THIRD PLACE WINNER

Drew Suljak
Kelly Krob
David Lopez, AIA, LEED® AP
hord|coplan|macht • studioRED

Phone: 443.695.0020
Email: dsuljak@HCM2.com
Website: www.HCM2.com
HOUSE 2.0

Carbon Challenge - BALTIMORE DESIGN COMPETITION
The Baltimore rowhome was developed as a form of housing for the industrial workforce that supported the city as it grew in the first part of the 20th century.

By 1960, the city’s population began to decline. Today, Baltimore is littered with unoccupied units - commonly referred to as ‘vacants’.

The vacancy issue in Baltimore is an excellent barometer of the city’s vibrancy. The empty houses are often left to erode over time where they become signals of neighborhoods in decline. The materials in these homes are salvagable - the bricks alone are readily recyclable, valued at about 35 cents per brick on the open market. Many materials are salvaged and stored in the warehouses spotted throughout the city.

Baltimore also has quite a unique history with water. The Jones Falls, once a vibrant source of water from a watershed region to the north, was paved over in the 1960s to provide a north-south route into downtown. Today, this altered relationship with water is critical to Baltimore’s recovery.

The health of the Harbor is recognized as the principal environmental issue under consideration for the city. How each new project constructed in the city deals with its water footprint is critical to the overall health of the Chesapeake Bay.
“Water is not a human invention... It cannot be bound and has no boundaries. It is by nature a commons – it cannot be owned as private property and sold as a commodity.”

- From Water Wars, by Vandana Shiva.
As we continue into the 21st century, a new battle for resources is emerging. Water is quickly becoming the new oil; therefore sensible water strategies will define the next era of building.

Individual water usage by the average American is a staggering statistic to consider. At a water use mark of 100 gallons per day - roughly 70 gallons from indoor sources - the typical person in this country out-uses the next highest population (Australia) by nearly 100 litres per day (from the UNDP Human Development Report, 2006).

Baltimore collects enough rainfall annually to change the dynamics of this issue dramatically. With minimal amounts of filtration, rain collection systems can be implemented for re-use by fixtures that do not need potable standards of water - including clothes washing, toilets and showers.

Essentially, we could reduce the indoor water footprint of an individual by roughly 60% using only water from a rainwater catchment system. Add into the mix the use of low flow fixtures, and this number improves to nearly 75% savings.
On average, Baltimore City collects 41.94 inches of rain water annually. At 14,250 sq. ft., our site has the potential to collect 372,560 gallons of water that could be used to supplement the domestic water usage for the 8 proposed homes. At 3 persons per household, filtering rainwater for re-use in non-potable activities could provide about 42.5 gallons of water, per person, per day.

The average person uses approximately 100 gallons of water per day of which 70 gallons comes from indoor usage. Flushing toilets uses about 27% of that 70 gallons (about 18.69 gallons each day), and washing clothes uses about 21% of that 70 gallons (about 15.19 gallons per day).

By simply re-using rainwater on our site we could remove toilet water and clothes washing from the grid for these 8 homes. Proposing to use low flow toilets and energy star washers can supplement the water balance even more.
The implementation of a water collection system for the entire site is relatively simple. The system begins with supplemental water supplies extracted from rainwater sources of the building roofs and the gravel driveways. Additional supplemental water is harvested from indoor sources - shower and bath water and water from faucet drains.

South of the homes is a 25-foot wide portion of the site where a 3-tank filtration system is set up underground. These anaerobic tanks remove the bulk of solids and contaminants from the water while an oil/water separator ensures any residue from automotive sources is removed.

After exiting the tanks, the water continues through an additional polishing filter to continue the filtration process. This filtration process is open air and exposed to view. Water tolerant plants within the polishing filter continue filtering the water.

On top of the system of tanks is a 25-foot by 75-foot lot for gardening. Community gardens play a vital role in the nutrition of residents in this region of the city - largely considered a food desert due to the lack of viable nutritious options in the area. There is enough farmable land to supplement diets for all residents with greens and a few vegetable options common to the local diet.

As the water is piped back to the homes, an additional polishing filter forms a part of the landscaping in front of each home. The water is then piped into the crawlspace of the homes, and into a 500-gallon storage tank in each home, ready for use.
The design of the site as a complete water collection and filtration system is critical to the concept of COMMUNITY. The struggling neighborhoods in decline throughout the city lack any sense of commonality due to both the sporadic stewardship and the lack of a functioning neighborhood structure.

By designing a site based system with a community agricultural component, the supporting tenants will begin to develop a sense of commonality. This logic can begin to disseminate to other localized areas. The park space and community garden across the street are relatively unused at this time. With the proposed housing on Bethel, it is possible for a ripple effect to begin to take root in the neighborhood, improving conditions beyond the limits of the site.

The process of diagramming such strategies is critical to the design outcome.
DAYLIGHTING

PUBLIC vs private

PASSIVE VENTILATION

building design strategies
The ground floor plan highlights the water collection system by introducing gravel beds wherever filtration takes place. The downspout feeds into a filtration channel, which ties into the utility pipe also collecting water from the gravel drive - a source for pre-filtration.

Therefore, visitors to the home are constantly reminded of the subterranean system. Water is present at all times.

The home itself utilizes a split level living area to provide multiple spaces for entertaining. An opening in the upper floor with a skylight above provides dramatic lighting that minimizes the need for daytime lamps. The stair activates and connects the different levels.

Finally, outdoor spaces are provided on each level to enhance passive strategies, keeping the interior cool during the hottest days of the summer.
EXTERIOR WALL - masonry veneer
- recycled exterior brick veneer
- 3" air space with extruded polystyrene insulation
- air barrier
- 5/8" exterior grade sheathing
- 2x4 KD Doug Fir with batt insulation
- 5/8" gypsum wall board

FLOOR | CEILING ASSEMBLY
- recycled content flooring
- 3/4" plywood sheathing
- 2x10 KD Doug Fir with sound baffs
- 7/8" resilient channel
- 5/8" gypsum wall board

MEMBRANE ROOF - white TPO
- reflective TPO membrane
- 5" extruded polystyrene insulation
- air barrier
- 3/4" plywood sheathing
- 2x10 KD Doug Fir with batt insulation
- 7/8" resilient channel
- 5/8" gypsum wall board

EXTERIOR WALL - cementitious siding
- cementitious panel siding
- 1/2" channels over 3" z-clips
- extruded polystyrene insulation
- air barrier
- 5/8" exterior grade sheathing
- 2x4 KD Doug Fir with batt insulation
- 5/8" gypsum wall board
INSULATED skylight: south facing for maximum natural daylight and thermal gain in winter months

FLAME BLOCK parti wall: treated OSB product for fire separation

PASSIVEHAUS strategies: cross ventilation in plan with air movement qualities in section to exhaust louver in skylight well

INSULATED crawl space: below main living floor to keep mid-summer ambient temperature a few degrees cooler
interior RENDERING below skylight
Roof and wall construction utilizes multiple layers of insulation for energy efficiency.

Each facade veneer operates as a rain screen with rigid insulation fitting into the air space beyond the veneer - be it masonry or cementitious panel siding.

The air barrier sits atop the exterior sheathing.

Then, added value is provided using batt insulation in the 2x4 stud cavity for an R-value beyond the required R-19.

The roof construction mimics these properties, utilizing a reflective membrane roof over extruded polystyrene insulation. The deck joists are then insulated with batt insulation to provide added value at minimal cost.
With integrated systems for water, food production, passive energy savings with upgraded exterior walls and impressive amounts of daylight limiting the use of artificial sources, the proposed design sets a new standard for housing in Baltimore.

Site based strategies will begin to build a sense of community that has been missing for some time in the area.

HOUSE 2.0 is a building block for the future of Baltimore.