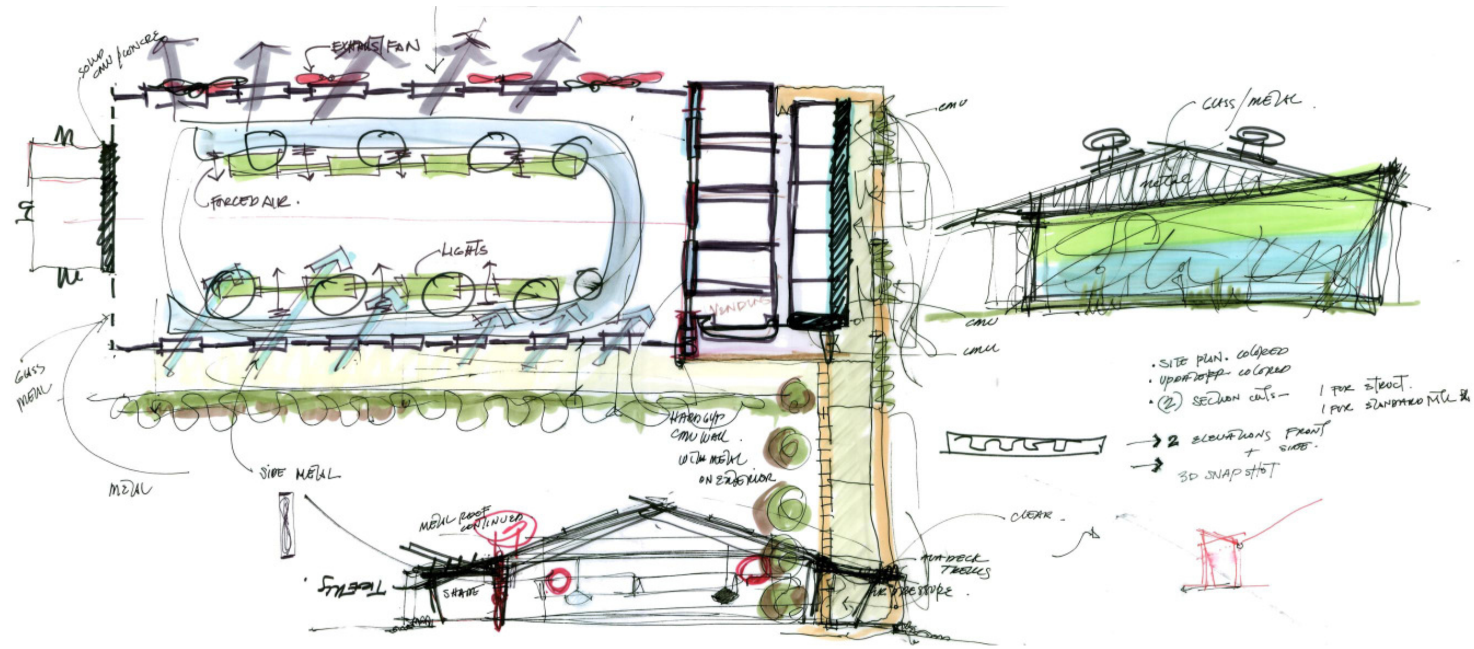
AQUATIC PRACTICE FACILITY 2010

FORT BEND INDEPENDENT SCHOOL DISTRICT



Sketch comedy.

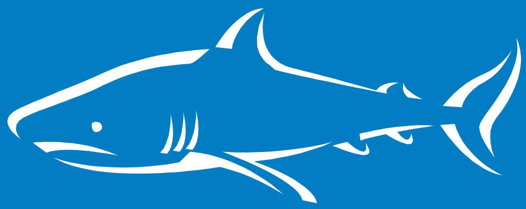
It is not uncommon for a design to gain momentum from a napkin sketch. These five minute scribbles often synthesize big picture elements and can drive the rest of the design process.

The above sketch was one of the first diagrams of the Aquatic Facility. Many other sketches would follow, but ultimately this was the sketch that best met the clients needs.

A Building with gills.

Buildings do breathe. Whether by mechanical or natural means, buildings inhale and exhale air as part of the lifeblood of its systems. Natural (passive) air flow depends upon air movement as created by internal and external air pressure.

One hundred percent of the 30,000 square foot swimming space is passively conditioned. That is, there is no mechanical assistance. The pool is ventilated by gill-shaped louvers that draw ambient air in and force it out as a natural process of convection.



Some fish like sharks don’t possess an air bladder to help keep them afloat and must swim continually lest they sink to the bottom.

Breathe.

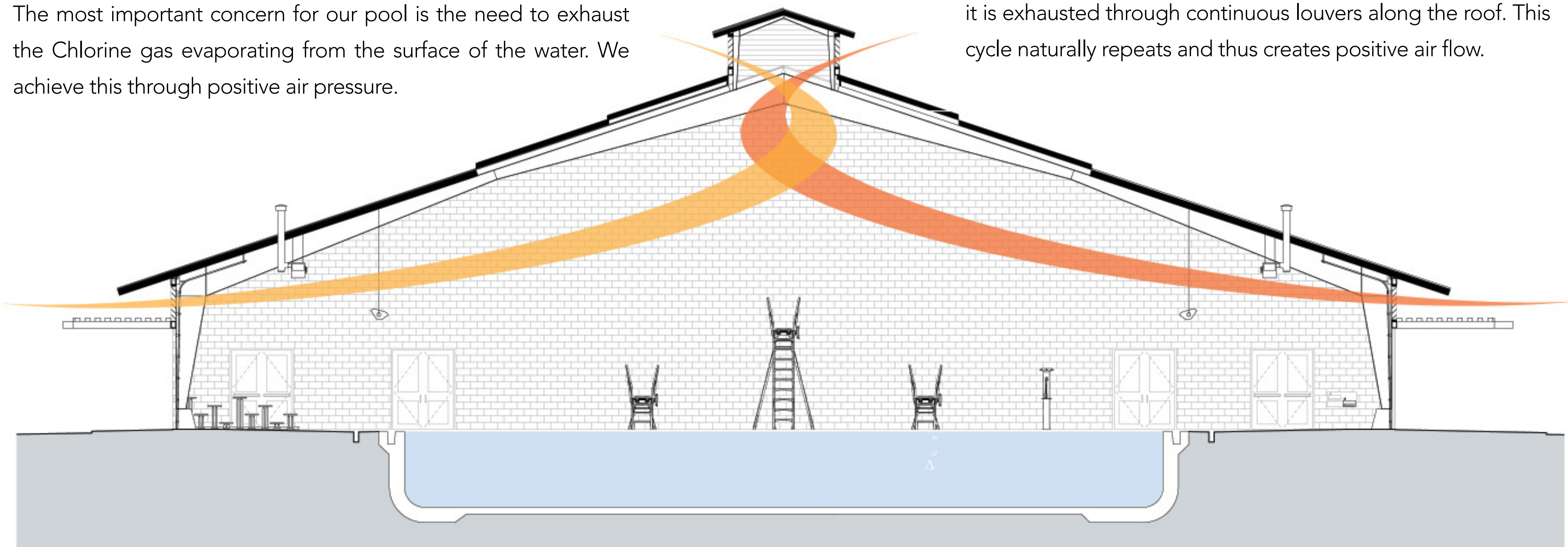
Be Positive.

There are an infinite number of climatic conditions that affect indoor air quality. Temperature, humidity, rain, wind, are all variables in a series of complex formulas and fluid dynamic simulations.

The most important concern for our pool is the need to exhaust the Chlorine gas evaporating from the surface of the water. We achieve this through positive air pressure.

The Aquatic Facility relies on central stack ventilation which is not unlike a residential chimney.

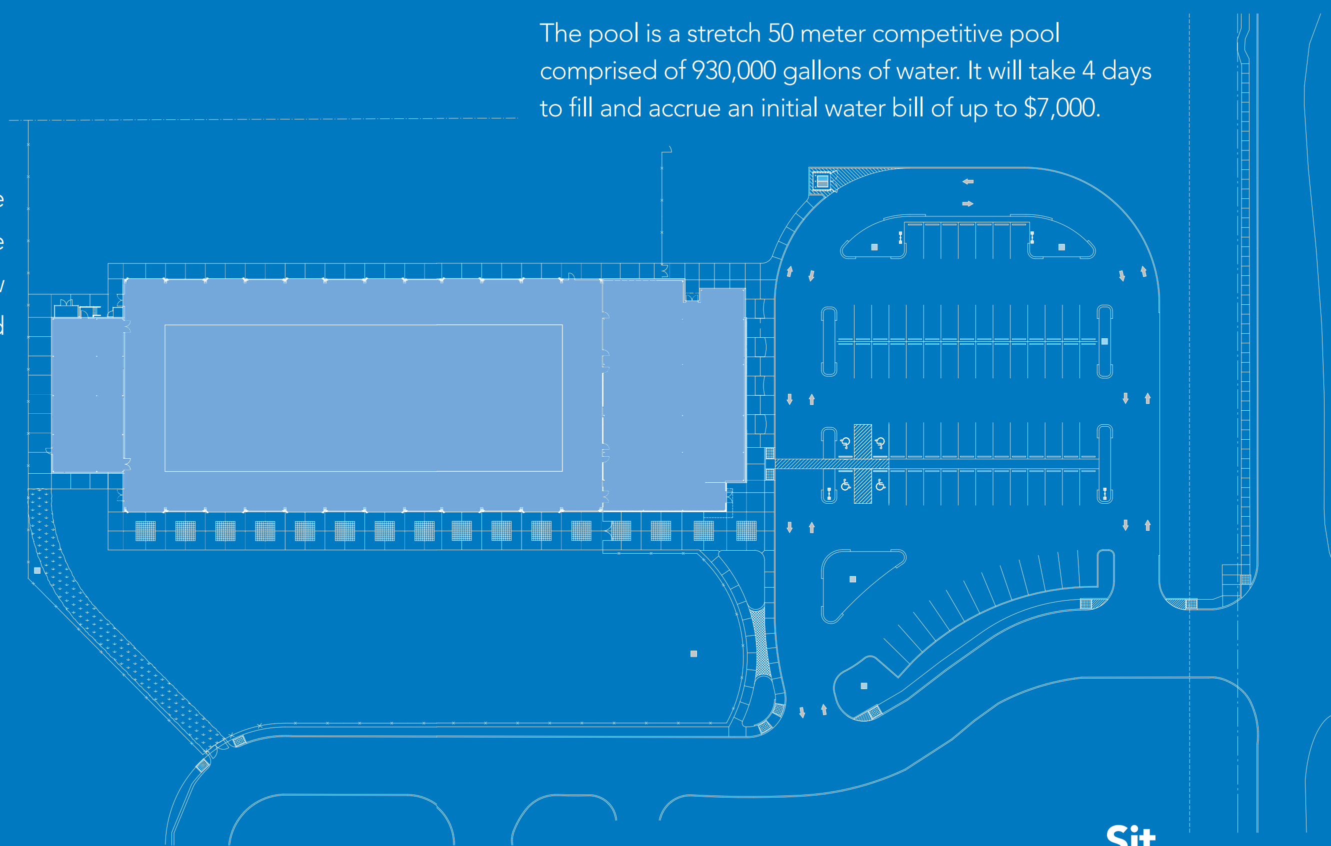
Warm air is lighter than cool air and thus rises to the ridge where it is exhausted through continuous louvers along the roof. This cycle naturally repeats and thus creates positive air flow.



Situate the building.

The pool is oriented on the site to take advantage of prevailing winds. In the summer, air will blow across the narrow width of the pool from the southeast and from the northwest in the winter.

The pool is a stretch 50 meter competitive pool comprised of 930,000 gallons of water. It will take 4 days to fill and accrue an initial water bill of up to $7,000.

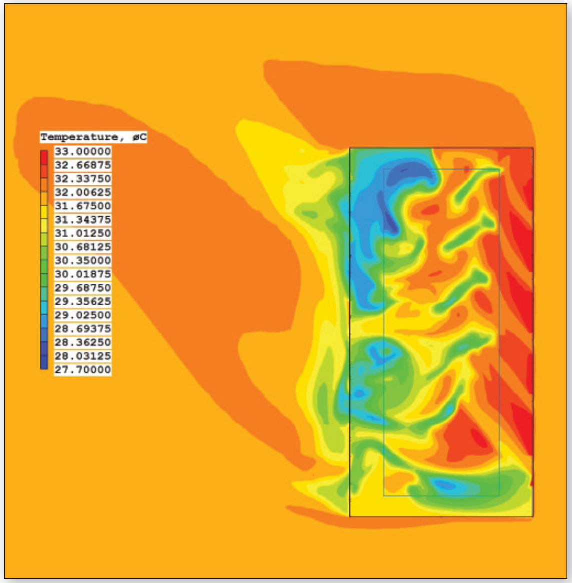


Sit.

Shotgun.

The "shotgun" style home of the early twentieth century perfected the idea of thru ventilation. Organize the rooms in such a way that they create a long and narrow central corridor or breezeway, then all you need is to open the doors on either end of the corridor for air flow.

As simulated in this early analysis to the right, the volume of the Aquatic Facility is outside the optimum geometry to maximize the Venturi effect which utilizes pressure to move air and distribute heat from one side of the building to the other.

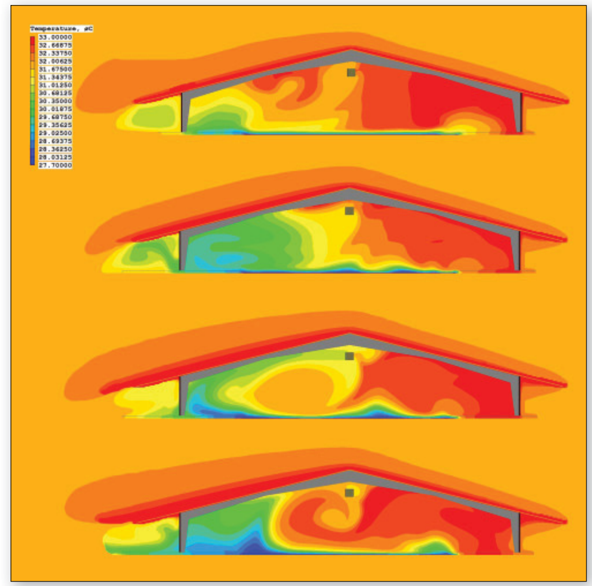


Thermal diagram plan

Heat exhaustion.

Internal heat gain is a consideration of any building. The best thing to do is give it place to exhaust. Residences accomplish this with a central roof ridge vent.

The fluid dynamic simulation to the right emphasized the difficulty of this early design scheme to transmit heat across the space and out the roof. Consequently, the heat travels along the underside of the roof and eddy's above the center of the pool. Subsequent designs would employ the addition of a large ridge vent.



Thermal diagram elevation

Computational fluid dynamics.

After we construct a computer model of your building we can test our design with simulations that identify relative humidity, air flow, wind speed, and temperature within the geometry of the space.

The formula to the right calculates the pool water's rate of evaporation. Why do we care? This information helps us understand the thermal comfort of the swimmers in or near the water as well as the spectators located at he periphery.

$$\frac{m}{A} = \frac{(42.6 + 37.6\mathrm{V}_w)(\mathrm{P}_w - \mathrm{P}_a)}{\Delta H_v}$$

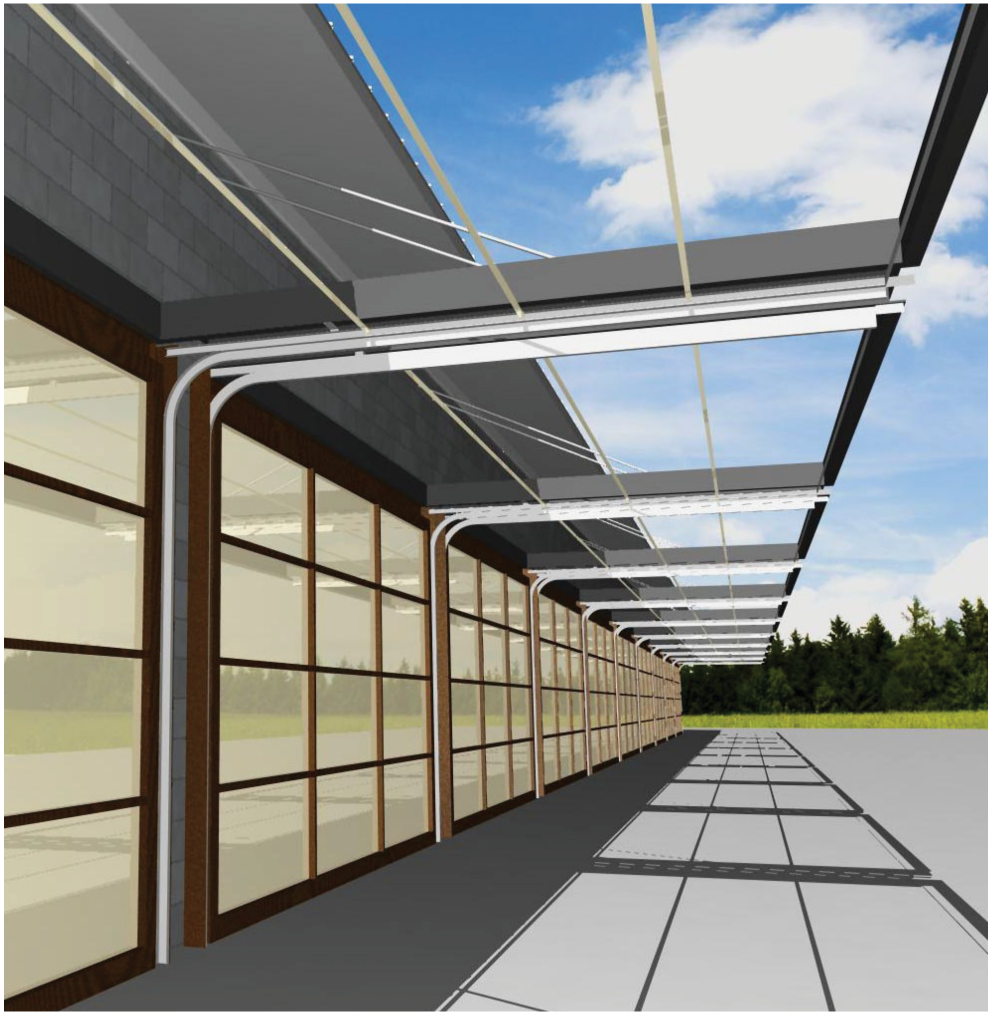
m / A	is the evaporation rate, kg/m2/hr
V_w	is the air velocity over the water surface, m/s
P_w	is the saturation vapour pressure at the water temperature, mm Hg
P_a	is the saturation vapour pressure at the air dew point, mm Hg
ΔH	is the latent heat of water at the pool temperature, kJ/kg

Rocket science.

Leave the door open. It's okay.

Operable garage doors and motorized skylight allow the pool area to be naturally ventilated during the summer and milder temperatures. This helps to reduce energy consumption and minimizes operational costs. When the garage doors are closed, ventilation is achieved through a system of continuous louvers.

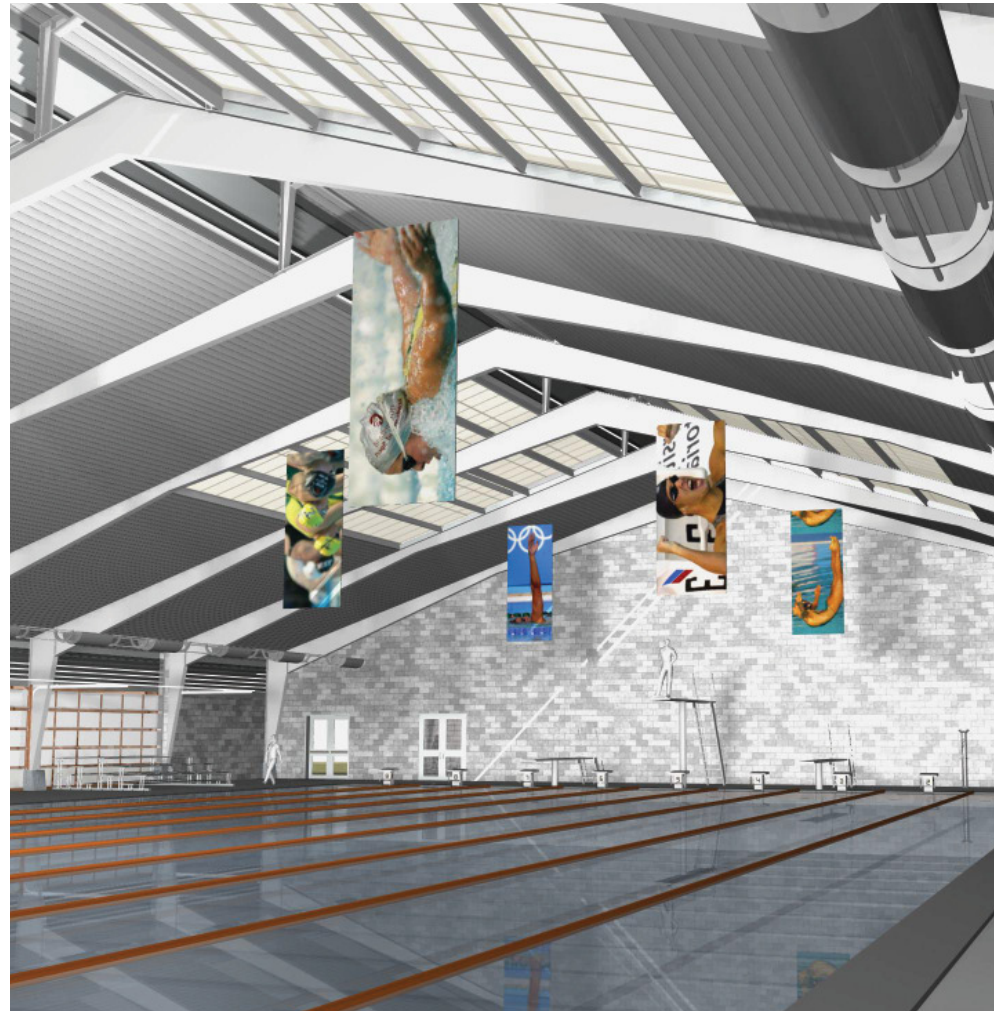
Twenty-three garage doors line both sides of the pool and provide a seamless exposure to the landscape. When in the open position, the doors shelter and shade while allowing an unencumbered passage of air.



See our dive.

The pool enclosure is to function like an open-air pavilion. The roof is supported by a pre-engineered steel structure, clad with semi-translucent roof panels for controlled light transmittance.

The pool itself will be of concrete construction with ceramic tile gutters and two fiberglass bulkheads. The 75 foot by 213 foot pool will accommodate both one and three meter diving. The pool can be configured to operate one 50 meter meet, or two perpendicular 25 yard meets with four training lanes simultaneously.



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