Arch 464
ECS
Spring 2011

Name_____

Quiz #2

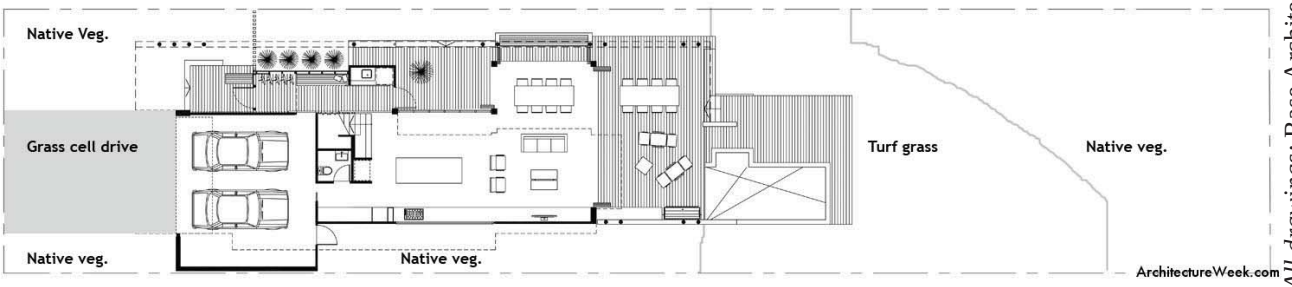
"Black Box, Black Water, Grey Water, Storm Water"

All photos: Christopher Frederick Jones, *Architecture Week*

For this problem you are the water management consultant for Base Architecture. Their project is known as the She Oak House (*above:* view of the west elevation from the street). Your role is to advise the architects and the client on strategies that assure water use on the site is as sustainable as possible.

Context. The site has sandy soil. The water table is near ground level and the building is slab-on-grade construction. Kingscliff at 28ºSL has a warm humid climate (averages 75ºF summer/58ºF winter) and receives about 35 inches of precipitation each year.

READ THE ENTIRE QUIZ BEFORE YOU BEGIN!



Site and lower floor plan. North is up.

All drawings: Base Architecture, *Architecture Week*

Black Box on the Beach

In Kingscliff, New South Wales, just south of the Queensland border, the She Oak House designed by Base Architecture is unquestionably purpose-built. Located in a beachfront neighborhood near the Gold Coast, one of the world's leading surfing destinations, the 350-square-meter (3,800-square-foot) dwelling was commissioned by a lawyer passionate about the sport who also wanted a place for entertaining.

Base Architecture chose a "raw" exterior building skin of galvanized steel and stained rough-sawn plywood. "We aimed for a refined design with an easy, open feeling that could also stand up to the harsh elements of the shoreline, including salt spray, blowing sand, and blazing sun," explains architect Shawn Godwin. Their approach sets the dwelling apart. "Our client's black box 'beach shack,' as he describes it, is a virtual anomaly in a community filled with skillion-roofed houses in yellow color schemes." Godwin says the firm chose plywood because of its structural qualities and resistance to termites, and because it is produced from fast-growing pine plantations. The stain applied to the wood provides a natural, earthy look that will age gracefully — "like a piece of driftwood" — unlike a painted skin that would flake and peel in time. Randomly placed vertical plywood battens bolster the plywood sheets structurally and control buckling and warping, as well as adding textural interest. Godwin says "the salt issue" is particularly challenging: "It gets everywhere and can rust and corrode most metals." Double-dipped galvanized steelwork, both hidden and exposed, was the architects' solution throughout the house. The metal's textured finish also suits the getaway's functional aesthetic. All windows and external doors are framed with natural anodized aluminum, an effective alternative to timber for sealing thresholds and other openings. The metal is durable, requires little or no maintenance, and will be reusable if it is ever removed.

She Oak House is grounded to its site by oversized galvanized posts that march down its sides. Large timber-clad sliding doors open into a semi-outdoor circulation corridor, which runs the house's length from front to back. Inside, stained timber paneling and polished concrete deliver a sleek yet durable finish. The ground-level living spaces open onto a side courtyard, culminating in a dramatic outdoor room at the rear that overlooks a pool and nearby dunes. The upstairs includes simple bedrooms and bathrooms that relate to the level below through a series of voids and openings. A double-height entry space features decking boards through which salt and sand can be hosed away. "You can take a shower en route back in from the ocean and go directly to relaxing," explains Godwin. The space also includes a concealed laundry room for wetsuits and a storage rack for surfboards.

The architects implemented passive climate-control strategies to increase comfort sustainably. "To design a place that is open and airy in the summer yet shut down against chilly southeast winter breezes is tricky," Godwin observes. Orientation, cross-ventilation, and control of solar penetration were intrinsic design considerations. Throughout the house, louvered windows aid air movement and sunshades reduce heat gain. "While there will always be days where there is minimal natural air movement and the air conditioner is required — in both summer and reverse-cycle modes — the idea was to minimize these and reduce the carbon footprint of the house," says Godwin. "As much as possible, we wanted the house to breathe naturally." Base Architecture also served as landscape designer. A grass-cell driveway, appropriate for the dwelling's sporadic use, adds to the casual feeling. Local land covenants dictated preferred and forbidden plant species, and a variety of hardy, drought-tolerant native varieties were selected. Rainwater is collected onsite for use in the toilets and washing machine, for topping off the swimming pool, and for minimal irrigation.

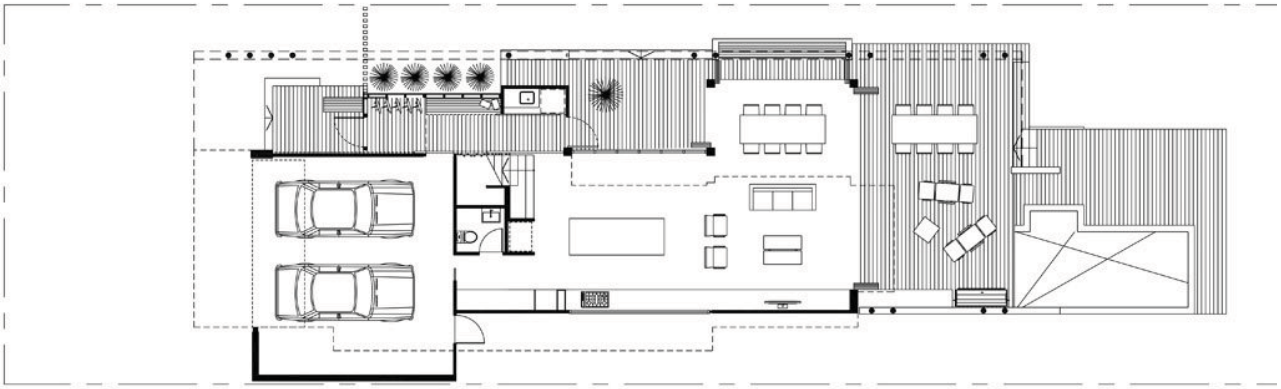
—Debra Pickrel, *Architecture Week*, 2 Sept. 2009

3 pts. 1. **Identify three site features** that manage stormwater on the site. **Fully explain** the merits and limitations of each method on this site. Use diagrams as needed to explain your ideas.

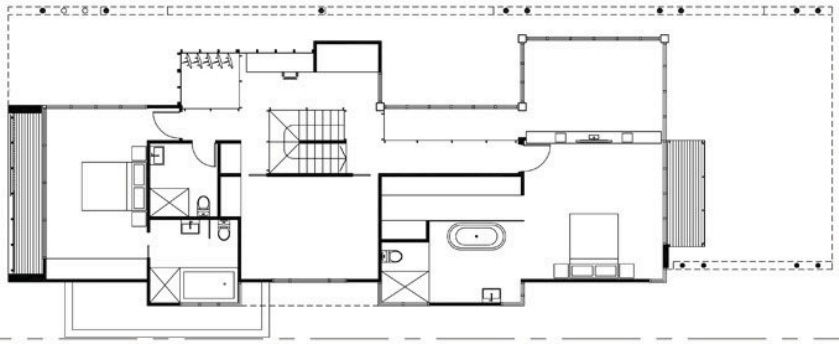
North side of house, looking west.

Looking east over pool from outdoor room over back yard.

3 pts. 2. **Propose two appropriate** roof types that could be employed to manage stormwater. **Fully explain** the merits and limitations of each type for this building. Indicate on the plan(s) below an ideal site and size for the stormwater cistern(s). Total roof area is about 2,400 sf. and can collect about 42,000 gallons annually. A cubic foot contains 7.48 gallons. Use diagrams as needed to explain your ideas.



Lower floor plan. North is up.



Upper floor plan. North is up.

4 pts. 3. **Inventory** the plumbing fixtures used in this building and note one way each type could save water. The plans called for dual flush toilets. **Propose two apprpriate alternatives** to these that would significantly reduce or eliminate black water discharged from this site to the city waste water treatment plant**. Fully explain the merits of your choices.**

Master bathroom. Note shower stall and toilet enclosure have been switched from original plan.

Galley kitchen with shaded/ventilated north wall to the right.