Arch 464
ECS
Spring 2017

Name_____

Quiz #3

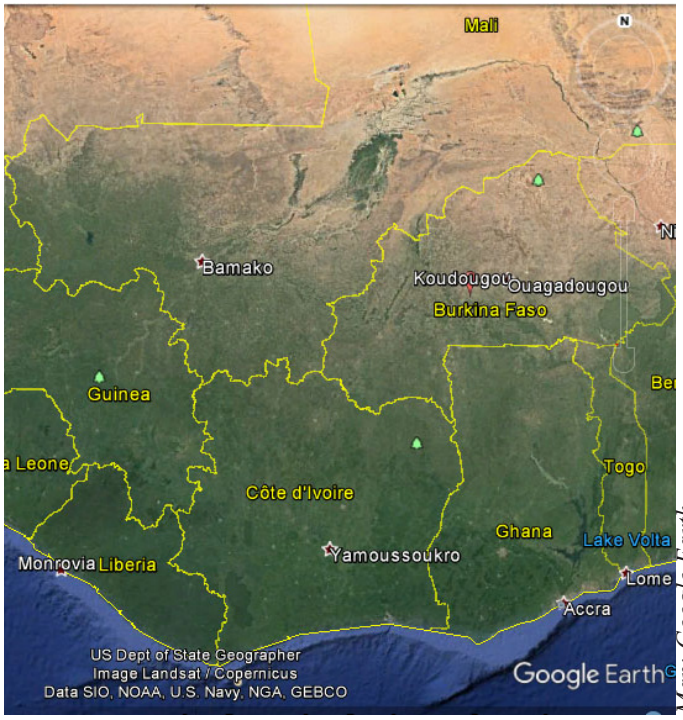
# "Location, Location, Location"

**Read and look at everything before you write!**

*All photos & drawings: Architectural Record* Jan 1, 2017

## Lycée Schorge

by Diébédo Francis Kéré




*Map: Google Earth*

When Susanne Pertl, a board member at the Stern Stewart Institute in Munich, first saw the work of Diébédo Francis Kéré, she knew he would be the ideal architect for an organization that promotes education and entrepreneurship in West Africa. Kéré had grown up in a remote village in Burkina Faso before earning his architecture degree in Germany and opening an office in Berlin. Today, Kéré remains committed to his home country, where he has completed such projects as the Center for Health Care and Social Promotion in Laongo and a high school in Dano. "I found Kéré's architecture to be extraordinary," says Pertl. "The buildings are not 'monuments,' but look special and work well for their inhabitants." The organization ultimately commissioned Kéré to design Lycée Schorge (named for a Pertl family member), a secondary school encompassing 17,900 square feet—the architect's largest completed building to date.

The school opened last February, on the fringe of Koudougou, a city in Burkina Faso with 132,000 residents. Featuring local materials, natural ventilation, a modern design vocabulary—and constructed by workers

who live in the area—the building embodies the qualities found in Kéré's other Burkinabe projects. It also introduces new stylistic, yet functional, elements: "I'm constantly experimenting with local building materials in innovative and modern ways," the architect explains.

*Lycee Schorge (top) has an inward looking circular plan similar to clustered settlements nearby*

Given its rampant poverty, meager resources, and brutal heat, Burkina Faso is a challenging canvas for any designer. The architecture of the mostly undeveloped, landlocked nation is dominated by simple concrete structures and mud huts. Kéré's first project there, a primary school in his native village completed in 2001, garnered international attention. Since then, he has worked tirelessly across the country to create dignified and low-cost architecture that responds to its context. Lycée Schorge does just that. Situated on a flat swath of semi-arid land, the school consists of nine distinct rectangular volumes arranged radially around a courtyard. Taking cues from traditional villages, the plan protects the outdoor gathering space from wind and dust while also providing a sense of privacy. The modules, each 900 square feet, contain classrooms and offices, along with a dental clinic.

To construct the school's walls, Kéré used red-hued bricks made of laterite, a subterranean soil that hardens when exposed to air. "It has a high thermal mass, plus a beautiful color and a porous, textured surface," he says. The masonry facades are punctuated with tall, unglazed windows covered with colorful metal shutters, which bring light and air into the building. Curved seating units made of thin wood members are affixed to the window casings and appear to merge with the shutters. The school's exterior is wrapped by a distinctive screen made of eucalyptus, a fast-growing tree that is typically used for scaffolding and firewood. Here it is used for a brise-soleil. "I wanted to give this material a more powerful and sustainable purpose," says Kéré about the enclosure, which shades patios and walkways. When it came to designing the corrugated steel roof, the architect employed one of his signature strategies. Using trusses of rebar, he raised the roof high above the building envelope, enabling hot air to easily escape the interior. Its deep overhangs also mitigate solar heat gain. To further enhance the indoor climate, Kéré added a series of angular, 8-foot-high (above the roof) concrete wind towers that capture fresh air and funnel it downward. The undulating ceilings are made of gypsum fiberboard, straw, and cement mortar. Long slits in the cream-colored surfaces allow the classrooms to breathe and expel heat while ushering in diffused daylight. Kéré also designed the furniture, with local craftsmen making hundreds of chairs and desks using salvaged construction material, such as plywood and rebar. The Philadelphia Museum of Art, which staged a solo exhibition of Kéré's work in 2016, recently added one such chair to its permanent collection.

By all accounts, the school has made a powerful impact. "I cried when I saw it," says Pertl, noting that a building of lower quality wouldn't have been as effective. "This landmark shows our students that we want them to work hard, dream big, and achieve great goals." The facility is also beloved by its pupils, who tend to linger long after classes have ended for the day. "The students are happy to see that the design is different from other schools," says Baslayi Tindano, a biology and gardening teacher. "It inspires them to excel and make a difference." Kéré, who vividly recalls sitting in cramped, dark, and sweltering classrooms as a child, credits the client for the school's success. "If you have a client who is open to innovation," he says, "you are able to do great things."

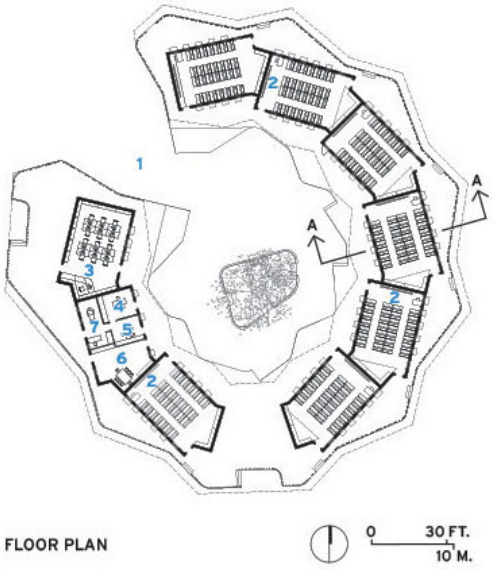
*— Jenna M. McKnight*

## Site Energy

*3 points*

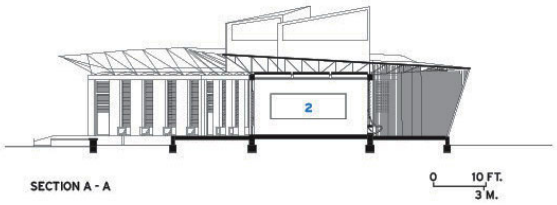
1. The architect did not opt for any on-site energy generation, but the building could easily harvest sufficient site energy to be net zero and off the grid. (1) ***Discuss*** the merits, placement, and drawbacks of photovoltaics. (2) ***Discuss*** the merits, placement, and drawbacks of solar thermal. & (3) ***Discuss*** the merits, placement, and drawbacks of a wind turbine. Use diagrams and the site plan to ***illustrate and locate*** your ideas.

1




*1. entry, 2. classrooms, 3. library, 4-7. offices*

2




3

*At one end of the courtyard, meals from a separate kitchen pavilion can be assembled.*

## Regeneration-Based Checklist for Design and Construction



**Project:**

For one point of extra credit rate the school.

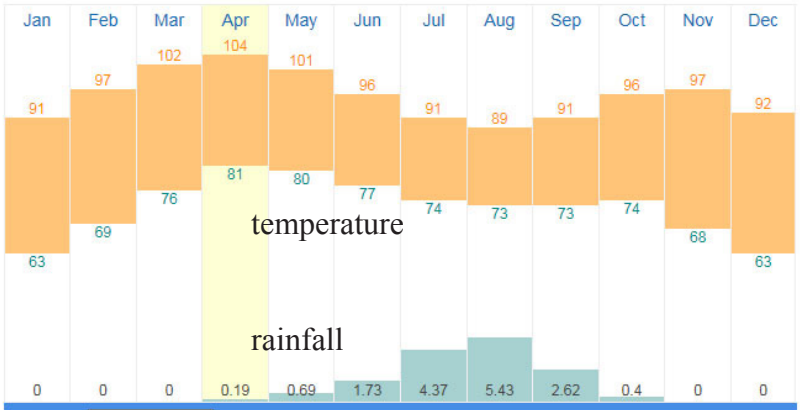
| | degeneration | -100 always | -75 usually | -50 sometimes | -25 a bit | 0 balances | 25 a bit | 50 sometimes | 75 usually | 100 always | regeneration |
|---|---|---|---|---|---|---|---|---|---|---|---|
| the site | pollutes air | | | | | | | | | | cleans air |
| | pollutes water | | | | | | | | | | cleans water |
| | wastes rainwater | | | | | | | | | | stores rainwater |
| | consumes food | | | | | | | | | | produces food |
| | destroys rich soil | | | | | | | | | | creates rich soil |
| | dumps wastes unused | | | | | | | | | | consumes wastes |
| | destroys wildlife habitat | | | | | | | | | | provides wildlife habitat |
| | imports energy | | | | | | | | | | exports energy |
| | requires fuel-powered transportation | | | | | | | | | | requires human-powered transportation |
| | intensifies local weather | | | | | | | | | | moderates local weather |
| the building | excludes daylight | | | | | | | | | | uses daylight |
| | uses mechanical heating | | | | | | | | | | uses passive heating |
| | uses mechanical cooling | | | | | | | | | | uses passive cooling |
| | needs cleaning and repair | | | | | | | | | | maintains itself |
| | produces human discomfort | | | | | | | | | | provides human comfort |
| | uses fuel-powered circulation | | | | | | | | | | uses human-powered circulation |
| | pollutes indoor air | | | | | | | | | | creates pure indoor air |
| | is built of virgin materials | | | | | | | | | | is built of recycled materials |
| | cannot be recycled | | | | | | | | | | can be recycled |
| | serves as an icon for the apocalypse | | | | | | | | | | serves as an icon for regeneration |
| | is a bad neighbor | | | | | | | | | | is a good neighbor |
| | is ugly | | | | | | | | | | is beautiful |

| negative score | positive score |
|---|---|
| 2200 possible | 2200 possible |

final score:

### Annual Weather Averages in Ouagadougou Airport

Ouagadougou Airport is 58 miles from Koudougou, so the actual climate in Koudougou can vary a bit.




*The school's exterior wall is a screen of eucalyptus limbs.*

## Regeneration

2. Koudougou is at about 12 degrees north lattitude just south of the Sahara, so it gets about 15.5" of annual rainfall and the highest monthly average wind speed is 7mph. Given the building plan and orientation ***point out and discuss two*** features of the **building design** that would earn regeneration points on the SBSE checklist (facing page) and ***two*** features of the **building design** that would earn degeneration points on the SBSE checklist.

*4 points*

1+

2+

1-

2-

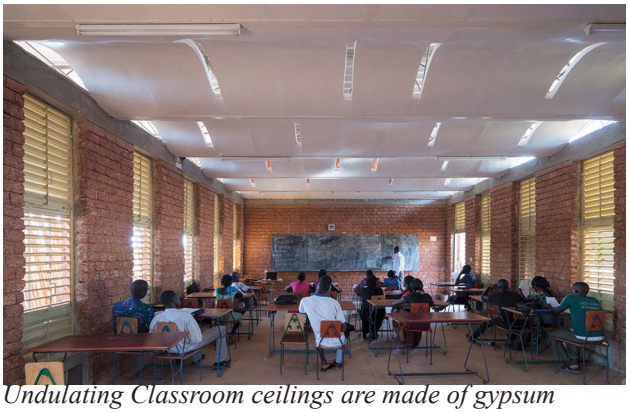
# Design Critique

3. ***Critique two*** of the architect's design strategies:
   **a.) Daylighting**
   **b.) Natural Ventilation**

***Comment*** on what is evident and improvements that could be made.

*3 points*

## a.)



*Undulating Classroom ceilings are made of gypsum fiberboard, straw, and cement mortar. Slits in these surfaces admit diffuse daylight.*

## b.)

*Between the eucalyptus-wood screen and the brick walls of the school's retangular modules is a sheltered space where students can socialize.*