the NOLAN HOUSE

Client: Maria Nolan, Hank Nolan
Project: Residential
Address: 701 W. Panorama Road, Palm Springs, CA 92262

‘Engineers’:
Gilbert Munoz, Keiko Sanders,
Michael Bahr, Titas Kavalnis.

‘Architects’:
Ellie Zukowski, Olivia Scheffler.

Interdisciplinary Studio
ARCE415/ARCH 453
Professors: E. Saliklis, M. Sattler

Date: June 10, 2021

Render by Ellie Zukowski
As a precedent, The Green Team analyzed the history of glass within architecture, literature, and culture. Based on our research, we found that glass is often depicted as breakable, delicate, and a way to expose or display aspects that would otherwise be hidden. We challenged ourselves to incorporate safety and privacy into our glass house as a way to combat the pre-existing notions of glass in architecture.
Our client's differing personalities are summarized in this simple slide. Each desired the home to have spaces where they could feel relaxed and be themselves.
The Nolan House is located in the Presley Estates neighborhood in Palm Springs, California. The sloped site provides an opportunity to create more privacy as well as a cantilevering slab over the swimming pool, the main feature of the Nolan House. The more private areas of the house are oriented into the hill while the more social areas of the house are more oriented downhill towards the pool.

Design by Green Team
Site Plan Drawing by Ellie Zukowski
A large driver in our design was the opposing personalities of our clients Maria and Hank Nolan. The house aims to balance the private and social spaces to serve each client equally. We began by mapping out the personalities of each client with hand drawn diagrams to interpret how each person would use the space. In this process we introduced a “curve” in our plan which shelters the private space and divides it from the social space. Being a large deviation from the style of Mies and Myron, after midreview feedback we incorporated the “curve logic” into more elements of the house, making the curve a more prominent language.

Design by Green Team
Watercolor Diagrams by Ellie Zukowski
Floorplan Drawing by Ellie Zukowski
In order to rationalize our design, we introduced a 5x5’ grid running throughout the floorplan of the Nolan House. This grid influence the placement of each element of the house and extends into the surrounding landscape design. To accomplish this process we produced a series of Parti Sketches throughout the quarter.

Parti Sketches by Ellie Zukowski
The inner utility areas split the house into social and private spaces. After midreview feedback, we made the outdoor balcony spaces a larger element of our design. The back balcony serves as more private outdoor space and the front balcony serves as more social outdoor space and an outwards extension of the living and dining areas. The main feature of the Nolan House, the pool running underneath the house, also became a larger element after our midreview. It extends out under the living room and serves as an outdoor “social hub”.

Parti Sketches by Ellie Zukowski
An intact versus exploded view helps understand the relationship between the structure and the floorplan of the Nolan House. The truss crossing in the middle of the roof begins to split the floor plan into quadrants relating to the four main areas of the house – bedroom, study, living room, dining room. The utilities at the center split these areas into social and private.

Design by Green Team
Axonometric Drawings by Ellie Zukowski
Each client moves throughout the Nolan house in a different manner and utilizes the private and social spaces in a different way. The inner partitions of the house allow potential guests to enter the house without having to access the more secluded and protected spaces. The utility areas begin to create a service core at the center of the house, serving as a transition space between social and private.

Design by Green Team
Drawings and Diagrams by Ellie Zukowski
From the driveway, the user steps up onto the front balcony to enter the building. On the other side of the house is the more secluded back balcony.
The cantilevering slab over the pool becomes a shaded place to cool off and relax during hot desert days in Palm Springs. This has a possibility to become a cooling method for the house.

Design by Green Team
Section Drawing by Ellie Zukowski
FOUNDATION PLAN

6" Ribbed Slab System
Partially On-Grade, Partially Cantilevered
Grade Beams For Moment Transfer

EAST ELEVATION
Site slopes ~ 5 feet across site

FLOOR LOADING

<table>
<thead>
<tr>
<th>Floor</th>
<th>D</th>
<th>L</th>
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<tbody>
<tr>
<td>Slab</td>
<td>57</td>
<td>0</td>
</tr>
<tr>
<td>Kitchen + Living</td>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td>Dining</td>
<td>0</td>
<td>50</td>
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<tr>
<td>Total</td>
<td>62</td>
<td>50</td>
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<tr>
<td>1.2D+1.6L</td>
<td>145.4</td>
<td>psf</td>
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GRAVITY SYSTEM DESIGN

### Dead Load Takeoff - Roof Level

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Slab (psf)</th>
<th>Secondary (psf)</th>
<th>Primary (psf)</th>
<th>Columns (psf)</th>
<th>Seismic (psf)</th>
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<tbody>
<tr>
<td>Steel Deck</td>
<td>W2x20Ga</td>
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<td>5</td>
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<tr>
<td>Secondary Framing</td>
<td>HSS Square</td>
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<td>4</td>
<td>4</td>
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<tr>
<td>Primary Framing</td>
<td>Vierendeel Trusses</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Column/Lateral System</td>
<td>SMF Lateral</td>
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<td></td>
<td></td>
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<tr>
<td>Total Structural Weight</td>
<td></td>
<td>5</td>
<td>9</td>
<td>12</td>
<td>14</td>
<td>14</td>
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<tr>
<td>Roofing</td>
<td></td>
<td>4</td>
<td>4</td>
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<tr>
<td>Rigid Insulation (1&quot; Thick)</td>
<td></td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
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<tr>
<td>MEP</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
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</tr>
<tr>
<td>Ceiling/Lighting</td>
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<td>1</td>
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<td>Fireproofing</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Miscellaneous</td>
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<td>1.5</td>
<td>1.5</td>
<td>3.5</td>
<td>1.5</td>
<td>1.5</td>
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<tr>
<td>Total Design Dead Load</td>
<td></td>
<td>16</td>
<td>20</td>
<td>25</td>
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### Live Load per ASCE 7-16, Table 4.3-1

<table>
<thead>
<tr>
<th>Live Load</th>
<th>Typical Roof</th>
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<tbody>
<tr>
<td></td>
<td>20</td>
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</table>
OLD ROOF FRAMING PLAN

SCALE: 1/8" = 1'-0"

W16x40 W16x40 W16x40 W16x40

HSS6x6x5/8 HSS6x6x5/8 HSS6x6x5/8 HSS6x6x5/8
HSS6x6x5/8 HSS6x6x5/8 HSS6x6x5/8 HSS6x6x5/8
HSS6x6x5/8 HSS6x6x5/8 HSS6x6x5/8 HSS6x6x5/8

TRUSS, SEE ELEVATION

HSS12x12x1/2, TYP.
NEW ROOF FRAMING PLAN

SCALE: 1/8" = 1'-0"
VIERENDEEL TRUSS ELEVATION

SCALE: 1/2" = 1'-0"

SEE TRUSS TO COLUMN CONNECTION

5' - 0"

TYP.

HSS5x5x1/2

HSS8x8x1/2

SEE TRUSS AT MIDSPAN CONNECTION

26' - 0"

27' - 0"
LOAD PATH AND SECONDARY FRAME LOADING

DEAD LOAD

LIVE LOAD
LOAD MODELING

Secondary Beam Design

Dead Load: 25 psf
Live Load: 20 psf
Load Length 1, L1: 7.13 ft
Load Length 2, L2: 35.35 ft
Total Length: 42.48 ft
Peak Tributary Width: 14.11 ft

Peak Distributed Load: 636.75 psf
Resultant load 1: 2.27 kips
Resultant load 2: 11.25 kips
Resultant Location, LR1: 4.7533 ft
Resultant Location, LR2: 18.9133 ft

Peak Distributed Load: 877.3 psf
Resultant load 1: 3.12 kips
Resultant load 2: 15.06 kips

Peak Distributed Load: 675 psf
Resultant load 1: 10.675 kips
Resultant Location, LR1: 10.54 ft

Peak Distributed Load: 930 psf
Resultant load 1: 14.708 kips
Resultant Location, LR1: 9 ft

Peak Distributed Load: 405 psf
Resultant load 1: 5.4675 kips
Resultant Location, LR1: 9 ft

Dead Load:

Live Load:

Moment (Strength):
DESIGN CHECKS

<table>
<thead>
<tr>
<th>Member Type</th>
<th>Member Size</th>
<th>Demand</th>
<th>Capacity</th>
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<tbody>
<tr>
<td>Joist</td>
<td>HSS6x6x5/8</td>
<td>14.1</td>
<td>87</td>
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<tr>
<td>Truss Chord</td>
<td>HSS8x8x1/2</td>
<td>15.1</td>
<td>140</td>
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<tr>
<td>Truss Web</td>
<td>HSS5x5x1/2</td>
<td>19.7</td>
<td>49</td>
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<tr>
<td>Perimeter Beam</td>
<td>W18x55</td>
<td>104.2</td>
<td>420</td>
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<tr>
<td>Diagonal Beam</td>
<td>W21x44</td>
<td>98.6</td>
<td>358</td>
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<tr>
<td>Column</td>
<td>HSS12x12x1/2</td>
<td>36.0</td>
<td>336</td>
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</table>

Maximum Deflections (in)

<table>
<thead>
<tr>
<th></th>
<th>D+L</th>
<th>Asymmetric L</th>
<th>D Only</th>
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<tbody>
<tr>
<td>Corner Deflection</td>
<td>1.23</td>
<td>1.6</td>
<td>0.68</td>
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<tr>
<td>Midspan Deflection</td>
<td>0.92</td>
<td>0.76</td>
<td>0.51</td>
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<tr>
<td>Diagonal Beam Deflection</td>
<td>0.76</td>
<td>0.85</td>
<td>0.42</td>
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</table>

No camber necessary from dead load deflections.
ETABS ANALYSIS

Seismic Coefficients

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Spectral Accel., Ss</td>
<td>1.823</td>
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<td>1 Sec Spectral Accel., S1</td>
<td>0.758</td>
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<tr>
<td>Long-Period</td>
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<td>Site Class</td>
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<td>Sds</td>
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<tr>
<td>Sd1</td>
<td>0.4043</td>
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<tr>
<td>Response Modification, R</td>
<td>8</td>
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<tr>
<td>System Overstrength</td>
<td>3</td>
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<tr>
<td>Deflection Amplification, Cd</td>
<td>5.5</td>
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<tr>
<td>Occupancy Importance</td>
<td>1</td>
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</table>

The information shown below is a summary of the input into the structural analysis program ETABS. Three different approaches were taken to assess the structure. Also, it is important to note that this special moment frame with shared columns is not allowed unless tested first. Further analysis and design will need to take place if the client chooses to opt out of testing approval.
The story drift results from an enveloped procedure is shown in the table. Compared to the maximum story drift based on the International Building Code, the building drift is well within the limits.
Torsional Irregularity is one of the most important checks when designing an irregularly shaped building or a high rise. Building members are designed to withstand forces in axial, shear, and bending but torsional movements under lateral loads can damage members and connections. Large variations in story drift at a given level can indicate cases of extreme torsional irregularity.

Due to The Nolan House’s structural symmetry, the variations between R1 and R2 will be minimal and not contribute to extreme torsional irregularity.
Pinned connection
- HSS column
- HSS truss members

Moment carrying connection
- HSS column

From: Titas Kavalnis
COLUMN TO TRUSS CALCULATION

From: Titas Kavalnis
COLUMN BASE CALCULATION

From: Titas Kavalnis
Truss to truss connection
HSS truss members
Embedded prefabricated element
Moment carrying connection

PRIMARY MEMBERS CONNECTIONS

Corner connection
Diagonal secondary members on top of truss
HSS diagonal member
To embedded element top plate
Pinned connection

SECONDARY MEMBERS CONNECTIONS

HSS to W-flange top connection
Pinned connection

COLUMN TO TRUSS CALCULATION

COLUMN BASE CALCULATION

From: Titas Kavalnis

Column to edge members and diagonals
- Moment carrying connection
- HSS column
- W-flange edge members and diagonals

PRIMARY MEMBERS CONNECTIONS

From: Titas Kavalnis
Truss to truss connection

- Moment carrying connection
- HSS truss members
- Embedded prefabricated element

From: Titas Kavalnis
Corner connection

PRIMARY MEMBERS CONNECTIONS

From: Titas Kavalnis
Diagonal secondary members on top of truss

- Pinned connection
- HSS diagonal member
- To embedded element top plate

SECONDARY MEMBERS CONNECTIONS

From: Titas Kavalnis
HSS to W-flange top connection

- Pinned connection

SECONDARY MEMBERS CONNECTIONS

From: Titas Kavalnis
Artifacts
Resin Art

My artifact mimics the looks and aesthetics of glass with the transparency of the resin and the delicacy of the flowers preserved inside it.

The flowers were a special gift from a friend. It took weeks to dry them, flatten them, and allow enough time for the resin to cure. Overall, I am very pleased with the color, texture, and shine than resulted from this project. Not only did I create something useful, but I also successfully preserved a wonderful gift and memory. I hope to make more unique coasters to match this one.

Going into the glass house project, I was worried about how glass would act as a structural property. However, after exploring its many uses through the research of our timeline, I began to appreciate it as a building material. The idea for this artifact came from my curiosity in exploring glass structures as a way to preserve and protect its interior.
2 people, one woman and one man holding and controlling our entire glass house project as a marionette.

They symbolizes our clients, a husband and a wife who describes their desire and needs from the project.

On inside from all 4 sides you can see a sculpture called “The Thinker” made by Auguste Rodin. It defines us, engineers and architects, who try to adapt project and come up with the best ideas that would be appropriate for clients although not very easy to imagine and come up with.
THE GLASS STUDIO

PRIVATE

TRANSPARENCY

RIBBED GLASS

SHADOWS

Michael Bahr
Final Fantasy
“Retirement home” often has a negative or dreary connotation. Typically, people are not looking forward to the day they are required to live in a retirement home. With our final fantasy project, we are taking a utopian approach to the “retirement home”. Glass housing modules are used to provide the elderly with a connection to the environment as well as foster a strong sense of community.

This luxury retirement complex is designed for celebrities and other high profile individuals. It is built floating on top of the beautiful Gunsight Butte of Lake Powell in southern Utah. The secluded and natural environment surrounding the community gives these residents an opportunity to relax and let their guard down with no pressure from fans or paparazzi. While they may have been living in the spotlight previously, these clients are now able to enjoy a close connection to nature and a small community feel associated with the glass house. With limited mobility, the glass housing modules allow residents to maintain a close relationship with the environment and nature, ultimately improving their health, wellbeing and enjoyment of life.

Water serves as a social hub while also providing a calm and serene scenic quality to the retirement homes. A close connection with water creates an opportunity for the utilization of water for therapeutic purposes, both emotionally and physically.