Sequoyah

The Sequoyah Hills area just west of the University of Tennessee is a respite from the city of Knoxville while still maintaining access to downtown and the river. The house site is adjacent to the Sequoyah riverfront park.
Riverfront Site - A Divide

The riverfront site gives opportunity for views and recreation right outside the southwest edge and park access to the southeast. There is a melancholy atmosphere with the previous homestead forlornly on display. The site divides this old world from the new and the river from the city.
Site Strategy

Angling the Divide House along the road and river allows for the best view orientation, but the massing strategy is also enhanced. The heavier bar parallels the road, blocking the sun in the summer and also noise from the road. The opposite side is open to views, winter sun and the predominant breeze.

In Knoxville, the months of April-August and May-July have equivalent solar exposure, but the temperatures vary significantly. By utilizing operable shading, the solar gain can be managed accordingly.
Steel Frame

The construction uses prewelded moment frames of steel. This allows for quick assembly and variability in layout. The house and Service bar that demarcates the Divide are inserted into the frame end and can be joined end-to-end or rotated or mirrored for added versatility.
Divide – Land/Water
<table>
<thead>
<tr>
<th>ARCHITECTURE</th>
<th>INTERIOR</th>
<th>TECHNOLOGY</th>
<th>SOCIETY</th>
</tr>
</thead>
<tbody>
<tr>
<td>architecture</td>
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<td>market viability</td>
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<tr>
<td>kit of parts</td>
<td>appliances</td>
<td>energy balance</td>
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<td>lighting</td>
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Living Expansion
UT Zero-Energy House
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Entry/Parking
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NorthEast Elevation
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NorthWest Elevation / 1:50
### Shading Strategy

Knoxville: 36 degrees Latitude

Building Orientation: -45 degrees SW orientation, +45 degrees SE Orientation

The temperature differences between solar equivalent months (May/July, April/August) make permanent shading undesirable for all but the longest days in June. To allow for solar gain in March/April/May but exclude it in the hotter months of July/August/September there needs to be a operable shading system. The separate horizontal and vertical shades allow for fine adjustment for these varying temperature conditions. In addition, because of the -45 degree SW orientation, the sun is quite low and horizontal shading would need to approach 6 meters to properly shade that side. By using a pull down vertical shade, the low sun can be avoided for both heat gain and glare situations.
Daylighting

Sunlight penetrates the living space but also enters through the back windows and the clearstory above the bar, illuminating the ceiling light.
View to Kitchen w/ Pull-out Island

Flexible Living Space / Exterior Connection
Winter loads balance well.
Summer loads require some cooling. The amount of glazing is clearly a factor in solar gain through the day. Less glazing or more complete shading may be required.
In the extreme winter, early morning heating is required. A larger thermal mass might help this situation.

In the extreme summer day, significant cooling is required. Although the same issues of glazing are present here, extreme summer days in Knoxville do not allow for significant night cooling and will almost always require cooling.
In the extreme winter, early morning heating is required. A larger thermal mass might help this situation.

In the extreme summer day, significant cooling is required. Although the same issues of glazing are present here, extreme summer days in Knoxville do not allow for significant night cooling and will almost always require cooling.
Catchment area = 1450 sf
Cistern Size = 2500 gal
Calculations assume a .2 precipitation probability and recycling
<table>
<thead>
<tr>
<th>Station Identification</th>
<th>Results</th>
<th>With 6 square meters of pv area, Divide can produce 36kW per day. Rows can easily be added in 1.5 sm increments.</th>
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<tbody>
<tr>
<td>City: Knoxville</td>
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<td>State: TN</td>
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<td>Latitude: 35.82° N</td>
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<td>Longitude: 83.98° W</td>
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<td>Elevation: 299 m</td>
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<td>PV System Specifications</td>
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<td>DC to AC Derate Factor:</td>
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<td>AC Rating: 3.08 kW</td>
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<td>Array Azimuth: 225.0°</td>
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<tr>
<td>Energy Specifications</td>
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<tr>
<td>Cost of Electricity: 6.9 ¢/kWh</td>
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</table>

<table>
<thead>
<tr>
<th>Month</th>
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<th>AC Energy (kWh)</th>
<th>Energy Value ($)</th>
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<td>23.12</td>
</tr>
</tbody>
</table>
Solar Domestic Hot Water Strategy

Closed-Loop System with Electric Backup

How it Works / Evacuated Tube Collector

Replaceable Tube System

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Photovoltaic System
Panel Mounting and Tracking System
Mounting and Tracking / Side View
Cross Section of M Rail
BP Solar SX 56M Solar Panel - Front/Back

Multicrystalline Array
3m Electrical Lead
Junction Box
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Glas Trosch Wall Corner (Plan) / 1:2

Kawneer AA3900 Thermal Sliding Door (Plan) / 1:2

All Section at Sliding Panel / 1:10
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