Optimization & Design: When is Green, GREEN?

Optimization and Innovation

OWEA Conference

Presented by Jones & Henry Engineers, Ltd.

When is green...GREEN?

- Usually, your Green is ...BLUE

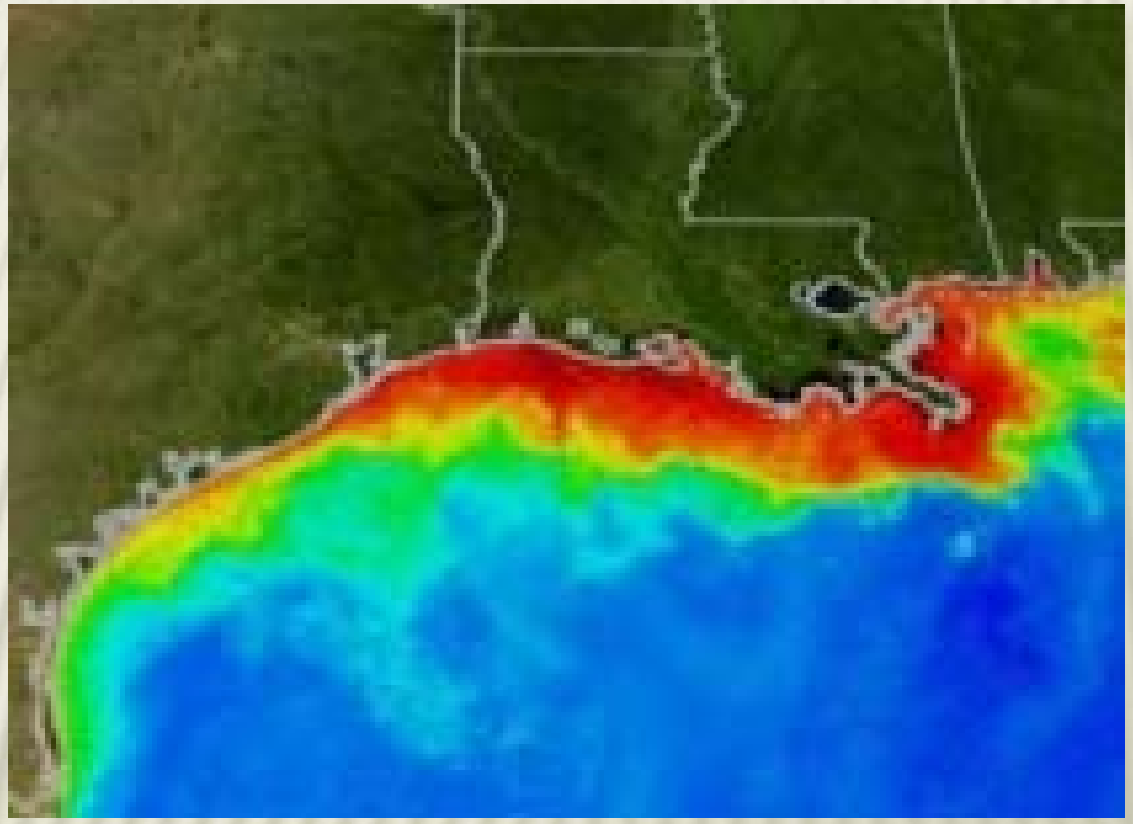
The Cultural Revolution of the 60's

A Peace Sign of Naked People… Next Time Sit in Front

Rivers Ablaze...

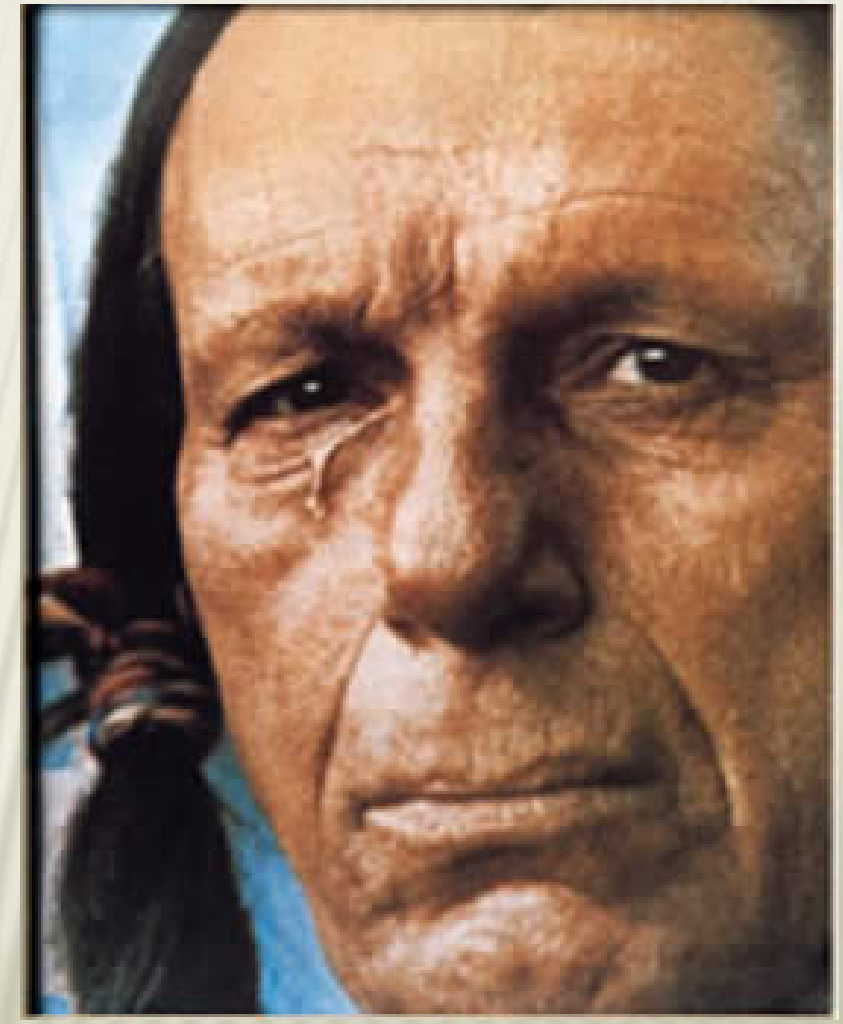
Waterways Turned to Sewers...

Dead Zone in the Gulf of Mexico



Civic, Corporate, & Agricultural Abuse & Neglect

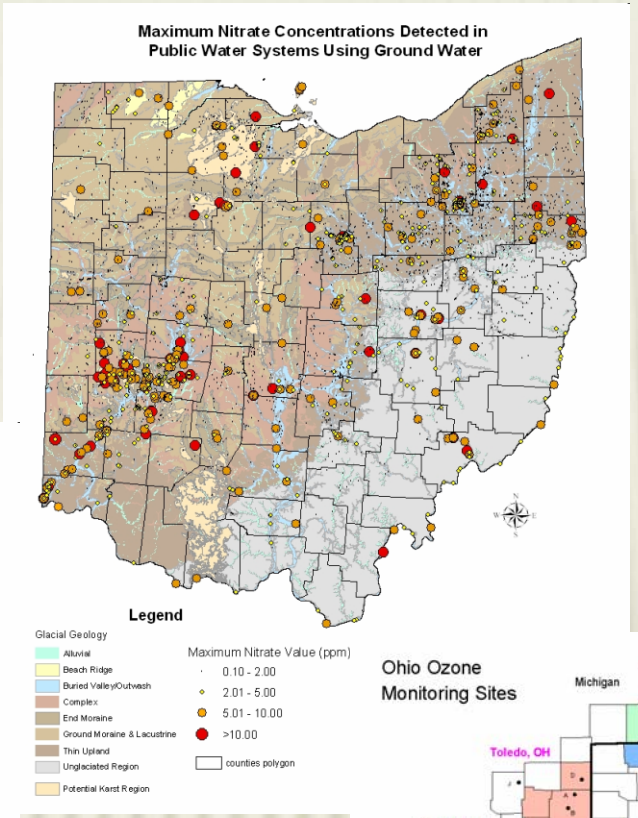
...We Made a Terrible Mess

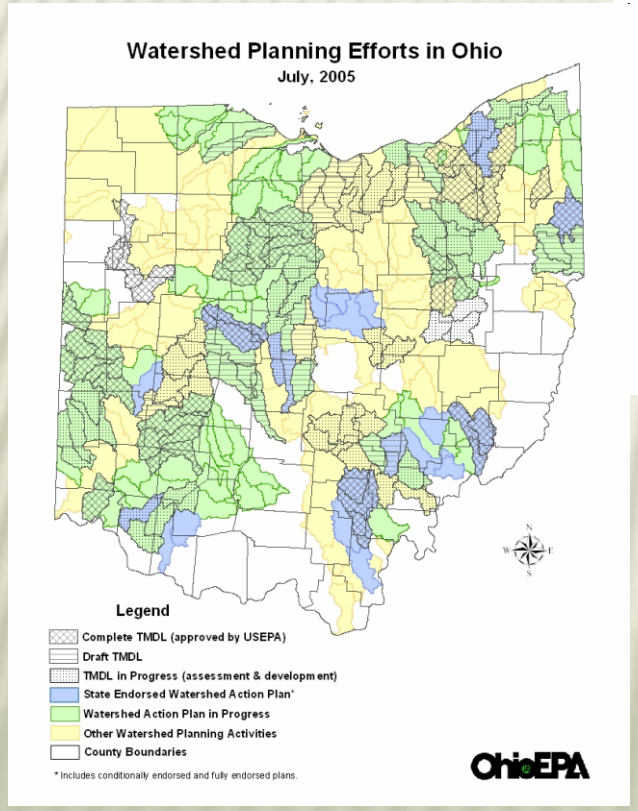


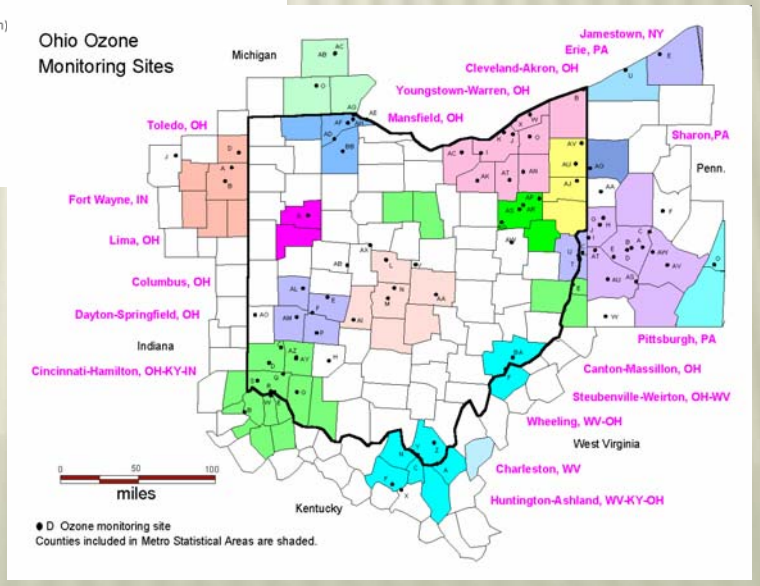
... Time to Take Action

… Time to Take Action

- OHIO EPA







... Time to Take Action

When is Green Building... GREEN?

- Green...

When is Green Building… GREEN?

- Green…

- Green..

When is Green Building… GREEN?

- green…

- Green..

- GREEN…

… a Kumbaya Moment

- STRIVE to OPTIMIZE
- "Green"

  Needs to Permeate
  All that we do…
- In a way that is
  - + Sensible
  - + Effective
  - + Affordable

OPTIMIZE

- To reduced environmental impact

- To reduce raw materials and energy consumption

- To reduce costs and economic impact

Green Building, Where do we Start?

- Federal Codes … and EPA
  - Uniform Building Code
  - Army Corps of Engineers
  - Department of Energy
- State Codes… Ohio EPA
- County Codes
- City Codes
- USGBC and LEED

United States Green Building Council

- *A nonprofit organization committed to expanding sustainable building practices.*

Leadership in Energy & Environmental Design

- Uses the Leadership in Environmental and Energy Design (LEED) Green Building Rating System

USGBC & LEED

Leadership in Energy & Environmental Design

- Promotes Energy Savings & Reduced Environmental Impacts
- Offers Guidance in Green Design
- Provides a Standardized Way to Review and Compare Drawings
- Platinum, Gold and Silver Awards Quantify a Buildings Green Score
- LEED Registration Helps Promote and Identify GREEN BUILDING PROJECTS

Greening Our Buildings

- Cradle to Grave Environmental Impact
- Materials Choices
- Chain of Custody
- Renewables
- High Tech
- Solar and Wind
- Computer Controls and “Smart Buildings”

Green Building... or Green Business?

green BUSINESS

Don't Forget the FUNDAMENTALS

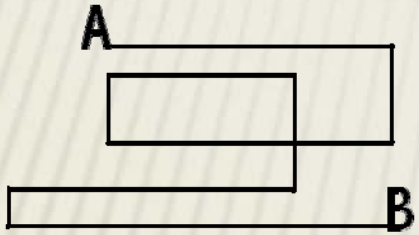
- Optimized Design
- Effective Site Location and Orientation
- Efficient Building Envelope

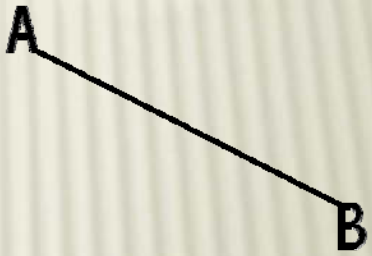
design, Design, DESIGN

- Find a Qualified Consultant
  - Use Qualifications Based Selection…”QBS”
  - Network your professional contacts
- Find a consultant that **LISTENS**…
  - Tell them what YOU need and want
- Include **EVERYONE** in the initial design…
  - Everyone has a different perspective
    - In a perfect world…our new building would…
    - You might learn something too…

Optimize Design…

- A Building that is not Effectively Tailored to your Need **is not** Efficient





- A very “architectural solution”…
  - An overly complex, ridiculously expensive, design with no apparent additional benefit
- A Lifetime of Worker Inefficiency is **WASTE**

design, Design, DESIGN

- Consider more building than you need…
  - Same core building
  - Save HVAC, Restrooms, Communications
  - Same permits and review

Optimize the Site

- Is this the Best Site?
- Solar Orientation and Natural Lighting
- Site Context and Existing Buildings

Optimize the Building Envelope

- High Thermal Efficiency
  - Reduces Energy Input for the Life of the Building
- Durable Materials
  - Reduces Maintenance Costs
  - Increases the Effective Lifespan of the Building

Optimize and Innovate in Design

- The essence of GREEN is to conserve
  - Conserves ALL our Resources…
    - Saves Materials
    - Saves Energy
    - Saves Time
    - Saves Money

So, Even if you Don't Incorporate

- Wind Generation
- Solar Panels
- Bamboo Floors
- Waterless Urinals
- LED Lighting

Congratulate Yourself!

- Good Design is not a Stack of Paper…

- It is a Treasure Map!

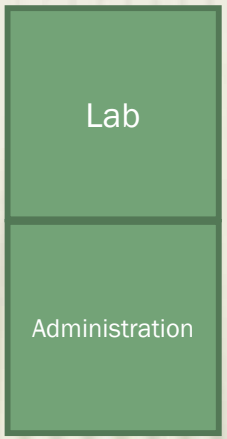
Design

- Meet, Listen, Design…Plan to be Efficient
  - Laboratory

Lab

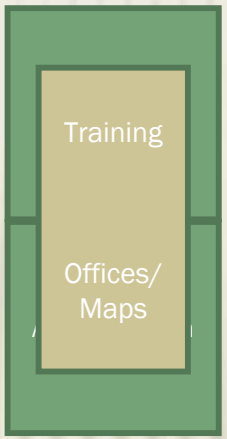
Design

- Meet, Listen, Design…Plan to be Efficient
  - Laboratory
  - and Administration



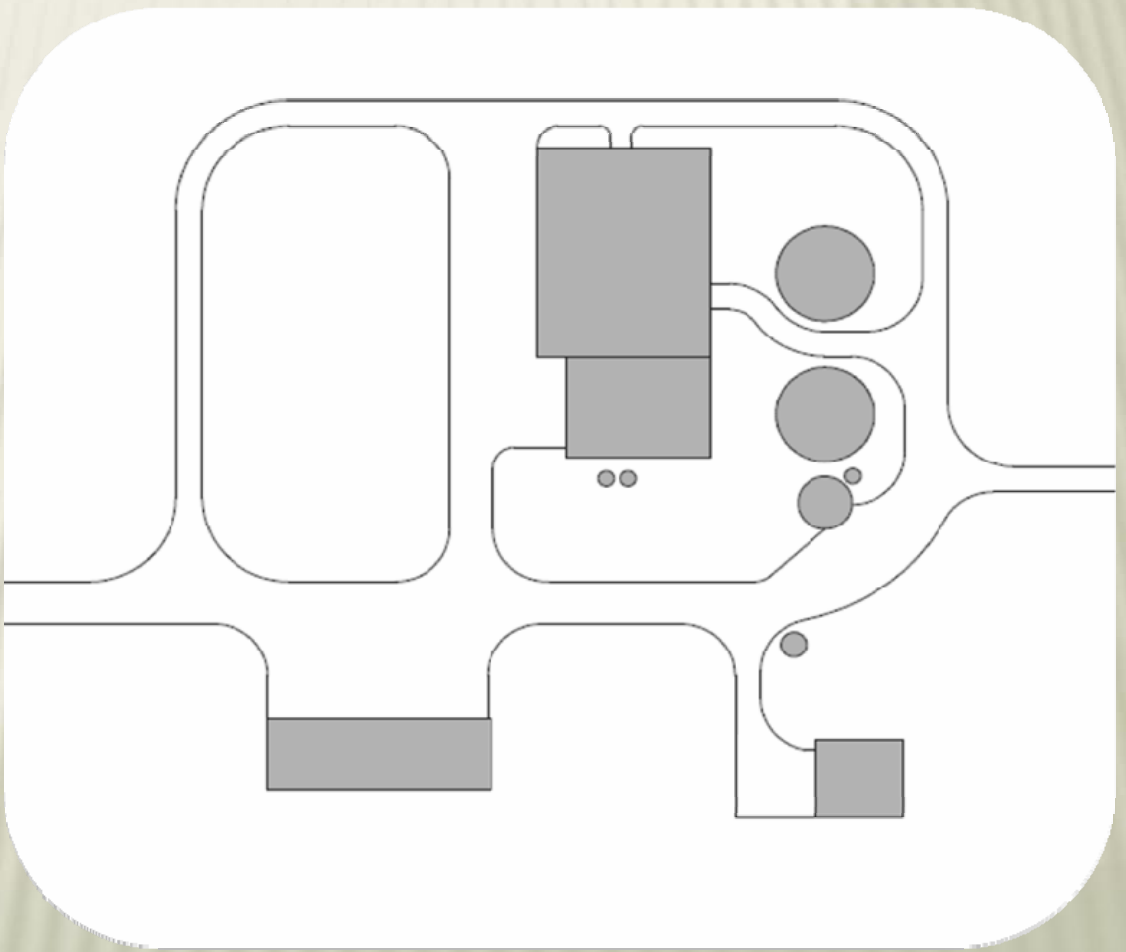
Design

- Meet, Listen, Design…Plan to be Efficient
  - Laboratory
  - and Administration
  - and Training
  - and Storm Water
  - and Collections



Site Orientation

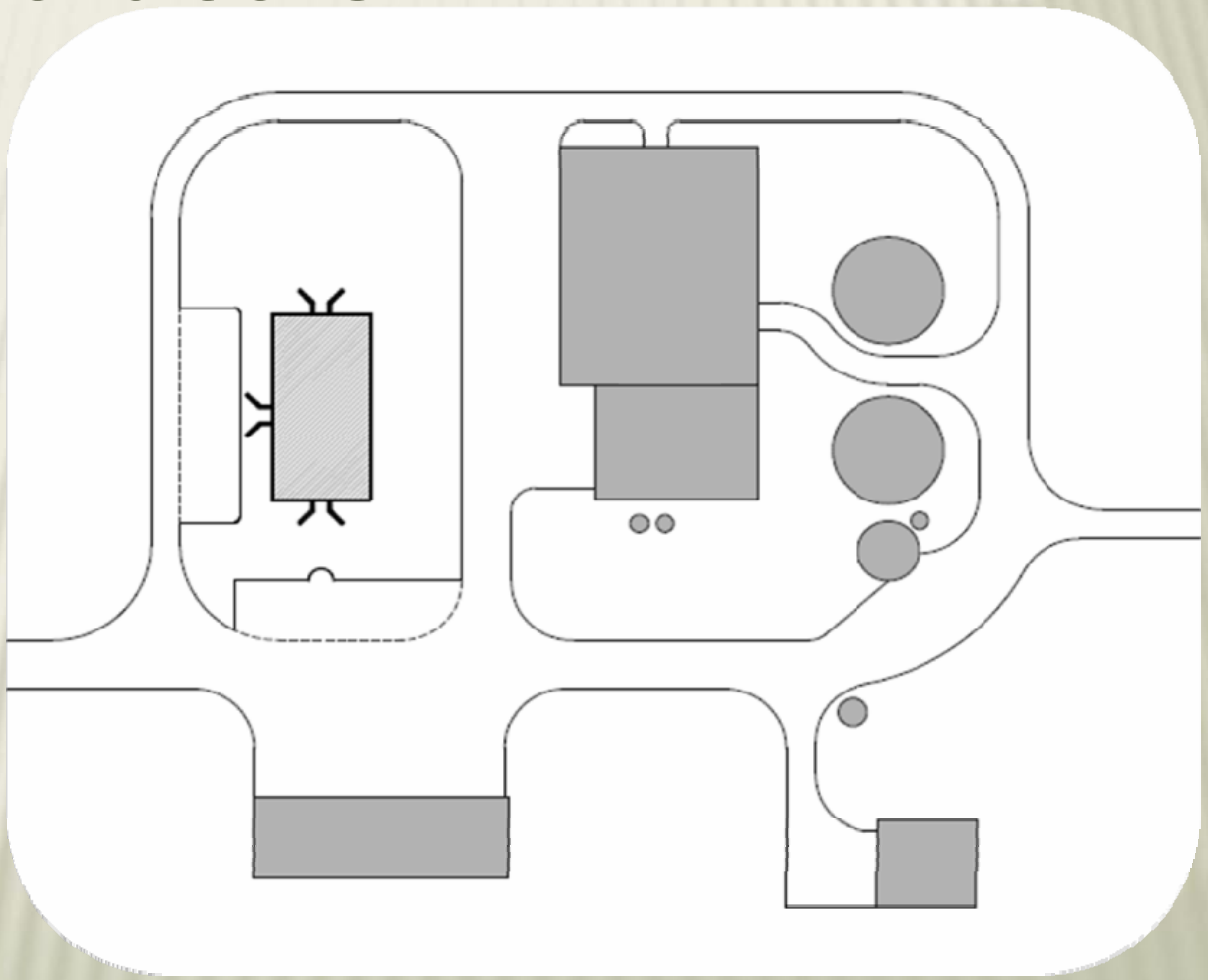
- Pre-Existing Conditions



- North ^

Original Site Plan

- Pre-Existing Conditions



- North ^

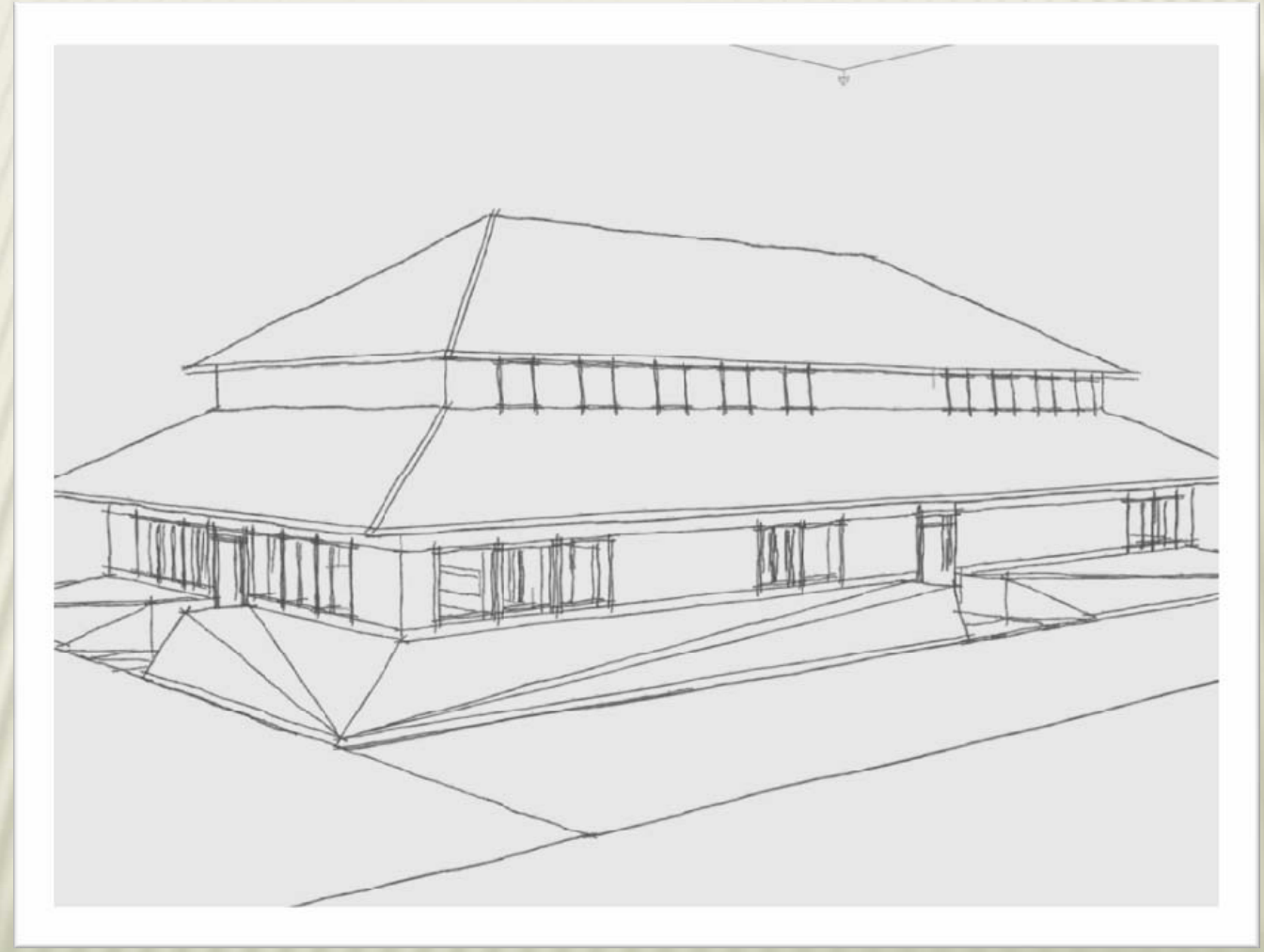
Conceptual Design

- Meet, Listen, Design…Plan to be Efficient
- Visit other Facilities
  - Talk to them and get their input
  - Steal their good ideas
  - Avoid their mistakes
- Review and Refine conceptual design

Conceptual Design

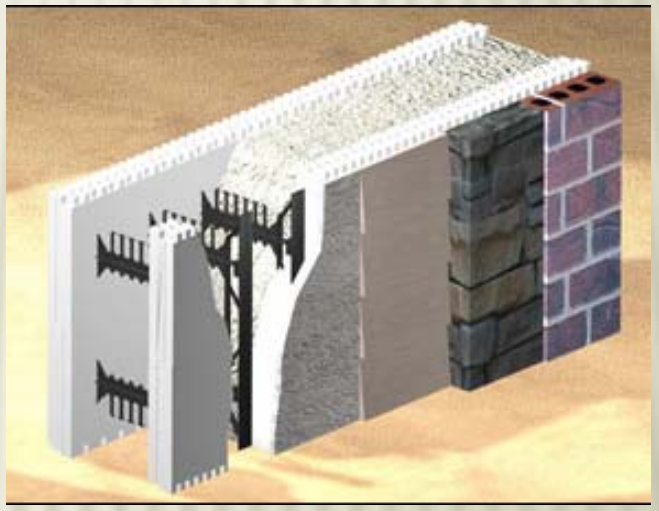
- Select a site
  - Orient the building
- Plan to design an efficient shell
  - Consider materials and construction options
- Prepare for the Construction Document Phase

Design Ideas...Become Drawings
3D Modeling Helps Everyone



Efficient Building Envelope

- Insulated Concrete Forms ICF's
- One of the NEWEST old Technologies
  - Thermal Mass
    - Caves
    - Castles
    - Adobe
    - Sod houses
    - Basement
  - Thermal Lag
  - Super Insulation
    - Better Insulation Means Less Heating and Cooling Costs



Efficient Building Envelope

- Radiant Floor Heat
  - High Efficiency
  - Zone Control
  - Warm Feet…
    - Cool Head…

Efficient Heating and Cooling

- GEOTHERMAL?
  - ABSOLUTELY !
    - US EPA says GEOTHERMAL is the most energy-efficient, environmentally clean, and cost-effective space conditioning system.
      - Energy costs are typically 25-50% less
      - Lower life-cycle cost then traditional HVAC

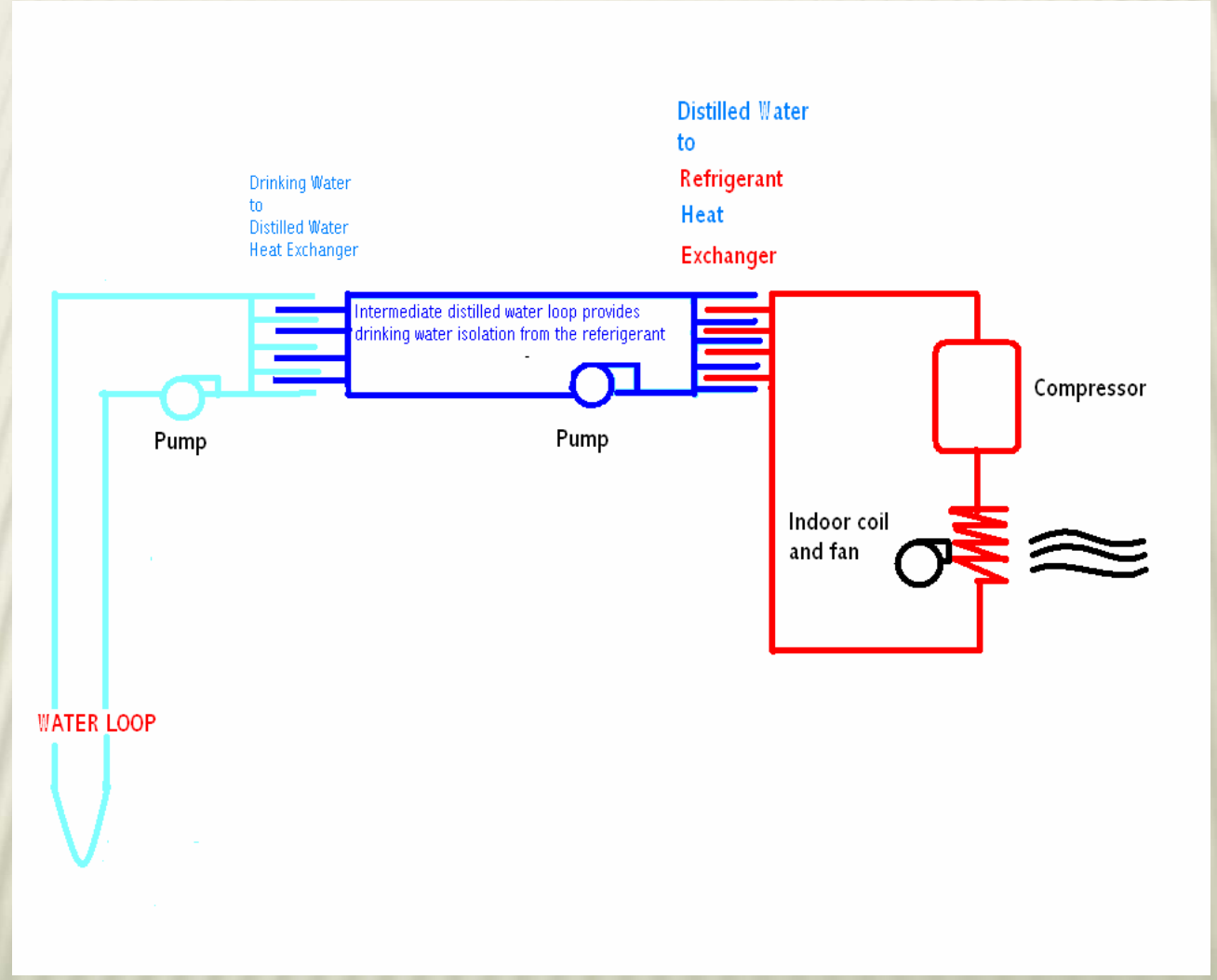
CHALLENGES…

- GEOTHERMAL
  - NEGATIVES
    - High COST of BTU Harvesting…
      - Water source and disposal
        - Closed loop system, trenched or radial
        - Open loop system, well source and discharge
        - OR…if you have available a water source of nearly 18.0 million gallons…there are millions of BTU's flowing by every day.

INNOVATE

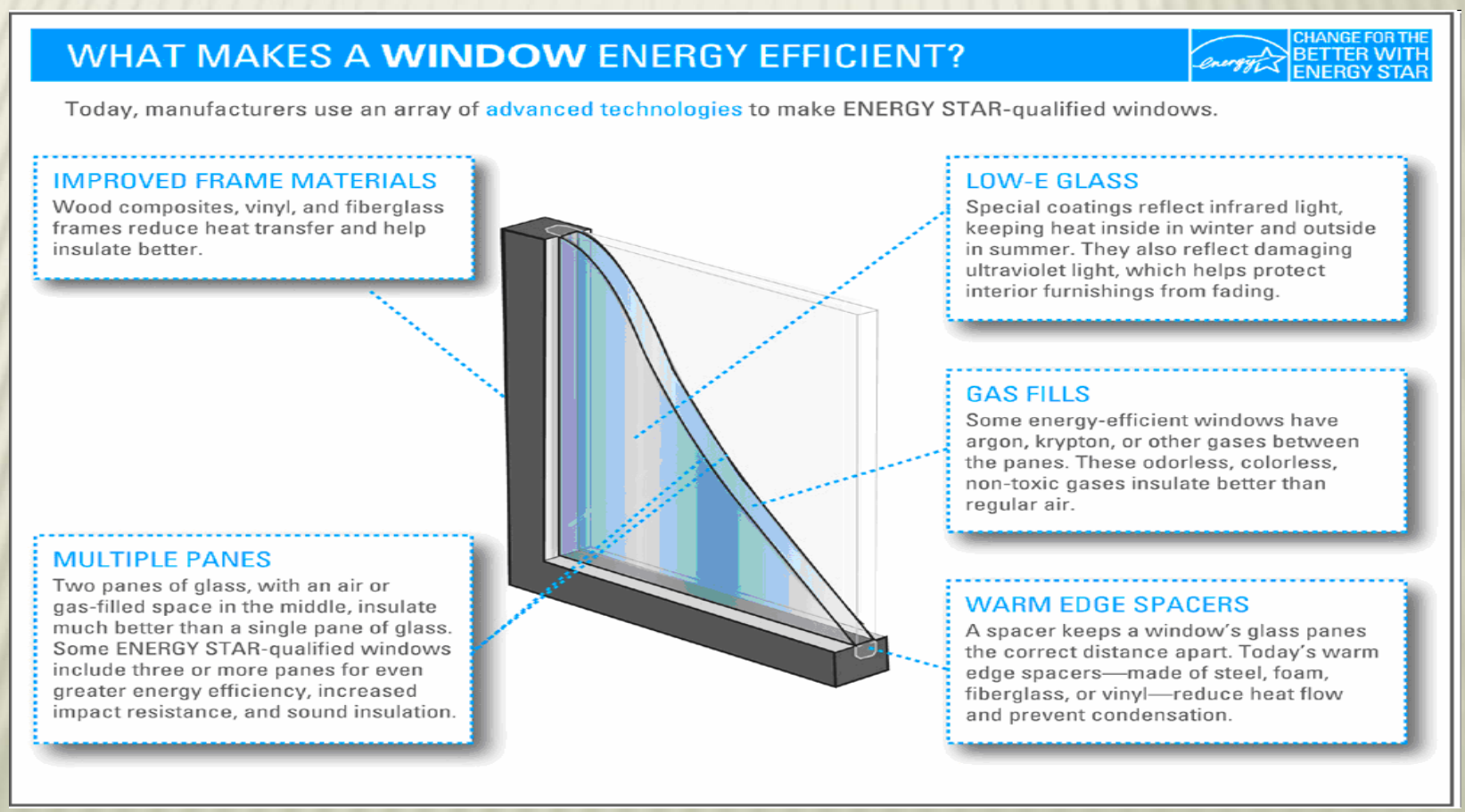
- GEOTHERMAL
  - SOLUTION
    - Source the municipal water supply
      - 18,000,000 gallons per day
      - Average temperature 53-58 degrees Fahrenheit
      - A 2” pipe can supply virtually all the BTU’s required for the entire office and administration area…60 gpm.
      - 18.0 mgd…60 gpm…
      - Less then 1/2 of 1% of the available flow

OPTIMIZED ENERGY EFFICIENCY



Efficient Building Envelope

- Energy Star Windows



Design...

Design…Becomes Construction

… Becomes Construction

… Becomes Construction

… Becomes Construction

… Becomes Construction

… Becomes Construction

Design...

Design Becomes Reality

Green Building is GREEN…

When you Remember the Fundamentals

Good Design will Optimize and Innovate:

- Site and Environment
- Building Function and Efficiency
- The Building Materials and Lifecycle
- The Dollars of the Utility

- Good Design will Optimize
  - YOU…and Your Employees

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