

GeoThermal, GeoExchange

- **Fond du Lac High School**
- Leo Udee
- GeoThermal Energy Enthusiast



Fond du Lac High School



General Contractor

**C.D. Smith
Construction**

Fond du Lac, WI

Architect

**Bray Associates
Architects, Inc.**

Sheboygan, WI

Plumbing & Heating

J.F. Ahern

Fond du Lac, WI

Electrical

Suburban Electric

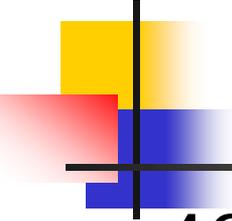
Appleton, WI



C.D. SMITH
CONSTRUCTION

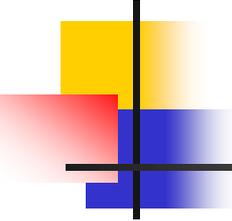
Bray Associates
ARCHITECTS, INC.





GeoExchange

- 400,000+sq. ft., “Open H”, 2 stories, Commons, Theater & Fieldhouse with indoor track. Holds 2400 students plus 200 staff.
- Approx. 720 tons, Water Furnace brand.
 - (179) Water to Air vertical units ranging from .8T to 15T with 2&3T units most common. (14) Water to Water units.
- All units are floor mounted, Water to Air in closets for ease of service.
 - Quick disconnects used.

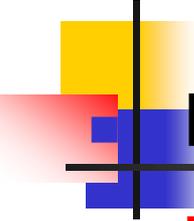


GeoExchange - Pond Loop

- **Fond du Lac Wi. High School**
- 9 Month Cooling load due to internal gains.
- Flat site- Added building elevation needed.
- DNR required holding ponds (26acre runoff)
- Got dirt, made ponds = Automatic, low cost
15.5 acre 22ft. deep heat sink on site.
- >4 x total building heat & cooling load.
- \$1.00/sq.ft add'l cost of Geo vs. std. HVAC



Half sized Geo
"Boiler" room.
Made added
space for
student training
center



GeoExchange

Pond Loops:

- (30) racked Heat Exchangers hold 24 coils of 3/4 " polyethelene piping equaling 42 miles of installed loop. 2 ponds at 19 to 22 feet deep are used.
- Racks manifold to 3" pipe which terminate at valve pits and connect to 10" supply and return.
- "Belts & Suspenders" System is Hybrid with down-sized high E boilers for heat extreme needs conditions support gyms, PAC, fresh air make up and for 59 foyers.
 - Note: Geo Consoles are available for door foyers.

42 mi. of Racked Loop pipe

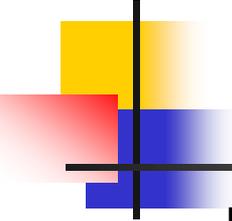


Position, Fill & Submerge





MAY 15 2001

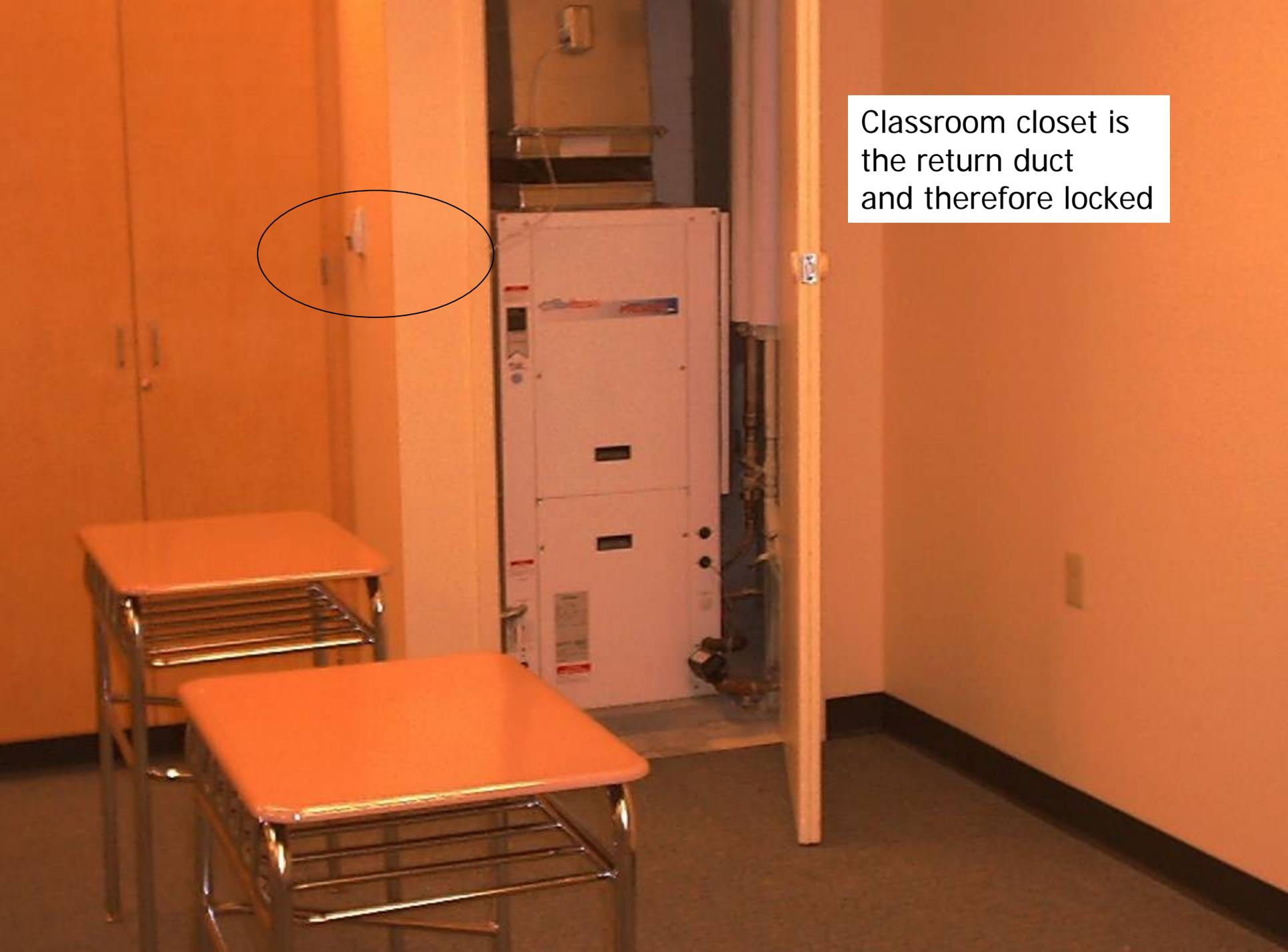


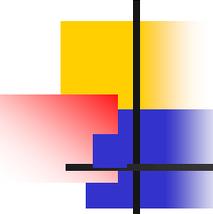
GeoExchange

Uses 10 inch supply and return lines coupled to (2) 150hp pumps with VSD.

- Reduced blocks & bricks ht. by 2 courses- no ducts. Savings put into insul. & glass.
- Complete building energy management with each classroom having a 4 degree F swing at individual thermostats.
 - Pre-Testing and Balancing reports that the building was unusually evenly tempered

Classroom closet is
the return duct
and therefore locked





GeoExchange

Diversified Heat & Cool Loads

- Geo does simultaneous heating & cooling. No singular large Chiller/Boiler/Fan package.
 - Reduced Electric Demand & Maintenance Expenses
 - Design flexibility and Sustainability
- VSDs, Heat Wheels, efficient lighting daylight controls, energy management, low-E glass, and improved building shell R-value, reduced demand energy from **1.2MW, at plans, to .8MW** (\$90K annual energy value in 2001)
 - Add'l \$90,000 Ann. Maint. Cost Avoidance
 - <3yr. Simple Payback

■ Designers skip Demand Energy

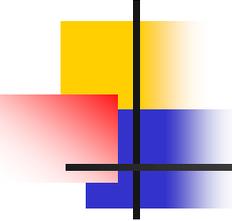
■ Too often total electric cost is only divided by total kwh with un-informed, simple design Modeling but:

Demand Energy Kw = **\$Dollars** & Kwh = Pennies !

2001 A.E./WPL Example: Kwh \$.042 Off Pk & \$.0743 On Peak

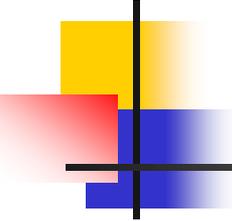
■ On-peak Demand = max. peak reached in current month. \$9.60/kw summer (\$8.20/kw wint.)

■ Customer Demand = maximum On or Off peak reached in the previous 11 months. \$2.00/kw is billed in EACH month of the year.



Demand Demand Modeling

- Not separating out Demand energy IS COSTLY!
- Energy Models by kwh may show 2% to 4% savings VS. <24% \$avings by KW demand cost included models.
- Use of Demand Energy requires more fuel and spinning the generators faster.
- Wasting Demand Energy is NOT a GREEN Practice!



“We cannot solve our problems with the same thinking we used when we created them.” Albert Einstein



Thank You for Your Attention