



Oklahoma Medical Research Foundation (OMRF)

Chip Morgan - OMRF

mike-morgan@omrf.org

Dan Watch - Perkins +Will

dan.watch@perkinswill.com

404-443-7694

Reinhold Ziegler - Synergy California L.P.

synergyca@earthlink.net

415-290-4990

Tom Fisher - The Phoenix Design Group

tfisher@phxdg.com

View From South-East

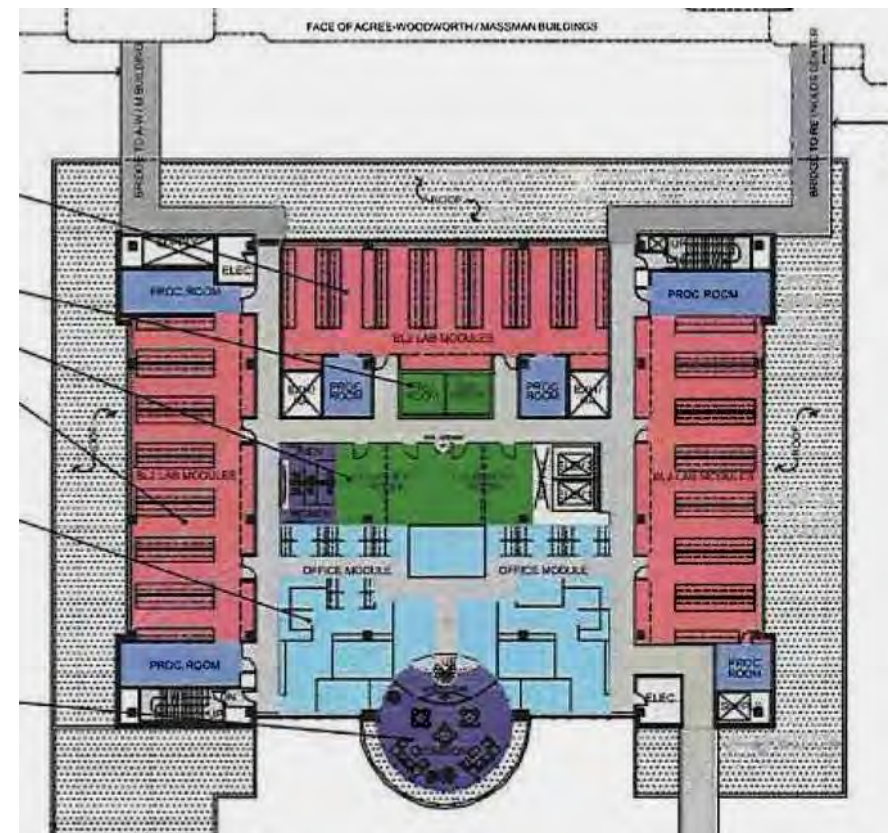


OVERVIEW

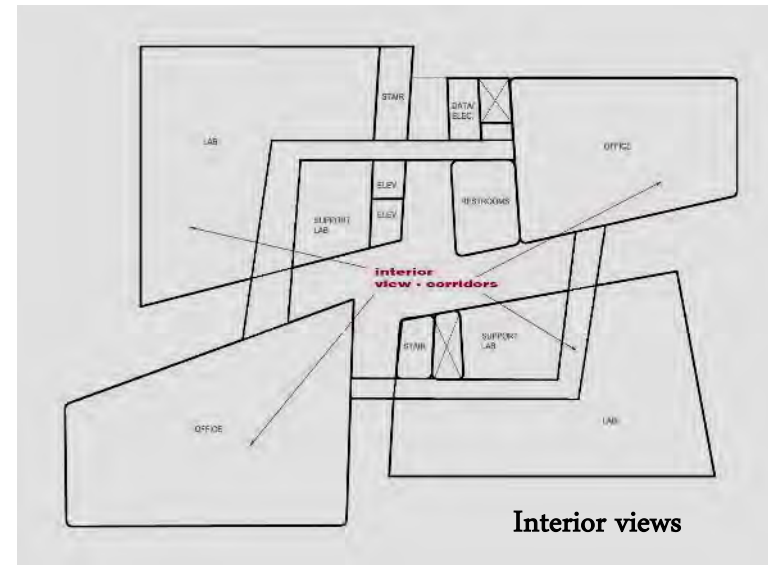
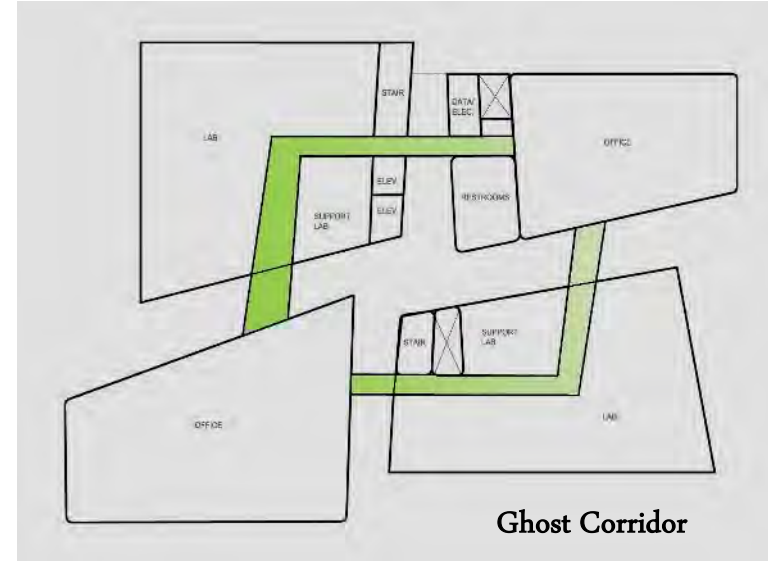
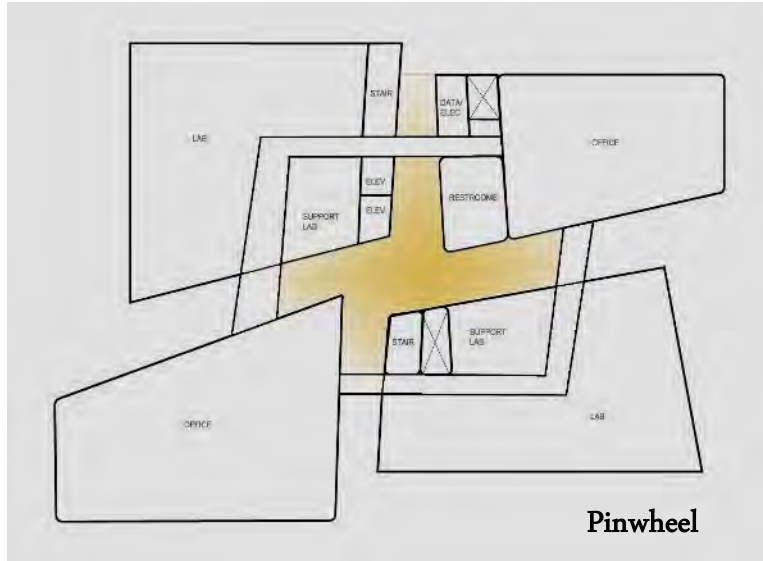
1. Design Efficiency
2. Create Energy
3. Lean Research

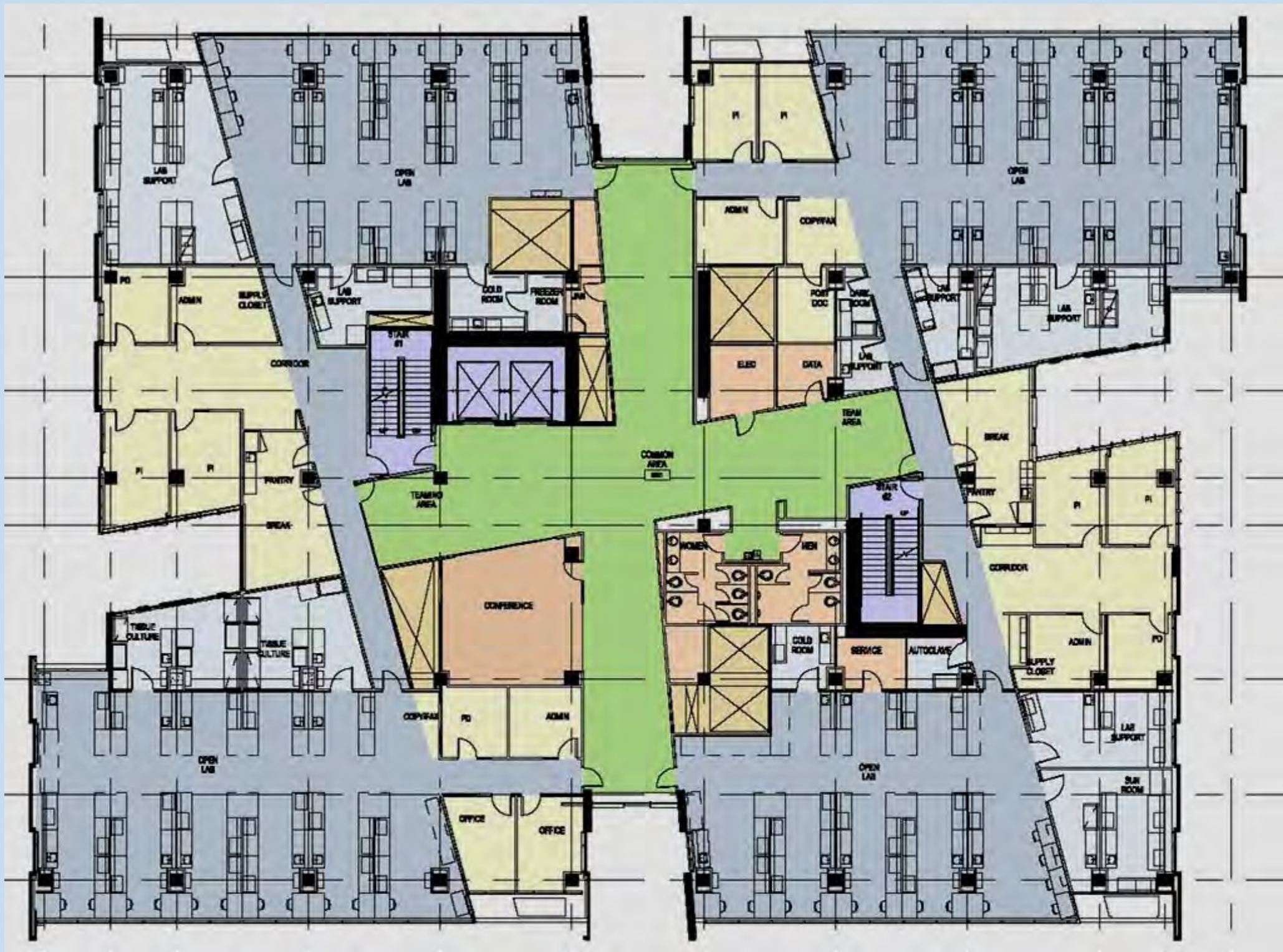
The Interview

Original Image in Local Newspaper



Original Concept





Sixth Level



	CORE	OPEN LAB NET AREA	OPEN LAB LINEAR FEET OF BENCH / EQUIPMENT	LAB SUPPORT NET AREA	LAB SUPPORT LINEAR FEET OF BENCH / EQUIPMENT	OFFICE NET AREA
EXISTING (3 RESEARCH LABS TOTAL)						
NEW (8 RESEARCH LABS TOTAL)						
EXIST + 5/3						
NEW - EXIST + 5/3						
CONCLUSION	42.7% LESS NET SF (NEW DESIGN IS MORE EFFICIENT)	7.7% MORE NET SF IN NEW DESIGN	EACH TEAM AVERAGE EQUAL 30 LINEAR FEET MORE BENCH SPACE (20% MORE BENCH SPACE PER TEAM)	27.2% LESS NET SF IN NEW DESIGN	EACH TEAM AVERAGE EQUAL 33 LINEAR FEET MORE BENCH SPACE	2.8% MORE NET SF IN NEW DESIGN

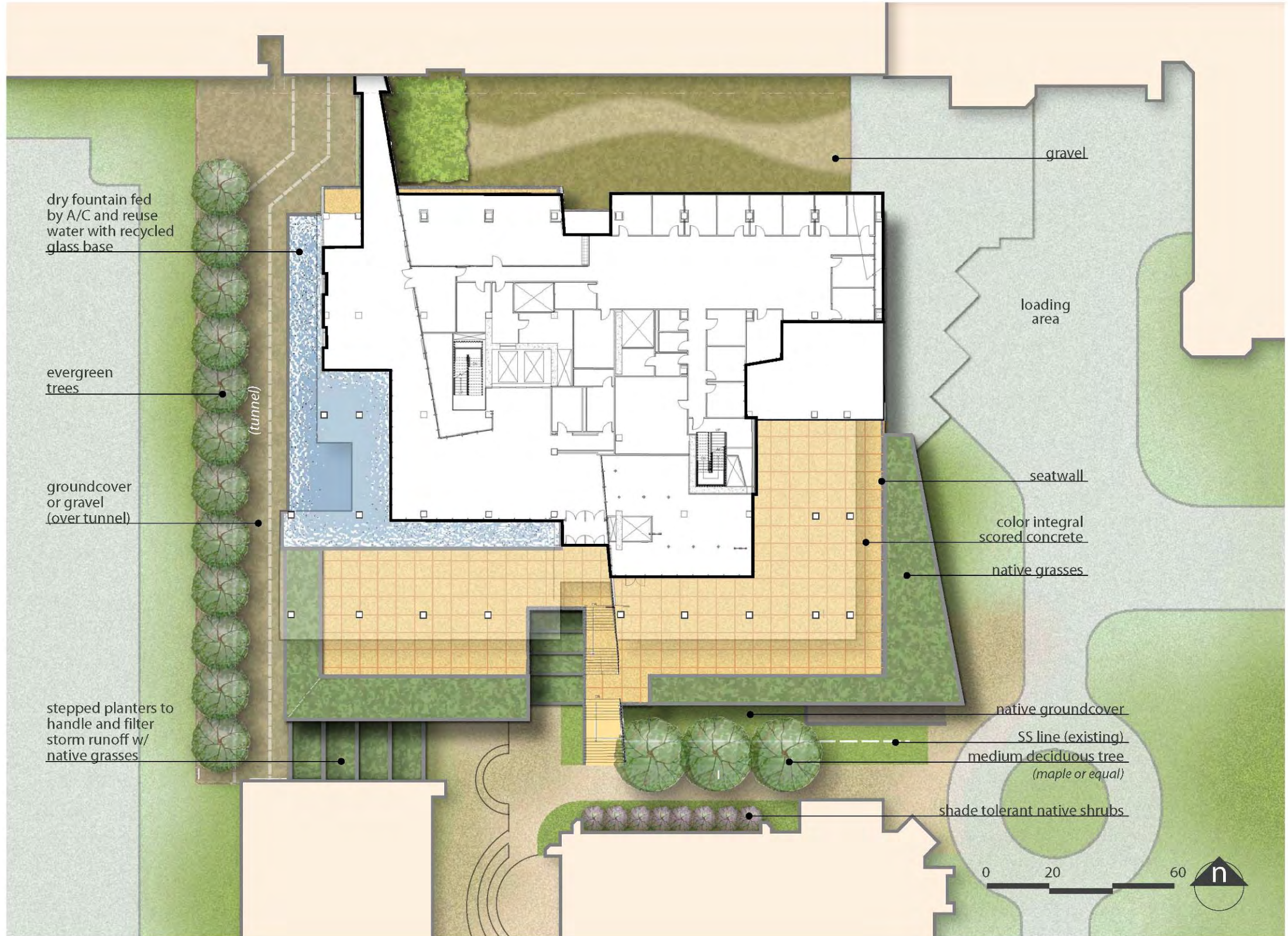
INTERSTITIAL FLOOR



FIRST FLOOR



SITE PLAN



SECOND FLOOR



THIRD AND FIFTH FLOORS – SHELL SPACE



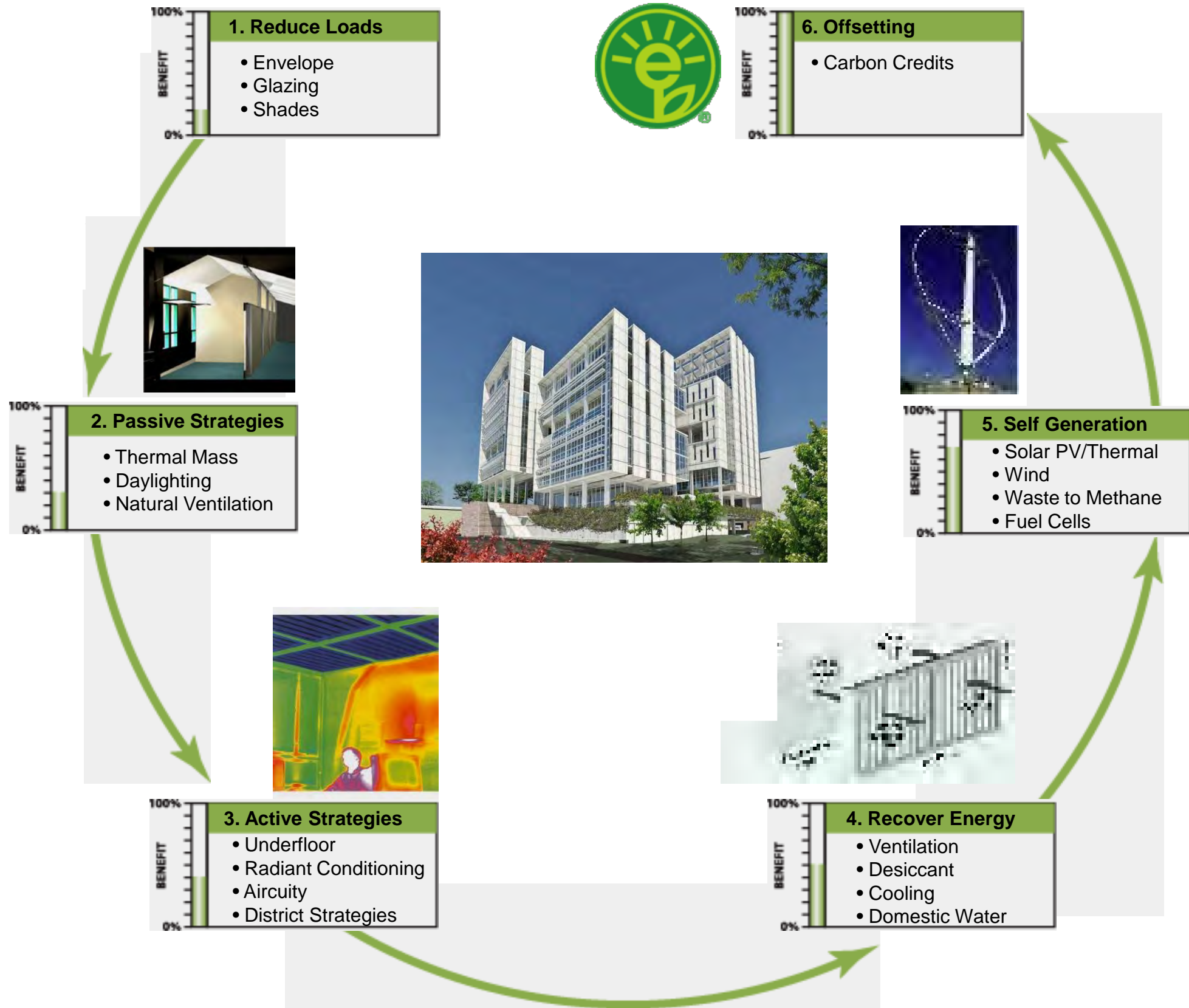
SEVENTH FLOOR



TYPICAL OPEN LABORATORY IMAGES



SUSTAINABLE DESIGN SOLUTIONS – ENERGY EFFICIENCY



SUSTAINABLE DESIGN SOLUTIONS



LEED® NC 2.2 GOLD
within 5 Year Payback

Scorecard

9

SS

Sustainable Sites

(14)

4

WE

Water
Efficiency

(5)

10+

EA

Energy +
Atmosphere

(16)

5

MR

Materials +
Resources

(13)

15

EQ

Indoor
Environmental
Quality

(15)

5

ID

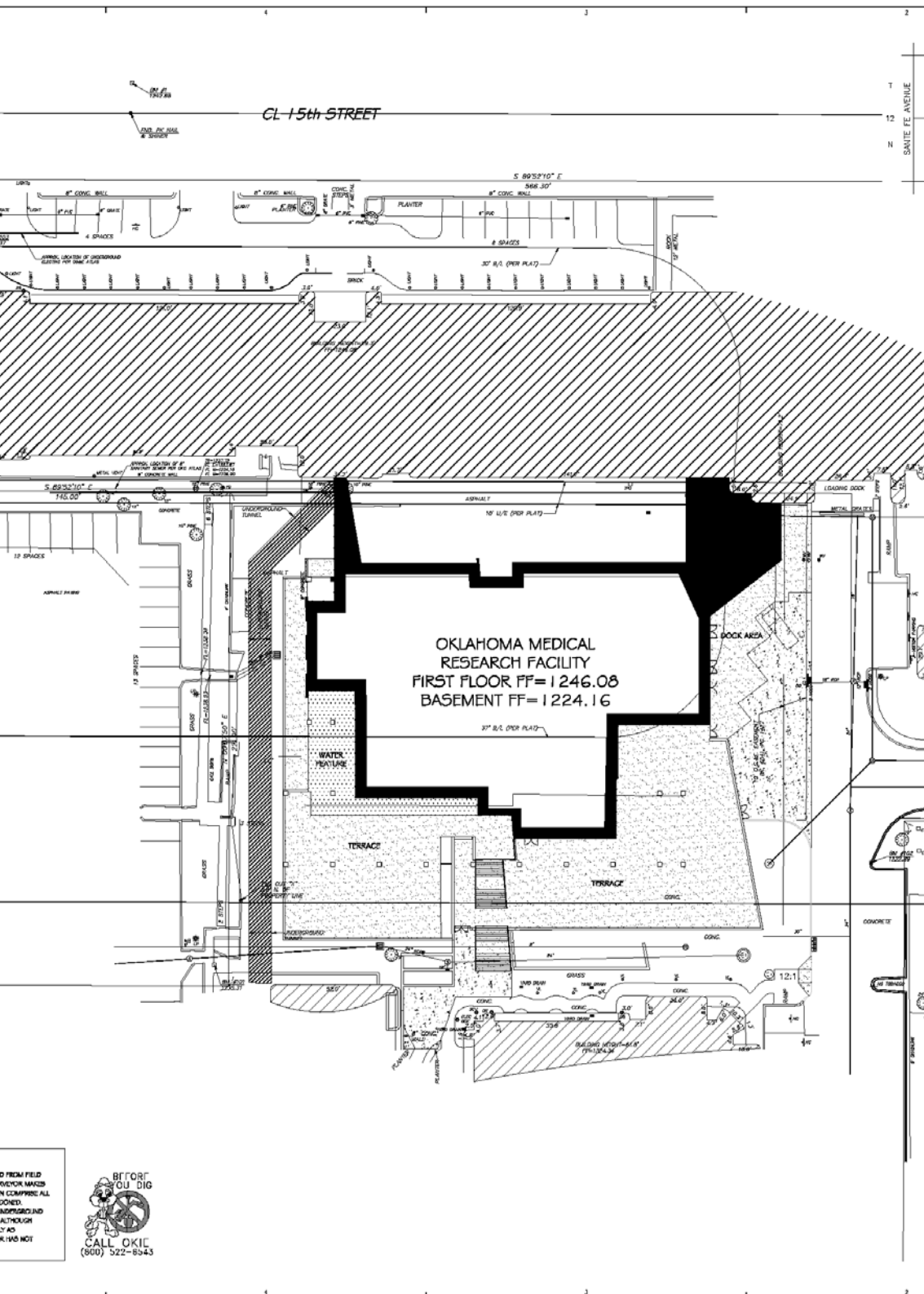
Innovation
in Design

(5)

48+

Maximum
Points

SUSTAINABLE DESIGN SOLUTIONS



9

Sustainable Sites

Alternative transportation: commuter rail stop within 1/2 mile; bicycle storage, showers, and changing rooms; preferred parking for low-emitting and fuel efficient vehicles.

Stormwater design: Rain gardens help control quality and quantity of runoff.

Heat island effect: Light colored paving; combination vegetative and high performance roof

4

Water Efficiency

Water efficient landscaping: No potable water used for irrigation and use of drought tolerant native plant materials.

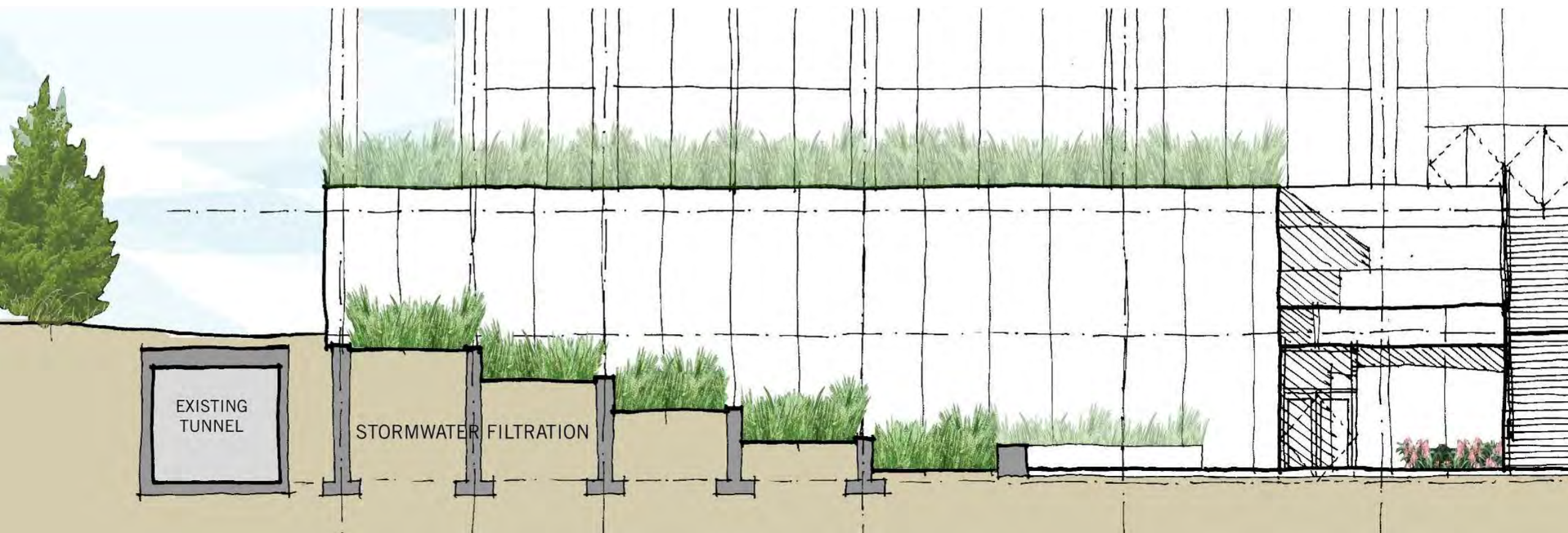
Water Use Reduction: Efficient plumbing fixtures.

DO NOT FROM FIELD
CHECK MARKS
IN COMPASS ALL
DONES
SURVEYED AND
ALTHOUGH
YAD
K. H. NOT



SUSTAINABLE DESIGN SOLUTIONS – WATER USE

- Water from air conditioning condensate used to fill water feature and for irrigation
- Investigating capturing and cleaning storm water run-off for use as irrigation through means of rain gardens. The intent is to reduce or eliminate water pollution by increasing onsite infiltration, eliminating sources of contaminants, and removing pollutants from storm water runoff.



SUSTAINABLE DESIGN SOLUTIONS

2. Building Alignment and Orientation:

The first step is to superimpose the wind rose summary over the future building.



Next comes the massing and flow study to determine the wind shear profile.



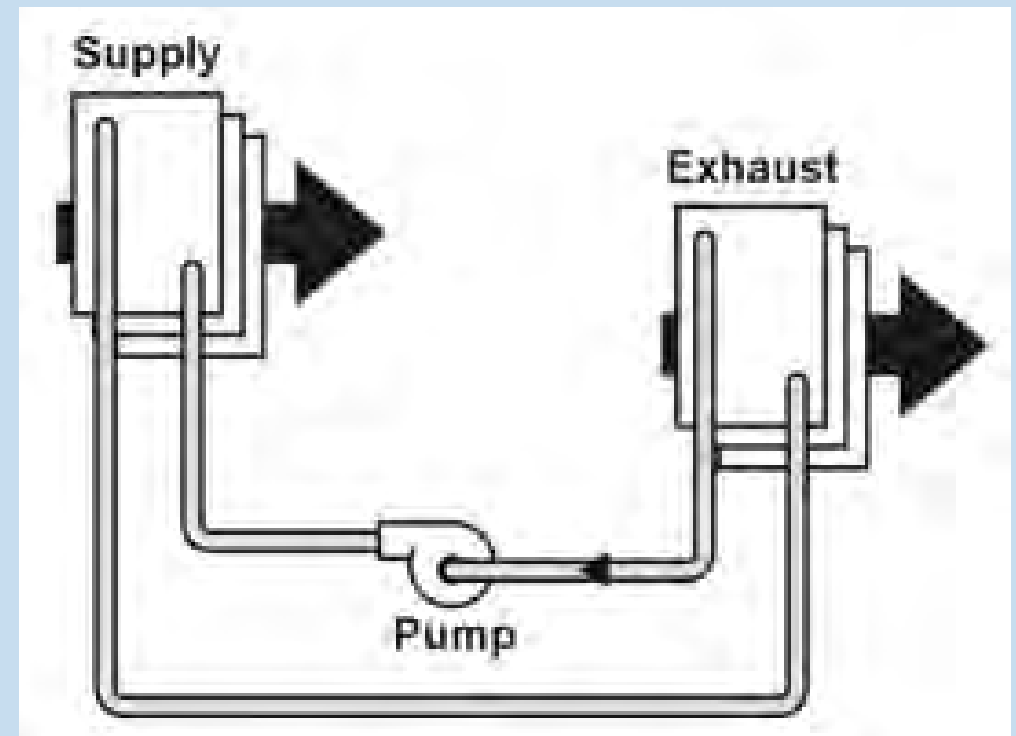
10+

Energy + Atmosphere

Optimized energy performance: Venturi Wedge/Chilled Beam combination, energy model engaged early in design to optimize impact.

On-Site Renewable Energy: Wind turbines and photovoltaic panels on roof and surrounding buildings.

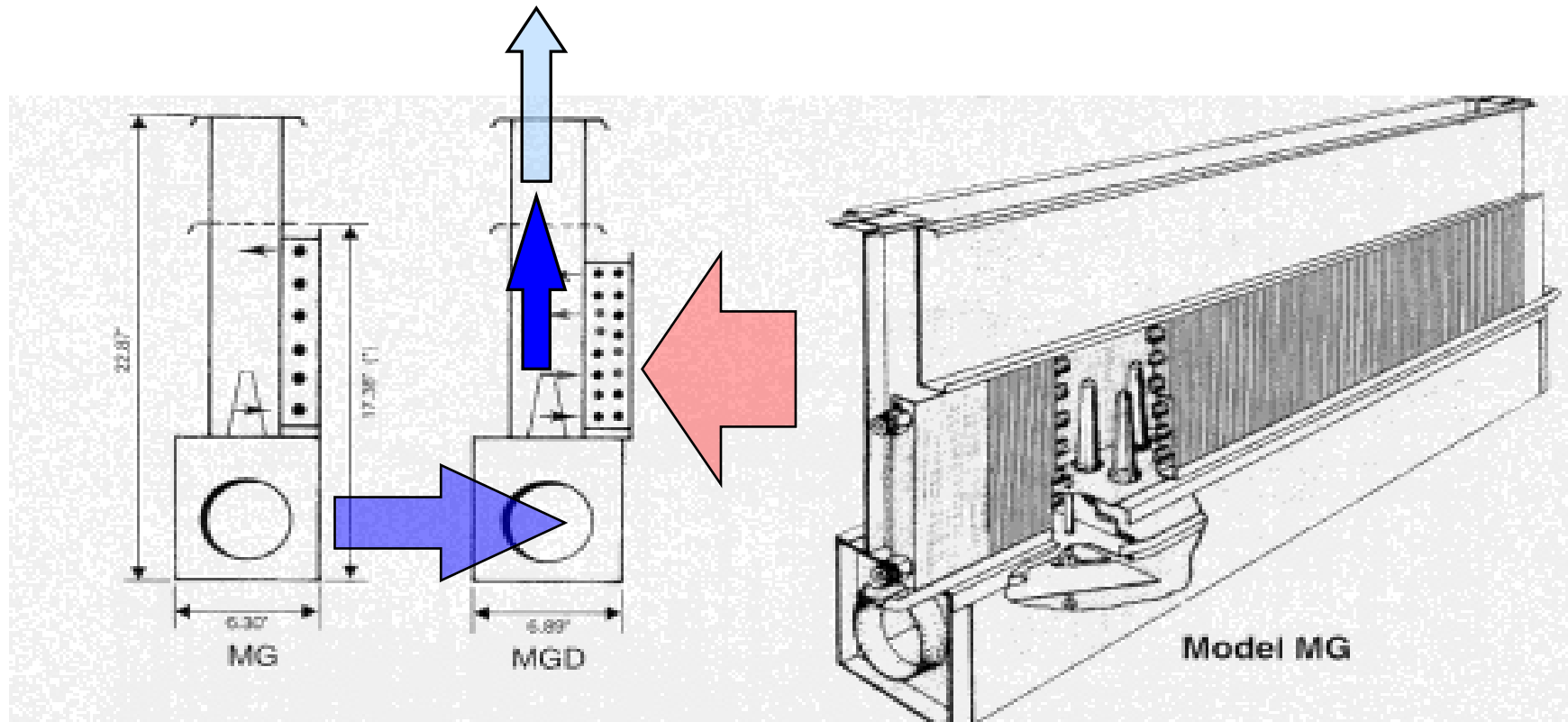
Enhanced Commissioning and **Measurement & Verification** to improve building operations over time.



Lab Design

- 1. Trend toward fewer fume hoods in Medical Research Labs.**
- 2. Peak Lab air flows are set by Heat Gain not Hood Exhaust.**
- 3. Design must be flexible to accommodate changes in research and increasing electronic equipment.**
- 4. Water is significantly more efficient than air at transferring heat.**
- 5. New design does not clutter the ceiling with air distribution devices.**

Induction Concept



Constant supply of conditioned primary air enters the plenum.

Primary Air is forced at a high velocity out the nozzles.

High velocity air creates a zone of negative pressure at coil.

Room air is induced over heating and cooling coils.

Primary air and heated/cooled room air are mixed.

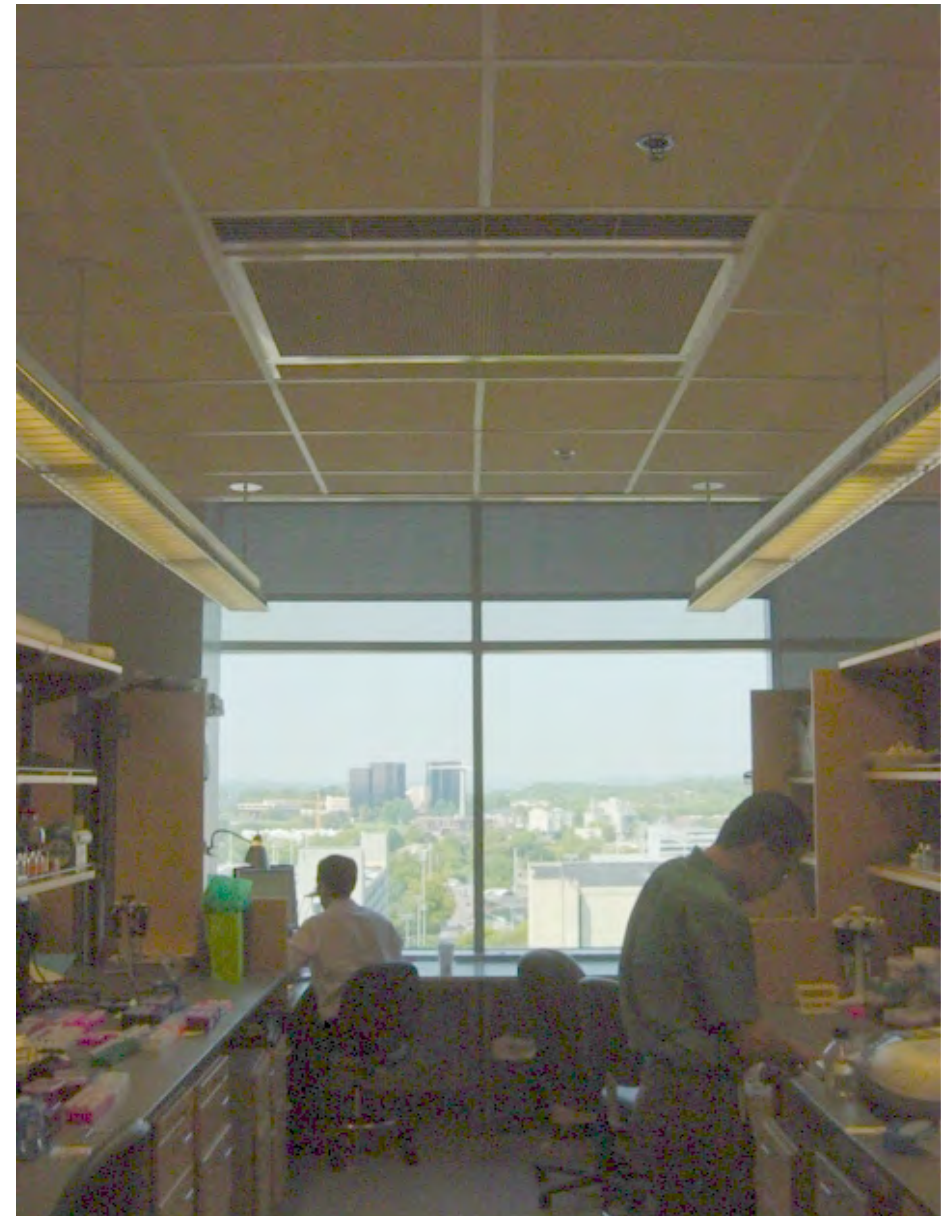
V-Wedge Installation



Double Wedge Unit



Single Wedge Unit



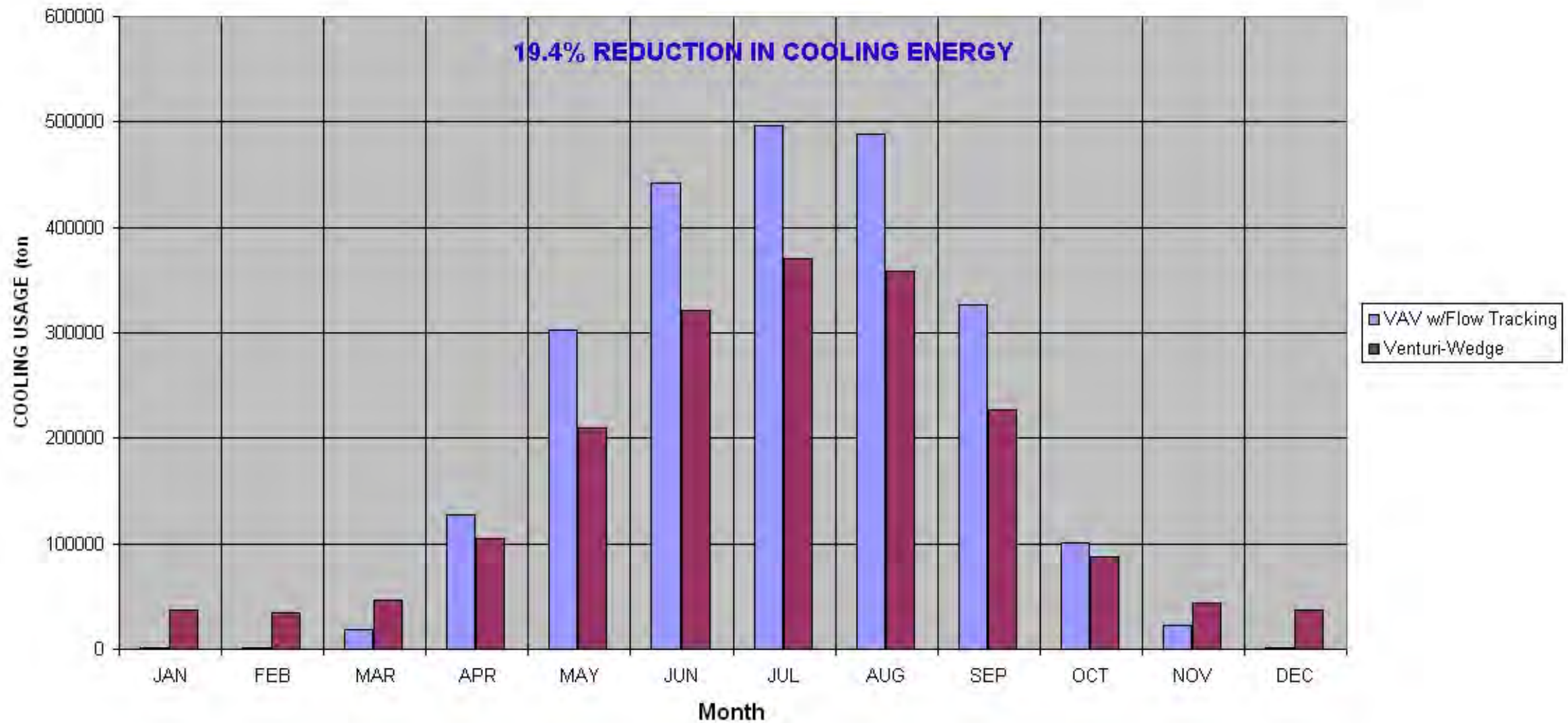
Wedge Unit in Lab Aisle

Mechanical System First Cost Savings

Chiller Plant & Piping	\$ -287,550
Sheetmetal	\$ -541,680
AHU Capacity	\$ -717,230
Exh Fan Capacity	\$ -346,200
VAV Boxes	\$ -203,400
Temp Controls	+13,950
Tracking Controls	\$ -526,900
Sec Cooling Systems	+ 761,860
V-Wedges & Chill Beams	+ 762,750
Total First Cost Savings	\$ -1,084,400

Annual Cooling Savings

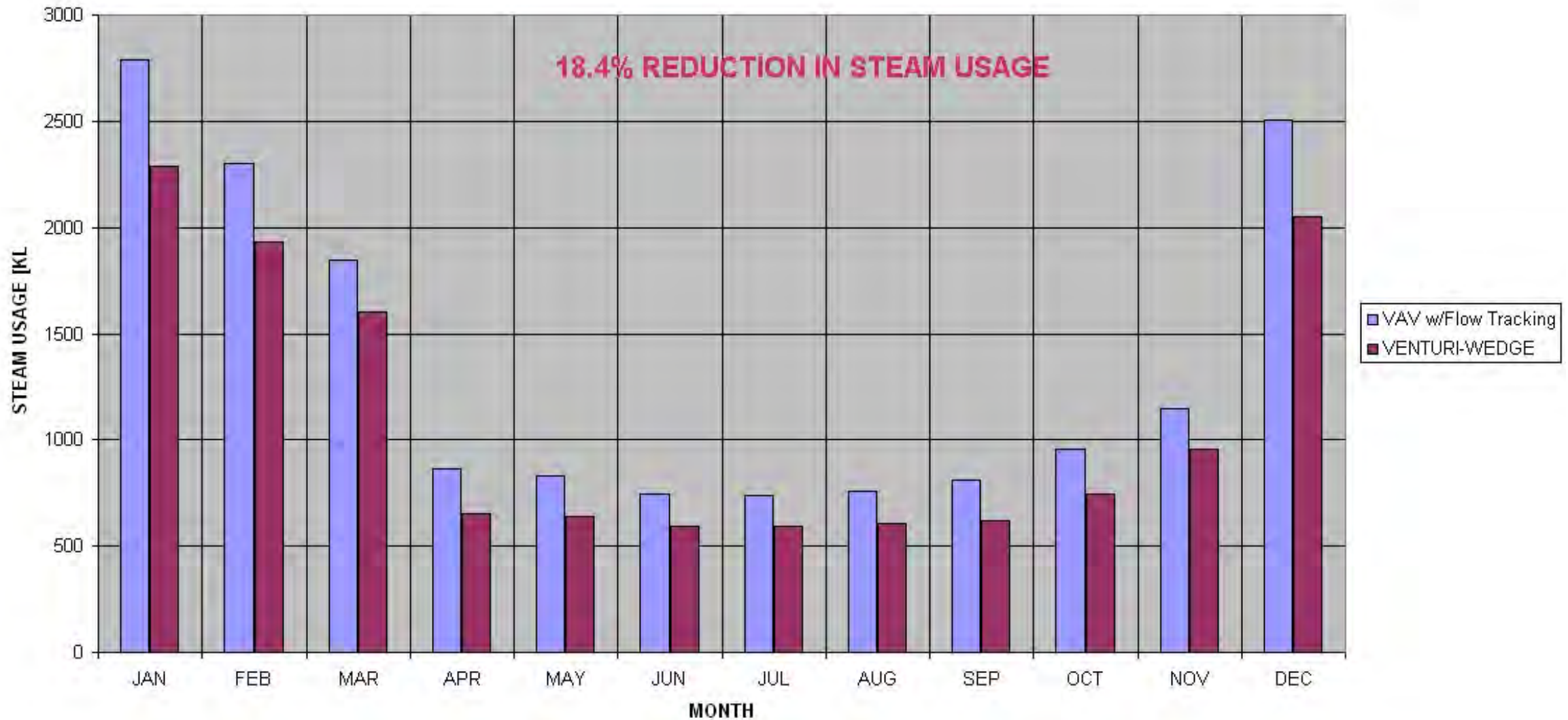
**COOLING ENERGY COMPARISON
VAV SYSTEM vs VENTURI-WEDGE**



Annual Reduction: 19.4%

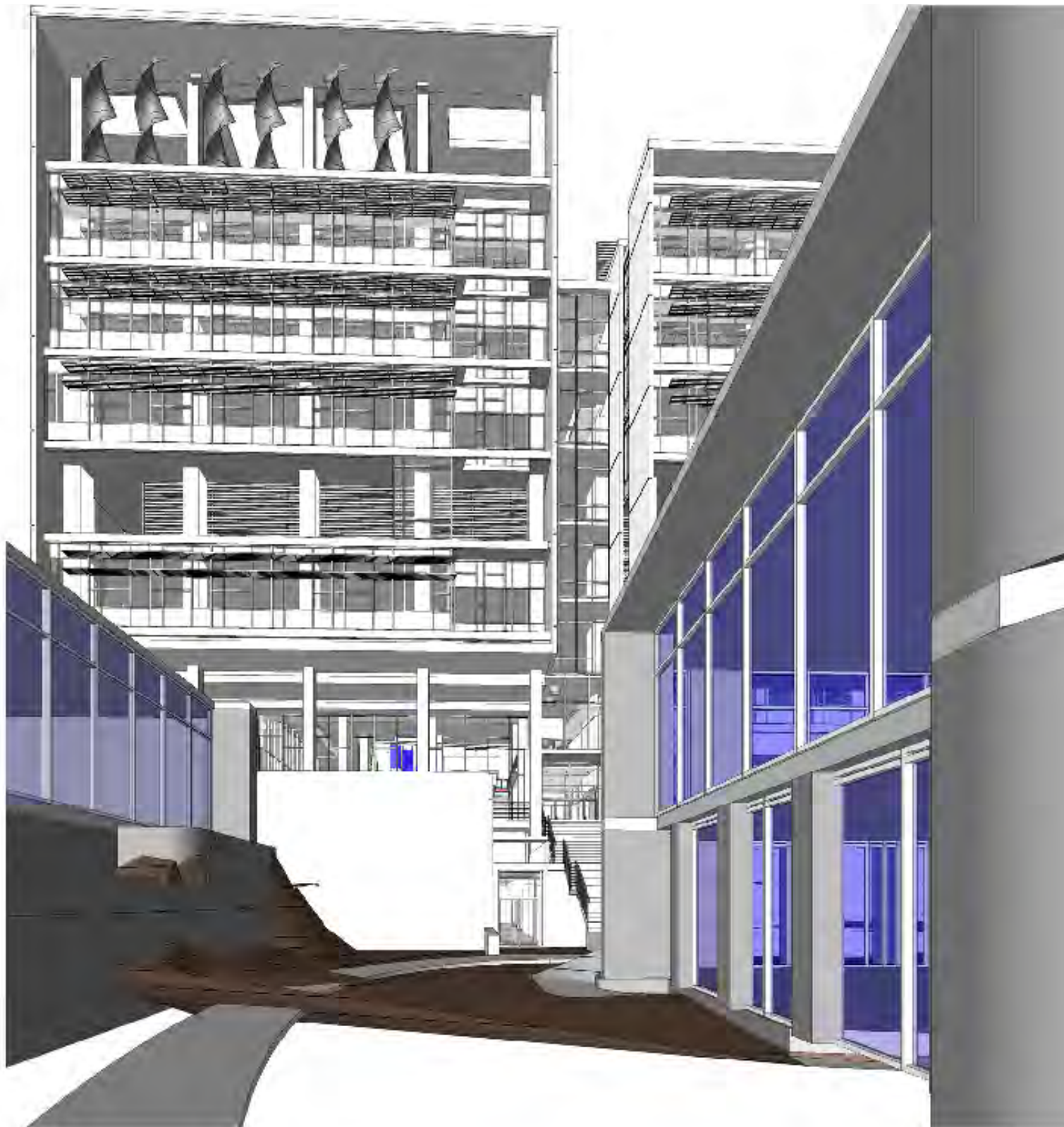
Annual Heating Savings

HEATING ENERGY COMPARISON VAV SYSTEM vs VENTURI-WEDGE



Annual Reduction: 18.4%

SUSTAINABLE DESIGN SOLUTIONS



5

Materials + Resources

Recycled Content: 20% (Post-consumer + 1/2 pre-consumer)

All of the wood products on the project will come from Forest Stewardship Council sustainable forests.

Certified Wood: 50% of wood-based materials and products.

15

Indoor Environmental Quality

Low Emitting Materials used throughout.

Controllability of Systems for lighting and thermal comfort.

Natural daylight and views are provided to occupied spaces

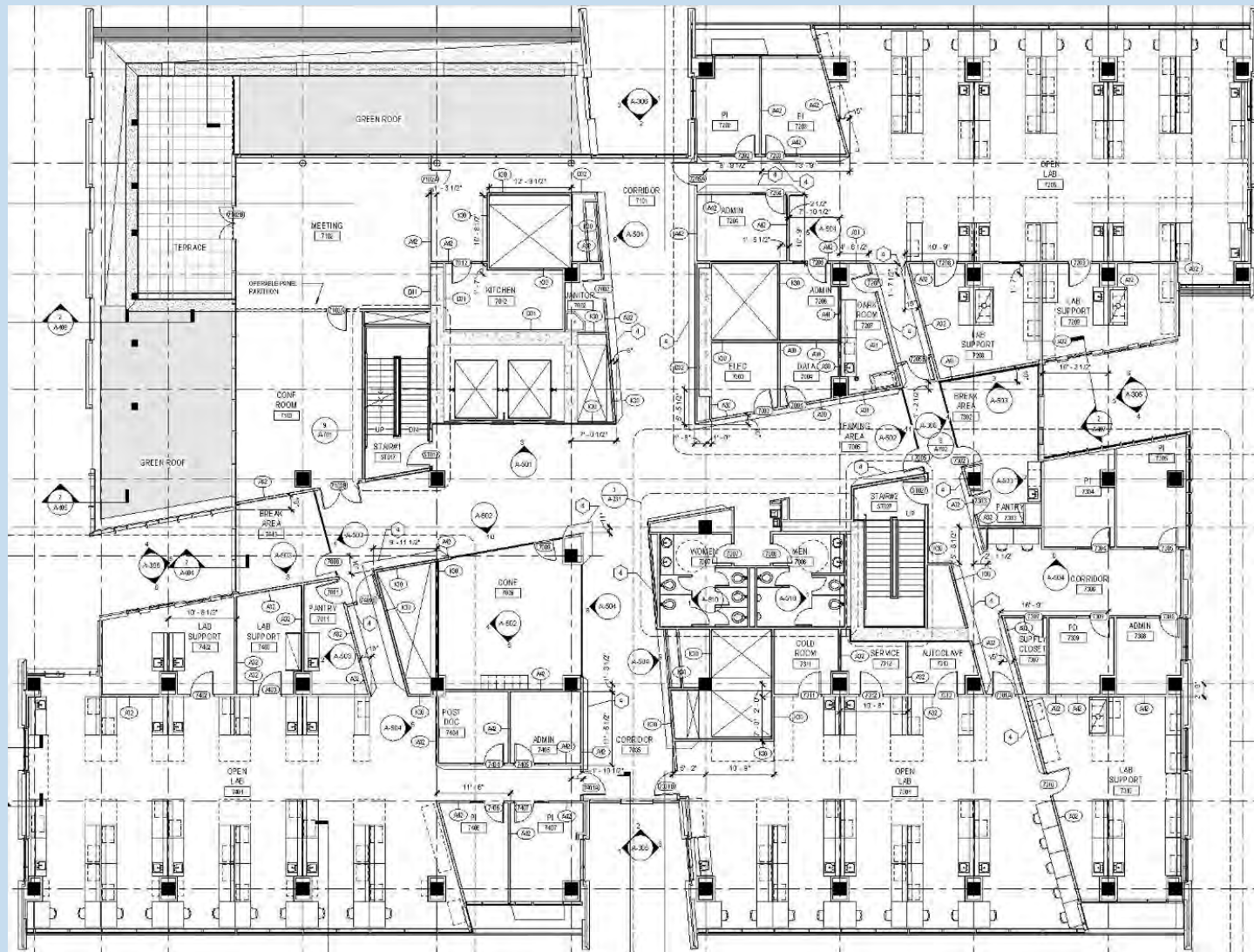
5

Innovation in Design

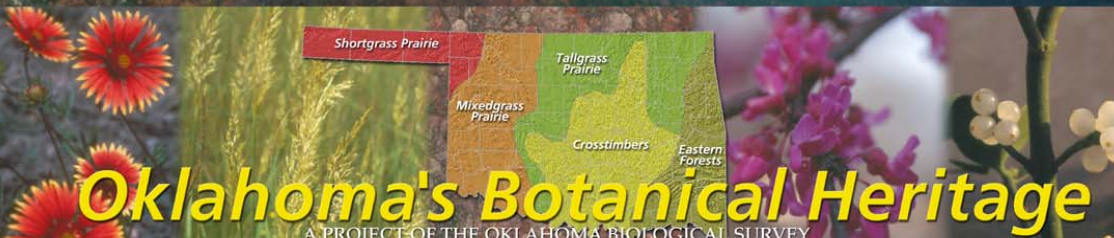
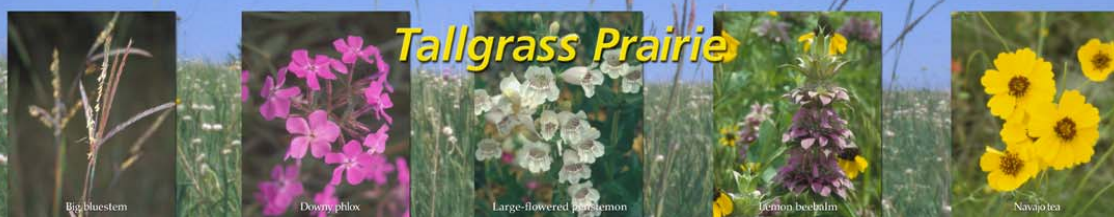
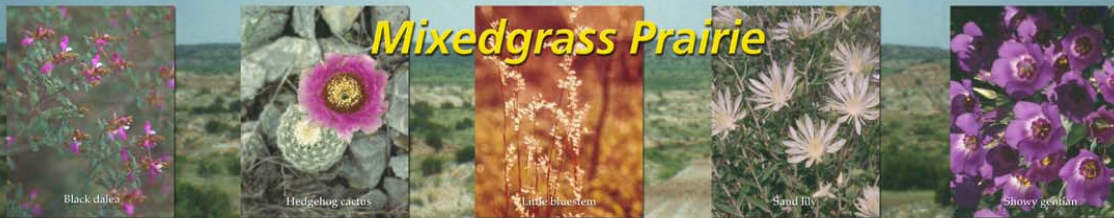
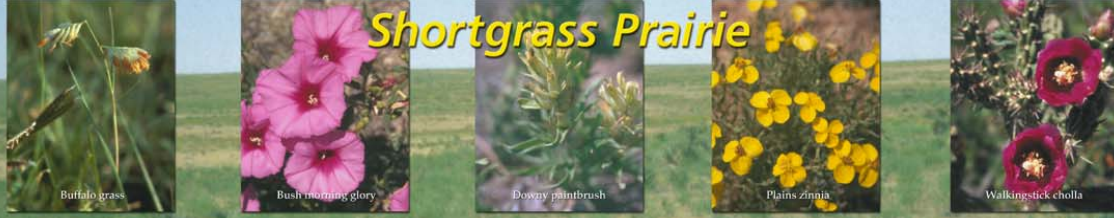
- Wind Tunnel Analysis
- 10% reduction in process water load
- Green housekeeping program
- Exemplary performance for recycled materials (30%)

SUSTAINABLE DESIGN SOLUTIONS – GREEN ROOF

- Reduce heat island effect
- Insulating benefits, aesthetic appeal, and lower maintenance costs than standard roofs.
- Green roofs require semiannual inspection but have longer lifetimes than conventional roofs.



SUSTAINABLE DESIGN SOLUTIONS



- Use of native grasses and vegetation – low water usage and maintenance (Xeriscaping, refers to landscaping in ways that do not require supplemental irrigation.)

SUSTAINABLE DESIGN SOLUTIONS – NATURAL DAYLIGHTING

- Utilize natural light as much as possible reducing energy usage.
- Increase occupant productivity and comfort.
- Salaries significantly outweigh first costs



SUSTAINABLE DESIGN SOLUTIONS – NATURAL DAYLIGHTING

- Utilize shading to reduce sun's heat
- Pinwheel design
- maximum exterior light penetration
- reduction of solar gain



INTERIOR DESIGN

High reflective ceiling finish allows optimization of natural light.

Ceiling tiles contain 70-75% recycled content and participate in manufacturer's reclamation process.

Interior glass allows light penetration to interior rooms, and provides users with views to the outside.

Glass at exit stair encourages use of stair over elevator.

Exposed concrete flooring, uses structural concrete slab to create polished surface without the application of additional finish materials.



Main Lobby

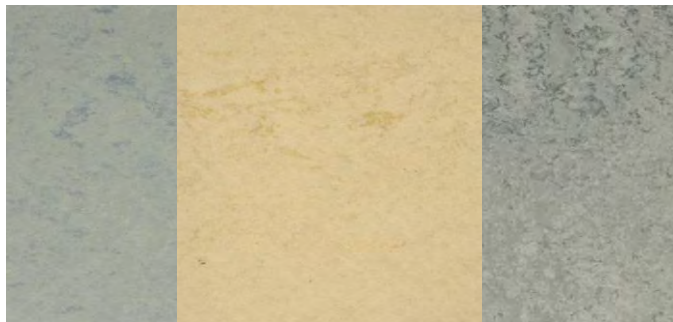
INTERIOR DESIGN

FSC Certified wood slat ceiling provides access to mechanical and electrical equipment while providing natural visual warmth to the space.

Ceiling tiles containing 30-68% recycled content and participate in manufacturer's reclamation process.

Direct/indirect fluorescent lighting is controlled by motion sensors and light meters to avoid unnecessary energy usage.

Linoleum composition floor tile made from rapidly renewable resources without plasticized PVC. Life-cycle impact less than VCT with no need to strip and wax.



Open Lab Area

2. CREATE ENERGY

VIEW FROM NORTH



Synergy California, L.P.

with over 30 years of working experience in regenerative and renewable energy systems, presents breakthrough technology suitable for installation on, and within, most existing buildings and presents a new design initiative for all future buildings, incorporating:

Energy Design-Integration

Building-Integrated wind energy systems.

Building Integrated Solar PV and Evacuated-tube hot water systems.

Building Integrated Stirling engine microturbine generators:

and other distributive energy assets and storage devices.

We call this new energy architecture:

SOLARTECTURE™

2. CREATE ENERGY

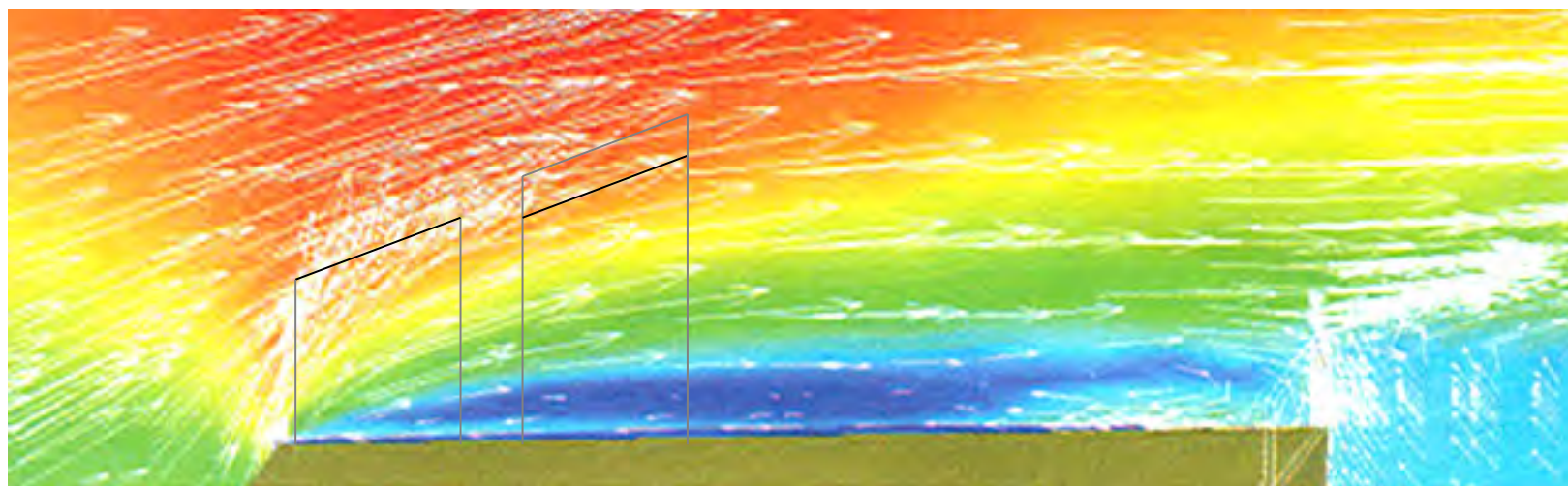
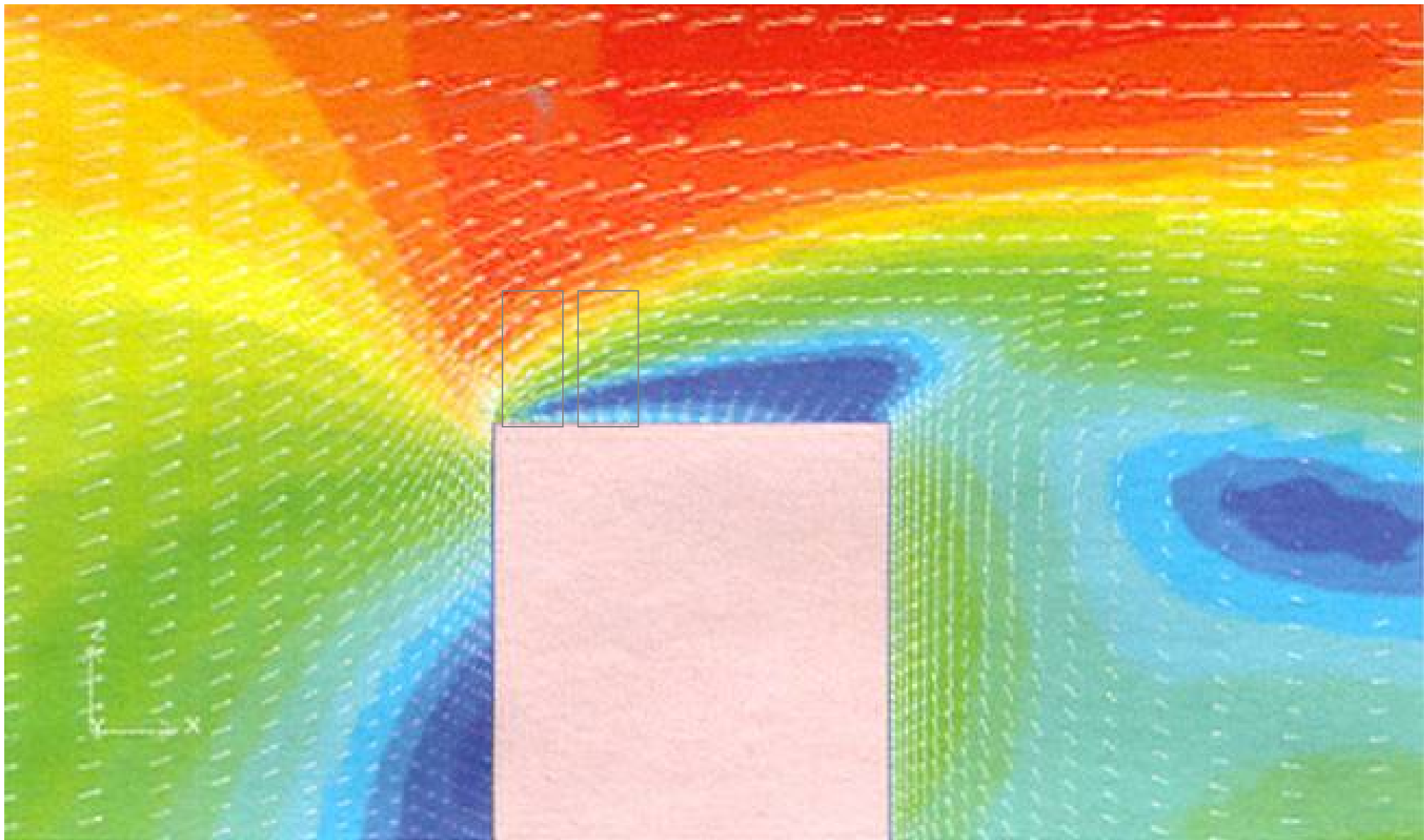


Solar and wind energy to generate up to 10% of building's power

- 24 Wind turbines
- 264 Photovoltaic Panels

solar panels on existing buildings

Airflow over a building's roof edge



2. CREATE ENERGY

Tax Incentives

Depreciate in 5 Years

Payback within 5 Years

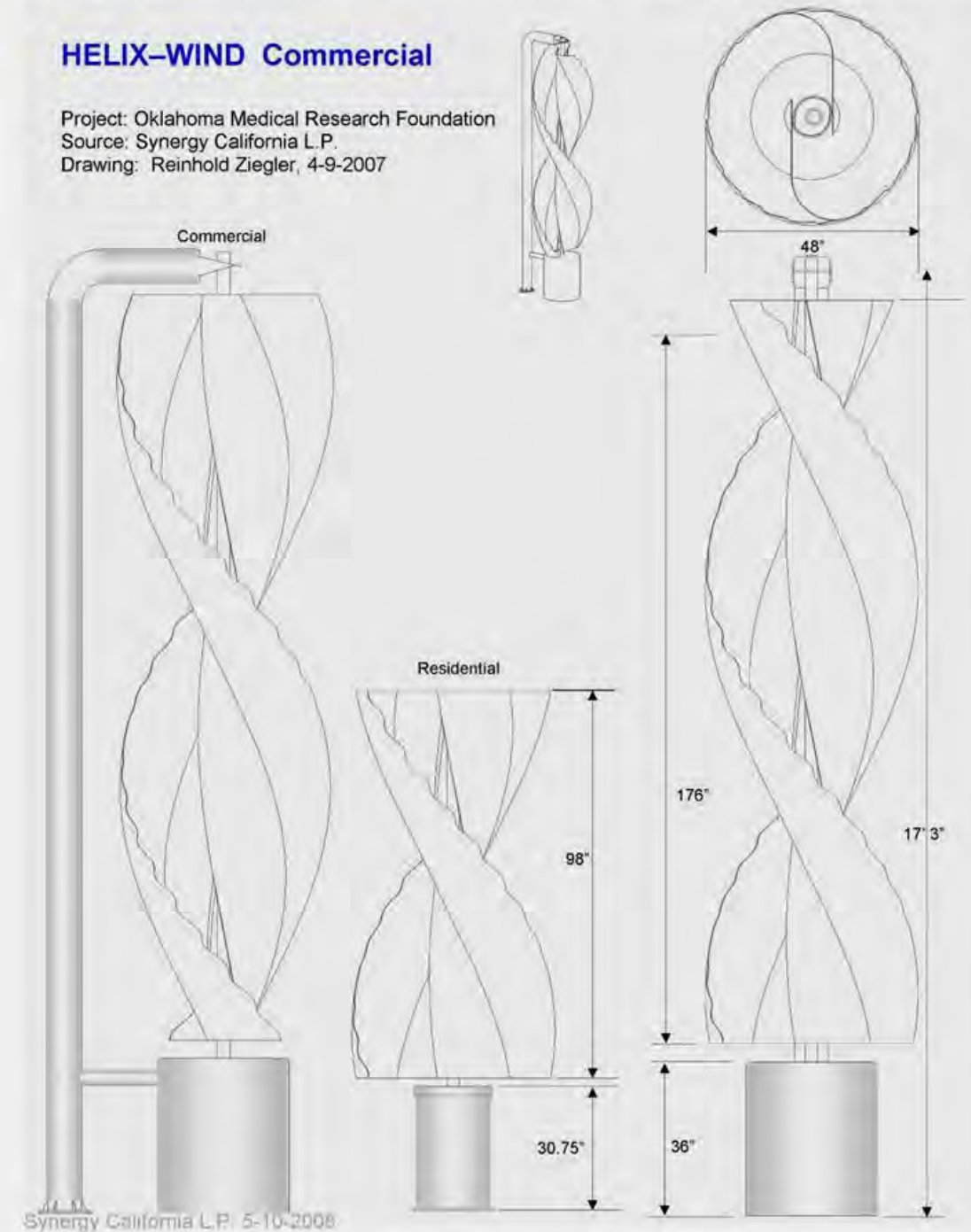
Generate 10% of Electrical Load

4.1 The Helix Wind Commercial turbine.

The turbines will be the Commercial units mounted on a base alternator that is 36" high with and overall height of 20'. An upper bearing will be mounted to the bottom of the building's concrete shrouds. Each machine has a maximum output of 5.0 KW.

HELIX-WIND Commercial

Project: Oklahoma Medical Research Foundation
Source: Synergy California L.P.
Drawing: Reinhold Ziegler, 4-9-2007



HELIX-WIND Inc.



Specifications of Model C5:

- Rated Power 5 KW
- Rated Wind Speed 21 m/sec
- Cut-in Speed 4 m/sec
- Cut-out Speed None
- No Transmission - Silent Operation
- Maintenance Free
- 5 year Renewable Warranty
- Can take advantage of the wind augmentation of buildings and increased wind velocities at higher building elevation.

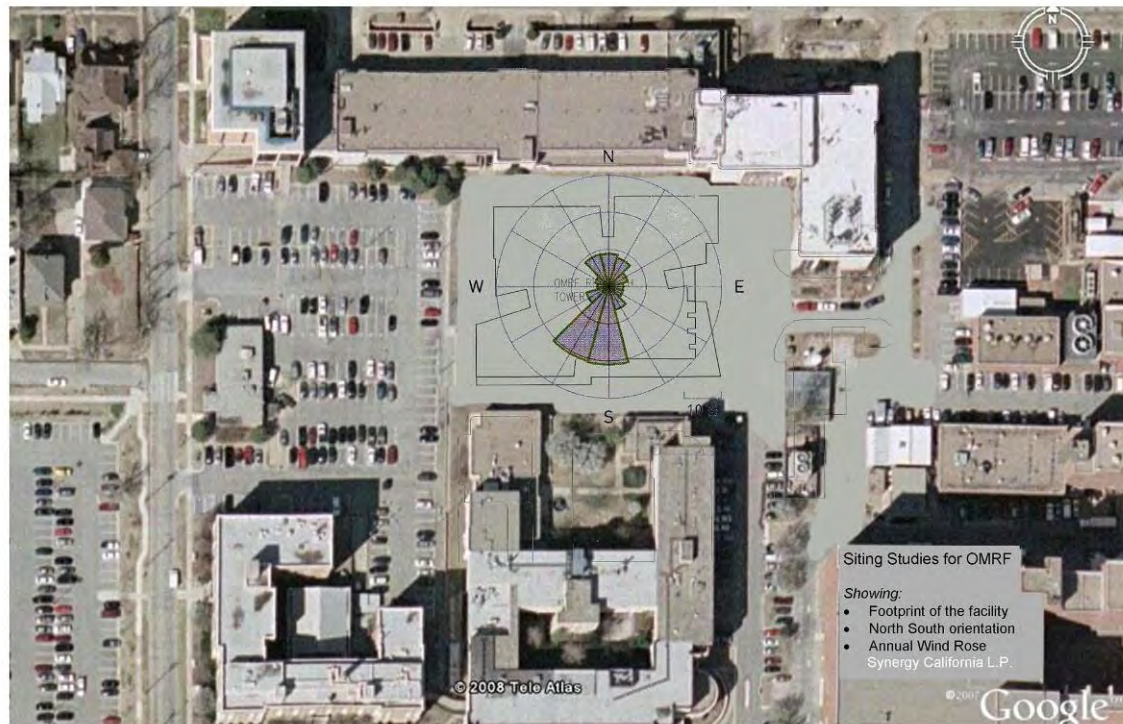
VIEW FROM CAPITOL (LEADING TO INCREASED DONATIONS)



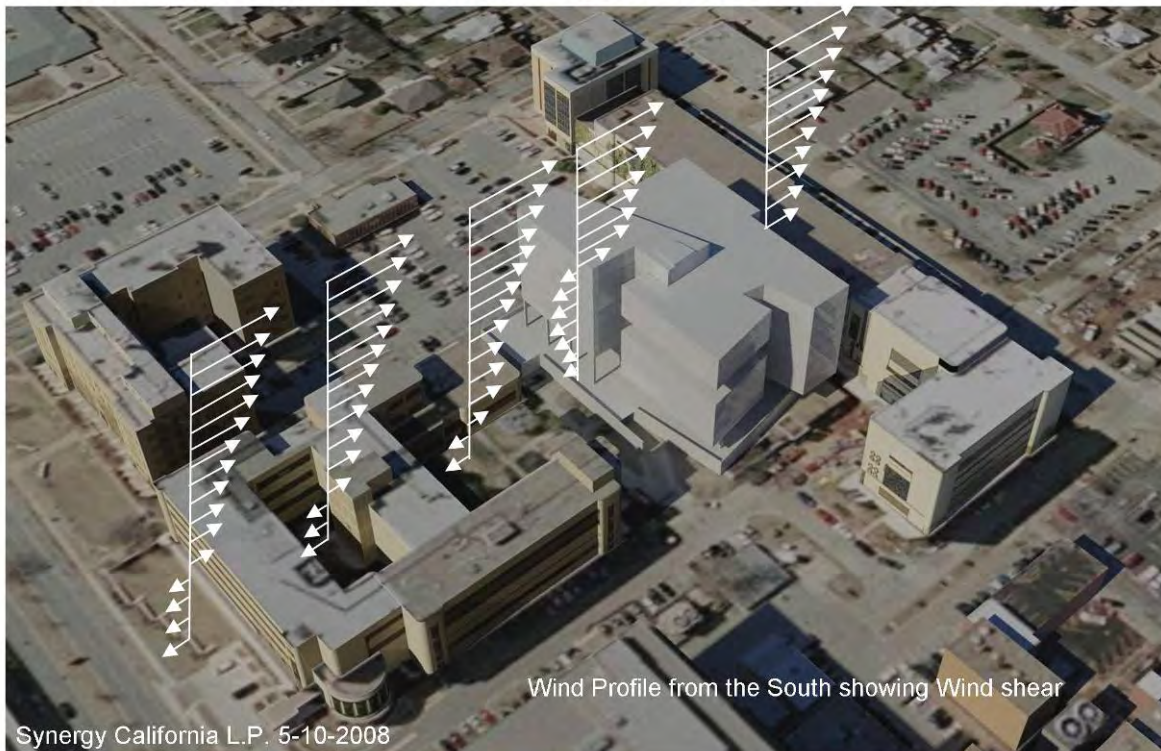
BUILDING ALIGNMENT

2. Building Alignment and Orientation:

The first step is to superimpose the wind rose summary over the future building.



Next comes the massing and flow study to determine the wind shear profile.



2. CREATE ENERGY

The Helix Wind Turbines:

The logo of the OMRF is the DNA double helix. We thought that it would be fitting to find wind turbines that look like a double helix. The machines are manufactured by HELIX-WIND in San Diego.

Helix-Wind Model R – 10' high. The special units built for OMRF will be 20' high.



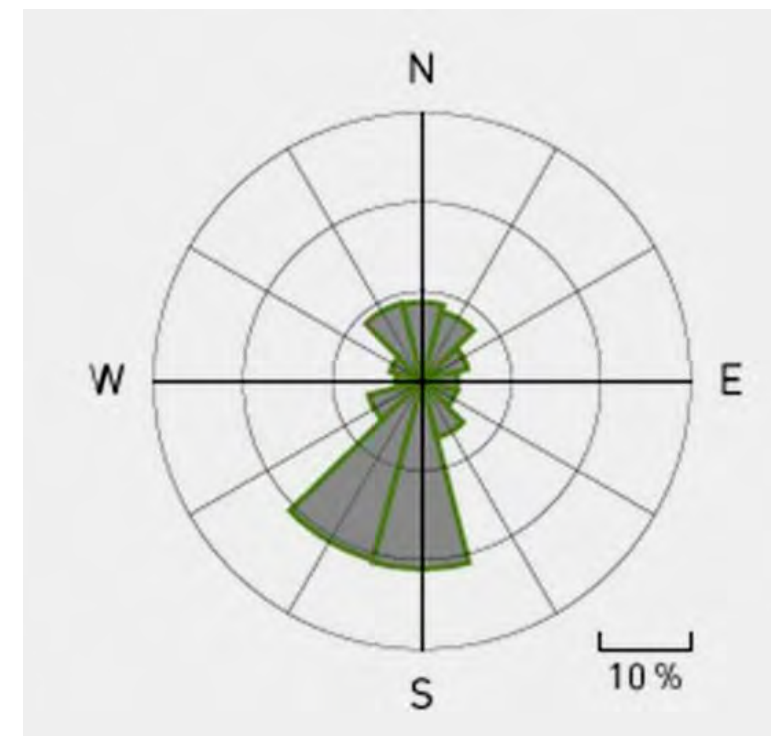
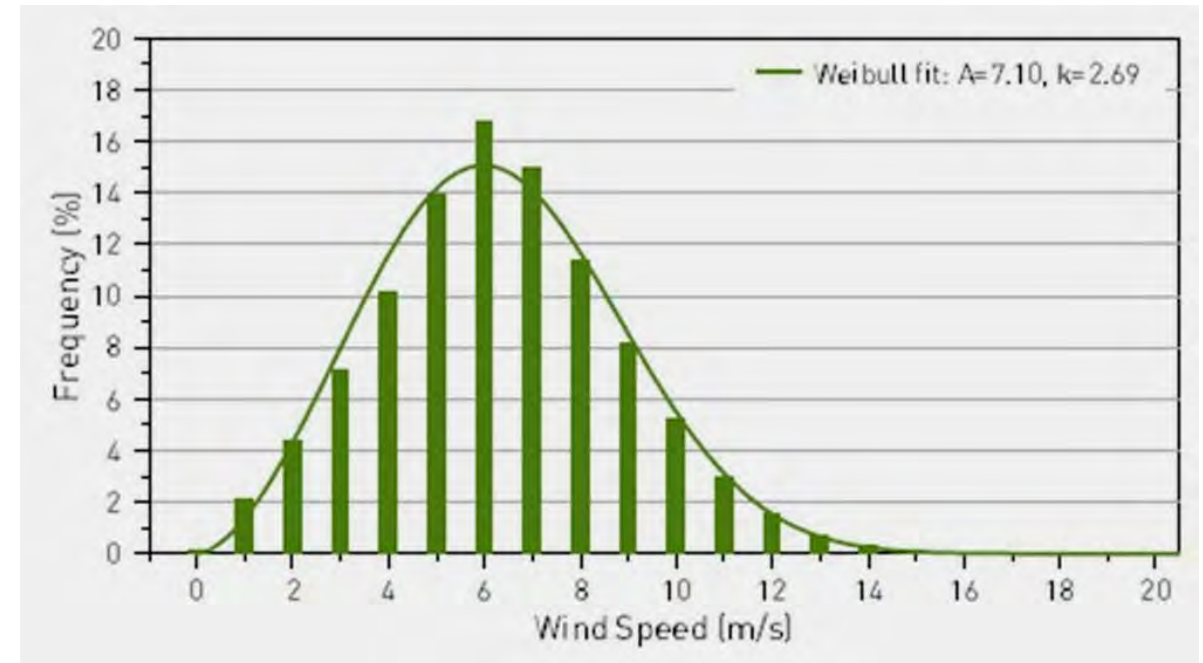
2. CREATE ENERGY

Hourly Wind Speed Distribution:

- Distribution of hourly wind speeds throughout the year.
- A narrow distribution of wind speeds means that the wind is very consistent at your location.

Wind Rose:

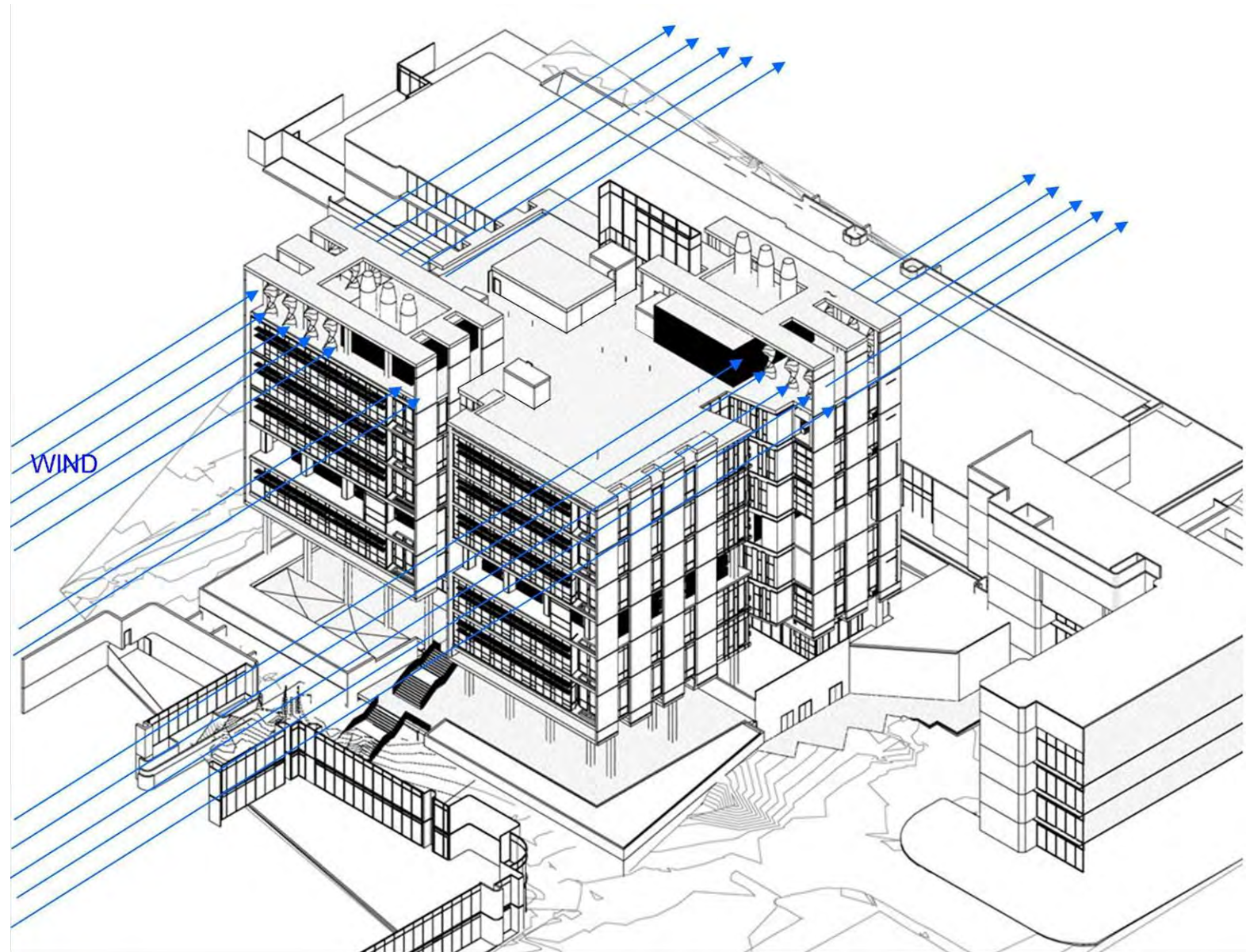
- Winds are predominantly from the North and South depending on the seasons of the year. Augmentation is positioned at this prevailing directions.



2. CREATE ENERGY

The OMRF Building Roof as Energy Collector:

- The shrouds that rise 20 ft. above the main roof act as wind guides directing the mass flow of air to the proposed 24 wind-turbines.
- On the top of the shrouds are proposed 300 watt photovoltaic panels. These PV panels while heavy with double glass, are designed to survive the occasional massive hail storms which Oklahoma is known for.
- Should we need more space for photovoltaic panels we have access to the roof of the other buildings that surround the main facility.



2. CREATE ENERGY

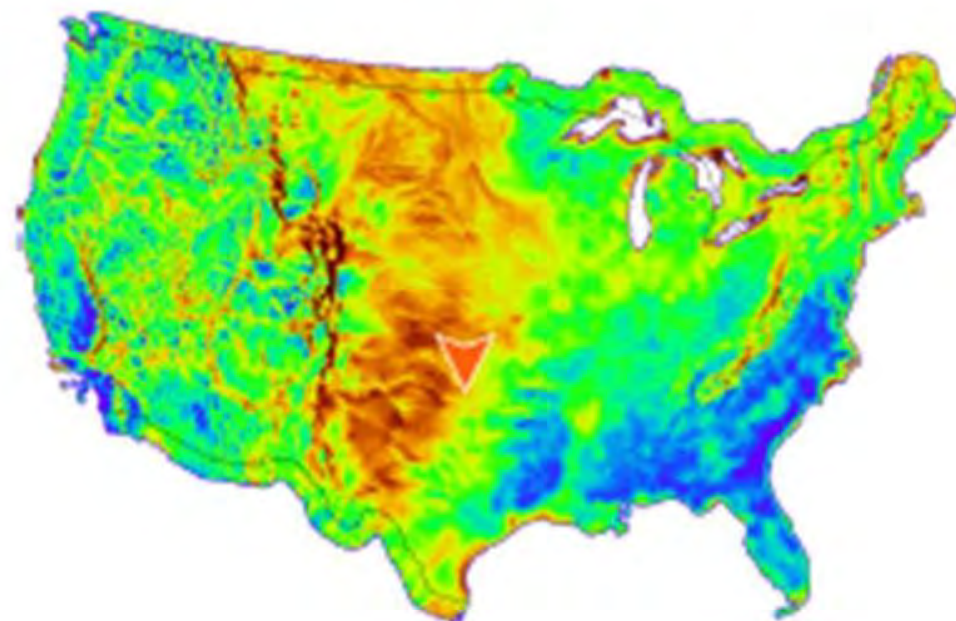


Latitude:
Longitude:
Hub Height:

The wind speed
at your location is

6.3 m/s
(14.1 mph)

35.482 N
97.498 W
50 m



Wind Resource Assessment:

- In the interest of time, a wind database compiling over 30 years of wind velocity and direction data was purchased from a meteorological data house in Seattle. The average wind speed for the site at an elevation of 50 meters (the height of the OMRF building) has been predicted to be 6.3 meter per second or 14.1 miles per hour. This is considered a fair to good wind speed, making it economically feasible to harness the energy of wind.

2. CREATE ENERGY

The Photovoltaic System:

We know that the solar radiation that falls on Oklahoma City is equal to 5 Kwhrs/m²/day. We also know that the solar potential is equal to 5.5 full sun hours per day. This is used to model the output of our photovoltaic panels and power strings.

SOLAR

PHOTOVOLTAIC

ASE-300-DGF/50

The World's Single Most Powerful Photovoltaic Module

Utilized in a wide range of applications, the ASE-300-DGF/50 is an industrial-grade solar power module built to the highest standards. Extremely powerful and reliable, the module delivers maximum performance in large systems that require higher voltages, including the most challenging conditions of military, utility and commercial installations. For superior performance, quality and peace of mind, the ASE-300-DGF/50 is renowned as the first choice among those who recognize that not all solar modules are created equal.

Faster Installation

- Large surface area requires fewer interconnects and structural members
- All module-to-module wiring is built right into the module
- Multi-Contact Plug-n-Play connectors mean source-circuit wiring takes just minutes
- Unique mounting systems available for commercial roofs eliminate need for traditional mounting rails, heavy ballast, and roof penetrations

More Reliability

- Bypass diode protection for every 18 solar cells in series, thus minimizing power loss, and mitigating overheating/safety problems
- Advanced encapsulation system ensures steady long-term module performance by eliminating degradation associated with traditional EVA-encapsulated modules
- Moisture impermeable glass on *both* sides of the module protects against tears, perforations, fire, electrical conductivity, delamination and moisture
- Patented no-lead, high-reliability soldering system guarantees long life and ensures against environmental harm should the module break or be discarded

Higher Quality

- Each of the module's 216 individual semi-crystalline silicon cells is inspected and power matched to ensure consistent performance between modules
- Every module is tested utilizing a calibrated solar simulator to ensure that the electrical ratings are within the specified tolerance for power, voltage, and current
- Module-to-module wiring loss is factored into the module's labeled electrical ratings by testing through the module's cable/connector assemblies

Independently Certified

- The ASE-300-DGF/50 is independently certified to meet IEEE 1262, IEC 61215, and UL 1703 Standards
- It is also the *only* module in the industry to receive a UL (Underwriters Laboratories) Class A fire rating



ASE-300-DGF/50 diode housing with bypass diodes; UV resistant cables with MC²-connectors.



Full square semi-crystalline EFG cells ensure maximum energy yield.

Designation:
DG = Double Glass
F = Frame
/50 = Nominal Voltage at STC

SCHOTT
solar

Improving The Science of Science

- **Team Evaluates Space to Improve Research Process**
- **Minimize Storage Space in Labs**
- **Just in Time Services**
- **Process and Equipment Oriented**
- **More work will be completed in same space- more efficient**