those of the rest of the country. However, half of the country’s nearly 2000 wineries are outside California: New York (136), Washington (125), Oregon (116) and Virginia (54) are the leaders. The historic centers of wine production in the 1800s along the Ohio and Missouri Rivers are also returning to production.

American Viticultural Areas

The Bureau of Alcohol, Tobacco, and Firearms created the AVA system (formally Approved Viticultural Area) at the behest of California wine makers in 1978 in order to assure wine buyers of certain standards. The criteria are weak compared to the French AOC (Appellation d’Origine Contrôlée) system insofar as they specify only origin, not composition. For example, Champagne may contain only chardonnay, pinot noir and/or pinot meunier grapes, all from the Champagne region. In contrast, Napa wines may contain any grape provided that at least 85% are from Napa.
Texas American Viticultural Areas

The BATF has created seven AVAs in Texas:

Davis Mountain
Escondido Mountain
Messila Valley
Texas High Plains
Texas Hill Country, which includes:
Bell Mountain
Fredericksburg

As with all such AVA designations, these limits are chiefly political and do not reflect the extent of land used for grape cultivation now or at any time in history. The Texas Hill Country AVA is the second largest in the country at over 15,000 square miles (the four-state Ohio River Valley AVA is larger but no Texan winery will admit its existence) yet the area is far from the most productive in the country and only a small proportion is under vine: 500 acres. There are additional areas of the state producing wine: A band running east-west to the north of Dallas (incorporating of course the Grapevine area) and a similar band to the north of Houston. The largest winery is Ste Genevieve, which lies entirely on land owned by the University of Texas in the Escondido Valley AVA. The smallest AVA is Bell Mountain, which contains only one winery: Bell Mountain.

There is a total of 48 wineries in the state now.
A few choice vintages

1619

Lord Delaware made the first major vinifera plantings in the Colonies, in 1619 in Virginia. All ten thousand vines died, as did the three hundred acres planted in 1622 by Lord Baltimore, and all other such plantings until grafting was introduced to protect the vines from root louse and other diseases.

Jefferson was a great supporter of wine as a wholesome drink that would prevent disease and drunkenness, which he believed the result of indulgence in hard liquor.

“No nation is drunk where wine is cheap.”

Jefferson himself gave up trying to make wine around 1815.

1788

Missions established during the Spanish expansion into California during the 1700s were the site of what was to become the United States’ first successful vinifera plantings. These probably did not occur until 1788 however, when the first harvest at San Juan Capistrano was recorded. By this time of course the US had annexed the state following the 1848 gold discoveries.
In 1803 Nicholas Longworth arrived in Cincinnati. By the time of his death in 1863 he had created the largest winery in America, whose fame extended to Europe. He used native grapes but hired Champenois winemakers, hoping to compete with the French, after an accidental secondary fermentation of the 1842 crop produced an unexpected carbonation in the wine. The Great Exhibition of London (1851) declared his Sparkling Catawba the finest wine of America.

Phylloxera destroyed the Ohio Valley vineyards in the 1880s and they were not widely replanted until the 1970s.

Phylloxera probably arrived in Europe in the 1850s but it remained a mysterious withering disease of no discernible cause until its identification by Jules-Émile Planchon in 1868. Between 1869 and 1873 he and Charles Riley of Missouri developed vines consisting of traditional European vinifera varieties grafted onto American roots.

After losing nearly eighty percent of vine production, Europe's growers replanted with the new chimera and eventually recovered fully.

The realization then came to American vine growers that if their roots prospered in Europe, they would also protect the European fruit in America. The first successful vinifera plantings east of the Rockies were subsequently established beginning in Geneva, New York.
1883

Frank Qualia first planted grapes at the Val Verde winery near Del Rio in 1883. A Lombard Italian, he was fortunate enough to homestead land with enough surface water to support the truck crops (market gardening) he was familiar with. His Lenoir grape crops were successful enough to last through Prohibition as a table crop and from the fifties to the seventies, Val Verde was the only bonded winery in Texas.

The Qualia family still owns and makes wine at Val Verde.

1918-1933

The “Noble Experiment”

American states started going dry in the early 1900s. The First World War only assisted the efforts of the prohibitionists, who succeeded in amending the Constitution at the end on 1917. Ratification was completed the next year, setting the stage for creative law breaking. Prohibition ruined nearly all American wineries and established the colossal grape growing combines that still dominate the wine industry, e.g. Gallo. The States only agreed to repeal in 1933 if they could maintain local controls. The most extreme version is of course Texas, where alcohol laws vary not just by county but by ward; hence the phenomenon of beer sales on one side of the street only.
Place making

The expression “place making” has been part of a phenomenological discourse within architecture, but it is considered here with an additional commercial (if not just plain mundane) sense of marking a location as an attraction. This sense is perhaps a direct contradiction of the phenomenological case, which suggests there is something somehow intrinsic to place. It is not beyond the power of architecture to synthesize these two approaches. This is done by bringing forth the nature of the place into its physical and visual expression and carrying that expression over into the impressions that accompany the place.

The scope of these impressions has been growing. The only way to experience place in our earliest history was by presence. Communication allowed evocation by speaking, then writing, painting, photograph and moving images. While these can never amount to presence (though perhaps they are not strictly phenomenologically irrelevant) they must be part of the building or place if they are part of our experience. It is essential to consider them is parallel with the formal issues of the project.
There is no “there” there

The economics of small-holding farming necessitate either specialization or diversification. Wineries in Texas that do not compete in the marketplace on a volume and price basis, such as Ste Genevieve, must move upmarket (Bell Mountain with its own AVA), concentrate on unusual products (Piney Woods making non-vinifera wines) or develop a tourist sales pool with on site “attractions” (Messina Hoff’s restaurant).

Though the Texas Hill Country is locally distinctive and a draw within the state population it does not tend to attract visitors from great distances. That does not mean that such visitors cannot be encouraged: though not of quite the same crowd generating ability as Disneyland, tourist attractions that Texans have created from towns that have little reason for being after their original economies withered have proved robust magnets for travelers.

Texans (the non-indigenous kind) have always invented such “attractions” as a way of colonizing the seemingly empty space. Towns such as San Antonio made use of natural resources at their birth and capitalized on history thereafter. In that particular case the cycle returns to nature in an entirely artificial fashion every time the River Walk is expanded: the waterway was an artificial loop of the river from the beginning and its subsequent improvements and extensions are made purely to attract tourists.
Other urban centers were created wherever land speculators could buy and sell or an unusual draw could be created.

Marfa - pop. 2121
World renowned center for minimalist art.

Archer City - pop. 1848
Town of used and rare book stores started by author Larry McMurtry. (In imitation of British town Haye-on-Wye, though slightly less famous.)

Dallas - pop. 1.2 M
Banking center, founded after the smaller neighboring Fort Worth.

The clear advantage to a winery owner is that there is something happening on site which, as Robert Mondavi showed, will generate considerable tourist traffic and in turn revenue.
There is no “there” there

Archer City

Dallas

Marfa
Wholesome fun

The Depression collapse in the price of farm products drove Walter Knott to seek other income sources for his south California fruit farm. His wife began cooking and selling chicken dinners at their farmhouse in 1934. Within six years the lines of customers waiting for dinner seatings at the farm’s new expanded restaurant were keeping people waiting for hours: the theme park line does predates the concept of the park itself, indeed it is the reason for its existence!

Knott bought a gold Rush ghost town and brought the old buildings and a narrow gauge train to his farm to entertain the waiting restaurant customers. The Ghost Town grew as Knott acquired more old buildings and added an Indian Village. (Eventually the park incorporated a Boardwalk, Fiesta Village, Wildwater Wilderness and finally Camp Snoopy. The restaurant now feeds the lines waiting to enter the park.) “Agritainment” was born: the farm as tourist attraction.

After establishing himself as an animator and studio head, Walt Disney began to look around for diversification opportunities that accorded with his company’s goal of entertaining families. He admired Knott’s wholesome project, a sharp contrast to typical carnivals and fairs with their freak shows. He was delighted by the Tivoli Gardens in Copenhagen. However, his project as it was eventually realized south of Los Angeles involved the destruction of a swath of orange groves rather than their use as an attraction.
The potential for profiting from the Knott's Berry Farm idea's initial spirit was not lost further north however, where Robert Mondavi built a wine tasting center for his new winery after falling out with his family and partners at Charles Krug in 1966. The construction of his now iconic building, with the long low tasting rooms and Mission-style tower visible from the main highway through the Napa Valley, was initially attacked by other Napa winemakers as either foolish or tasteless. However, the center and the huge wine factory (by Napa standards) that it obscured soon attracted more visitors than any other site in the valley and Mondavi's competitors swiftly followed his example.
Wholesome fun

Knott's Berry Farm

Santa Clarita

Disneyland

Anaheim

Robert Mondavi

Napa Valley
Design

The intention of the design is to combine the visually interlaced flows of wine and visitors with a layered treatment of light exposure.

Layers

At the base level, the wine process and storage cellars are arranged down the hillside to enable gravity-flow wine handling. Each stage of the process is expressed in the articulation of the building. At the exhibition level the display areas are enclosed by walls but open entirely to the light-diffusing baffle roof. The roof comprises a glass shed roof with the baffles above, exposed to the air. The three layers extend throughout the building.

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light diffusion
exhibition
aperture floor
dark cellar
Flows

The wine and visitor flows occur down the notional spine of the building. Initial arrangements of each room straddled the spine route, meaning that movement within the spine and the room would interfere. This is avoided using an “ox-bow lake” arrangement, with each process, storage or exhibition area in an eddy space beside the circulation spine. At the same time, they are not separate from the flow spine.

Sectional relationship

The two layers are connected visually through glazed voids is the floor.

Views

The exhibition space in the final design is enclosed by walls. The windows in these walls are placed to allow views to particular areas of the vineyards and the surrounding country.
Area

What is an appropriate size for a cultural exhibition space of this type?

How large a winery will be operating here?

Nasher
Sculpture Center
20,000 sf net

Dominus
Premium Winery
10,000 cases
20,000 sf

Kimbell
Art Museum
22,000 sf net

Fall Creek
Quality Winery
32,000 cases
25,000 sf
Winemaking process

Crushing
2 000 sf

Fermentation
3 500 sf

Pressing
2 000 sf

Barrel Aging
6 500 sf

Bottling
1 000 sf

Case Storage & Distribution
5 000 sf

Total 20 000 sf + Services & Vertical Circulation 750 sf
Visitor flow

Reception
1,000 sf

Winemaking History
3,500 sf

Hill Country
2,500 sf

Winemaking Process
4,000 sf

Tasting and Sales
2,000 sf

Restrooms
250 sf

Terrace/Deck
6,000 sf

Total 19,250 sf + Services & Vertical Circulation 750 sf
Flow & view interactions
Light tests

Light conditions

In order to determine the most suitable roof structure for a diffuse light with direct eye contact with the sky but minimal direct exposure to sunlight, a number of potential baffle arrangements were modelled and subjected to a range of sunlighting conditions. These varied throughout the day and the year: from morning to evening (8am, 10am, noon, 2pm and 4pm, ensuring at least some light even during winter) on the equinoxes and the solstices. As the sun is in the same position on the vernal and autumnal equinoxes, only three dates need be shown to cover the whole year’s lighting conditions. A total of seven structures and one clear roof were analyzed under the fifteen sun positions. In each case there is at least one position for a person beneath the roof to view the sky directly, but the amount of direct sunlight reaching the walls and floors of the interior varied widely.

Study models

The light-baffle models are shown as seen from below. They were placed in the test models over a simple roofless two room structure with a connecting void between the upper and lower floors. The model uses a low level of ambient light in addition to the direct sunlight but does not make “radiosity” calculations for reflected light. The exposed model is then shown viewed from the east, with the south to the left. The fourth wall is removed for viewing but is present in the model to cast shadows on the interior.
Example

Detail of baffle D

“Egg crate”

Lighting case D

Spring and Fall

Equinox, 10 am
Light-baffle shadow study models

A

No light baffles

Glass roof only

B

Vertical baffles

East - West orientation
Light-baffle shadow study models

C
Vertical baffles
North - South orientation

D
Egg crate
B & C combined
Light-baffle shadow study models

E

Egg crate

30° from vertical
towards North

F

Cold-rolled
Z-sections

East - West
orientation
Light-baffle shadow study models

G
Expanded mesh
North orientation

H
Expanded mesh
South orientation
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<th>Spring &amp; Fall</th>
<th>Winter</th>
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Roof modelling results

The most economical solution that approximates the desired effect would probably be F, a series of Z-sections set east-west, as a series of support members of this type, albeit far more widely spaced, would be necessary for all light-baffle types. There is considerable occlusion of even the most direct line of sight to the sky however with this arrangement. The preferred solution is therefore G, an expanded metal model that allows a view to the north interrupted only by a web of members of sheet-metal thickness. The effect can be observed by comparing the top and bottom of the G and H light-baffle renderings.

The proposed fabrication method for this solution is to produce corrugated strips to be laid like composite roofing strips: each wavy strip screwed to the one beneath in “valley to hill” fashion. Hence the roof can be rapidly built up on site. The proposed depth of the corrugation is six inches, allowing apertures and strip widths of one foot.
Computer models

Digital reproduction of light-baffle pattern G slows fatally the calculation of the model of the entire building, so the light-baffle used in building renderings is a series of simple strips inclined to approximate the effect of the chosen arrangement G around noon. Note that the approximation is strictly true only at that time and completely invalid during the early morning and late afternoon. The sun penetrates the approximated model completely during these times. It does not do so with the actual proposed baffles.

The site for the building is faithful to the actual ground profile obtained from GIS, the Geographic Information System, a US government initiated system of geographic databases. The latest information available for the site comes from aerial photographs made in 1995 and 1998 and contour maps from the United States Geological Survey. This information was transferred to a Form-Z model as the basis for constructing the building model.

Stage One renderings: The initial massings and arrangement down the slope are made with a principally glass-walled top floor over a windowless basement.

Stage Two renderings: The walls of the upper floor are solid, with some windows, to maximise the effect of the roof on the exhibition spaces. The arrangement of the building masses is adjusted to reorient the building for southerly access.

Stage Three physical model: Dimensions are fixed after drawings confirm programmatic details and connections in plan and section.
Stage One Model
Aerial view
Matched production and exhibition spaces set in series, east to west.
Stage One Model

Exterior view from southeast

Layers clearly expressed in building articulation
Stage Two Model

Aerial view

Long-term storage area removed form flow path

Circulation focus in tower at center
Stage Two Model

View from northeast

Visitor and exhibition spaces enclosed
Stage Two
Model
View from
northeast
Entry
pavilion
retains
clear walls
Stage Two Model
Interior with floor void and roof sightlines
Visual connection between levels
Stage Two Model

Interior with floor void and cellar sightlines

Visual connection between levels
Stage Two Model

Interior view from wine/ level with floor void and roof sightlines

Visual connection between levels
Stage
Three
Model

Exterior view from southeast
Design resolution

The final design resolution fixed all aspects for final review. The material choices include dressed limestone facing for the winery base, stucco finish for the exhibition floor above, a glass shed roof supported within the perimeter of the exhibition space walls, and a galvanized cold-rolled steel light baffle layer floated in planes overhead. The roof is divided into three major planes, which gives a variety of effective ceiling heights to the top floor: as a result, smaller rooms are generally shorter and the largest exhibition space has the highest ceiling.

Plans

Plans are shown with grid-north at the top of page.
The final physical model, in basswood with a multi-layered painted copper mesh roof, was constructed in demountable layers to show how the different levels related to each other throughout the building. The site is simplified but the slope is accurate. The roof structure’s multiple layers mimic the support structure necessary for the selected roof light-baffle system. The top layer is an expanded mesh with similar directional transparency to the proposed roof.
Aerial view of complete building from west

Plan view
Aerial view of exhibition spaces from east

Plan view of exhibition spaces
Aerial view of winery spaces from west

Plan view of winery spaces
Last words

The initial focus of my study was natural light, but after the design problem was defined, the potential topics for discovery ranged far wider. Eventually I found that these supposedly peripheral subjects were in danger of becoming the entire project. Phenomenology; the history of wine and architecture; or the economics of building tourist attractions would each have been sufficient for an entire research thesis. Although as great deal of time was spent with these interesting diversions, the need to develop a synthesis of all these ideas outweighed the attractions of any one topic individually. Certain fields of research that did not receive as much attention as I now feel they deserve could have been much better incorporated into the design: material studies in particular. (Early decisions about the material palette stayed fairly constant throughout the design process because I was happy with the intended effect.)

Overall however I believe the project was successful as both a framework for my intended investigations and an exercise in the manipulation of light and form for the making of place.
Bibliography


