



# Sustainable Design Strategies in Healthcare: Linking Research to Designs

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Kaiser Permanente

# Agenda

- Session Objectives
- The Center for Health Design
- US Green Building Council (USGBC) Grant
- RIPPLE Database
- Kaiser Permanente Strategies
- Reporting Metrics
- Discussion and Questions



# The Center for Health Design

## Mission

To transform health care settings into healing environments that improve outcomes through the creative use of evidence-based design.

## Evidence-Based Design

The process of basing decisions about the built environment on credible research to achieve the best possible outcomes



# EDAC (Evidence-Based Design Accreditation and Certification)

- EDAC was created to
  - Be an educational tool to establish new standards and expectations for individuals who are or will be using an evidence-based design process (EBD).
  - Institutionalize EBD as an accepted and credible approach to improve health care outcomes.

Mission: To develop a community of accredited industry professionals through education and assessment of an evidence-based design process.



# Session Objectives

- Review and understand the framework for the USGBC grant
- Understand the connection between design strategies, desired outcomes, and metrics
- Learn how to access the RIPPLE database
- Discussion regarding data collection



# USGBC Program Goals

Develop a robust framework for understanding the relationship between environmental design strategies that potentially promotes safety in health care.

Identify and define standard metrics to understand the relationship between environmental design strategies and outcomes.

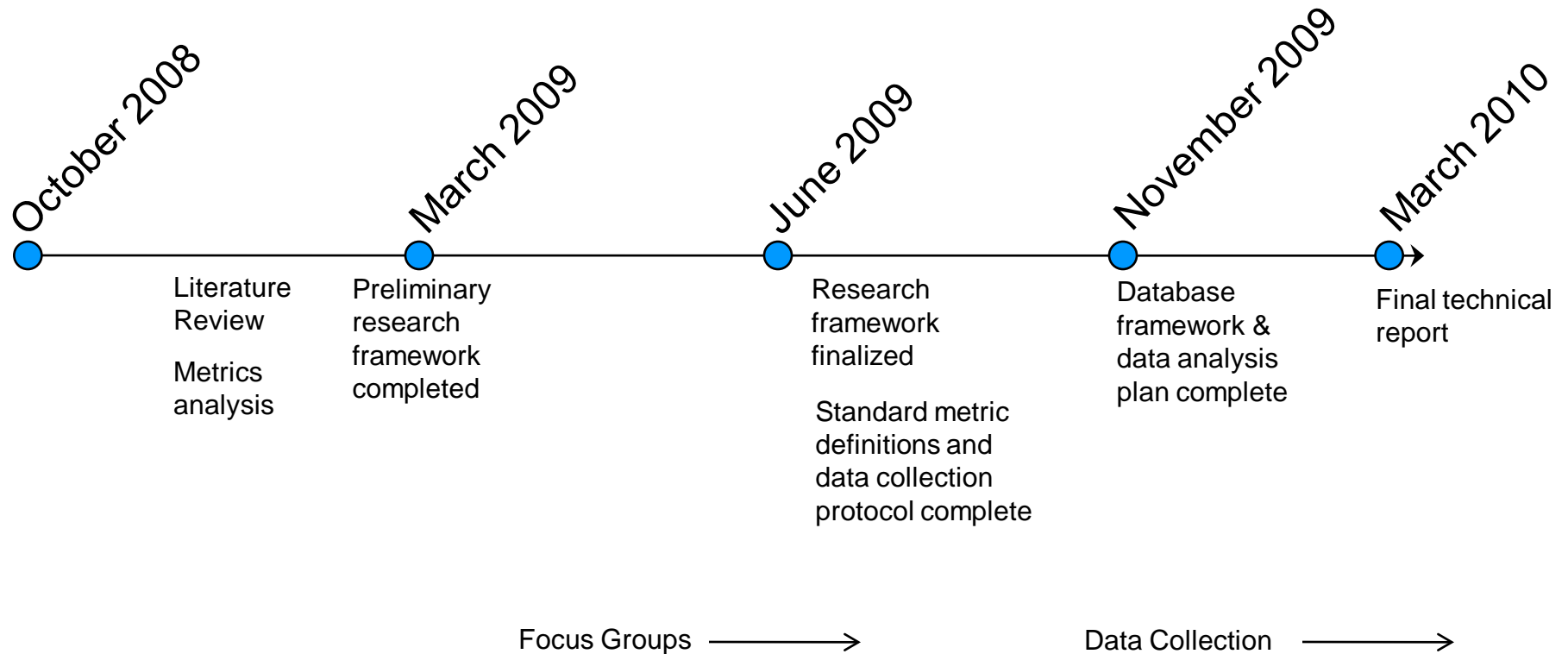
Develop standard protocols for collecting data on environmental design strategies and outcomes.

Promote evaluation and comparison of outcomes between different healthcare organizations.

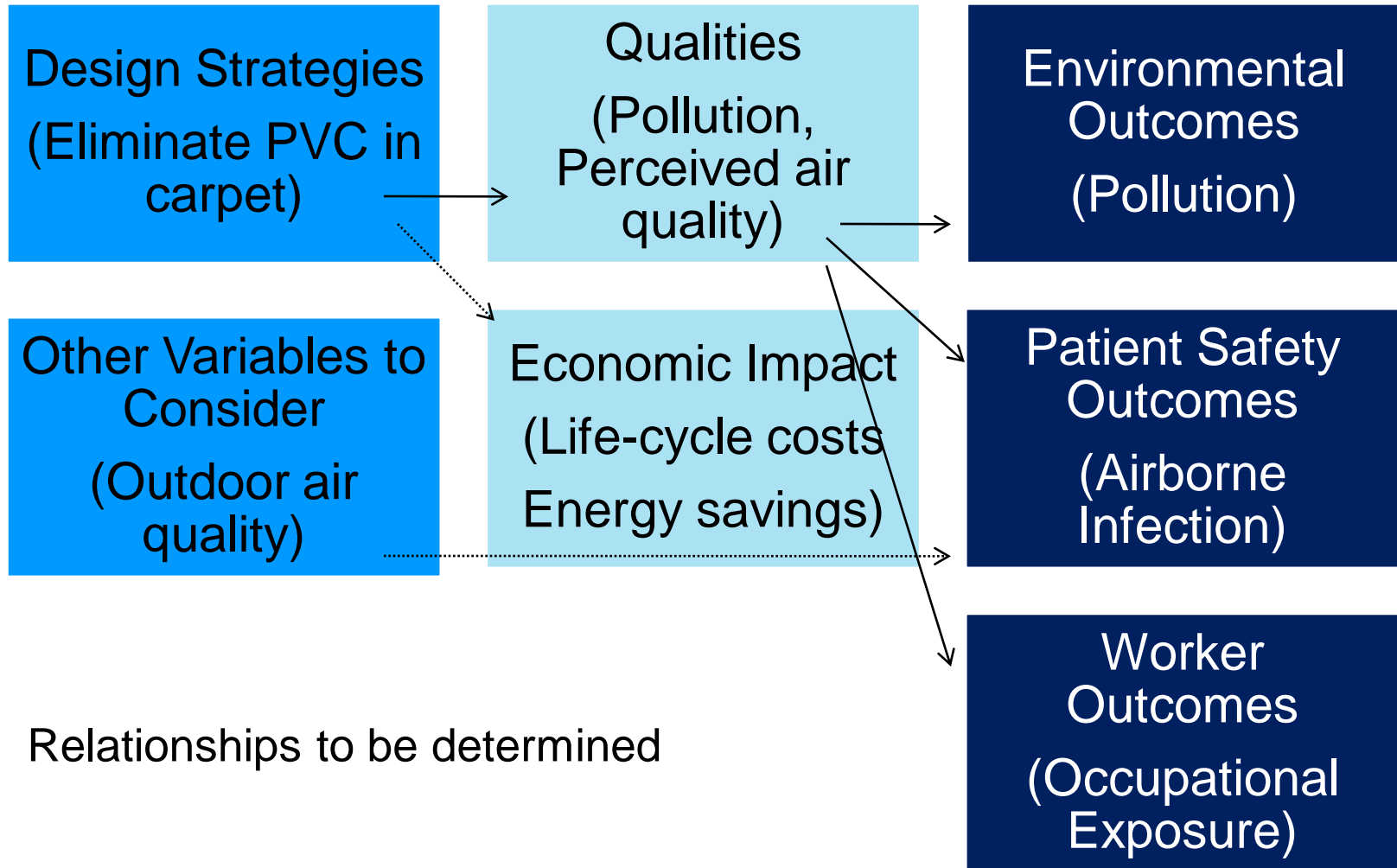
Grant Timeline: October 2009 – March 2010



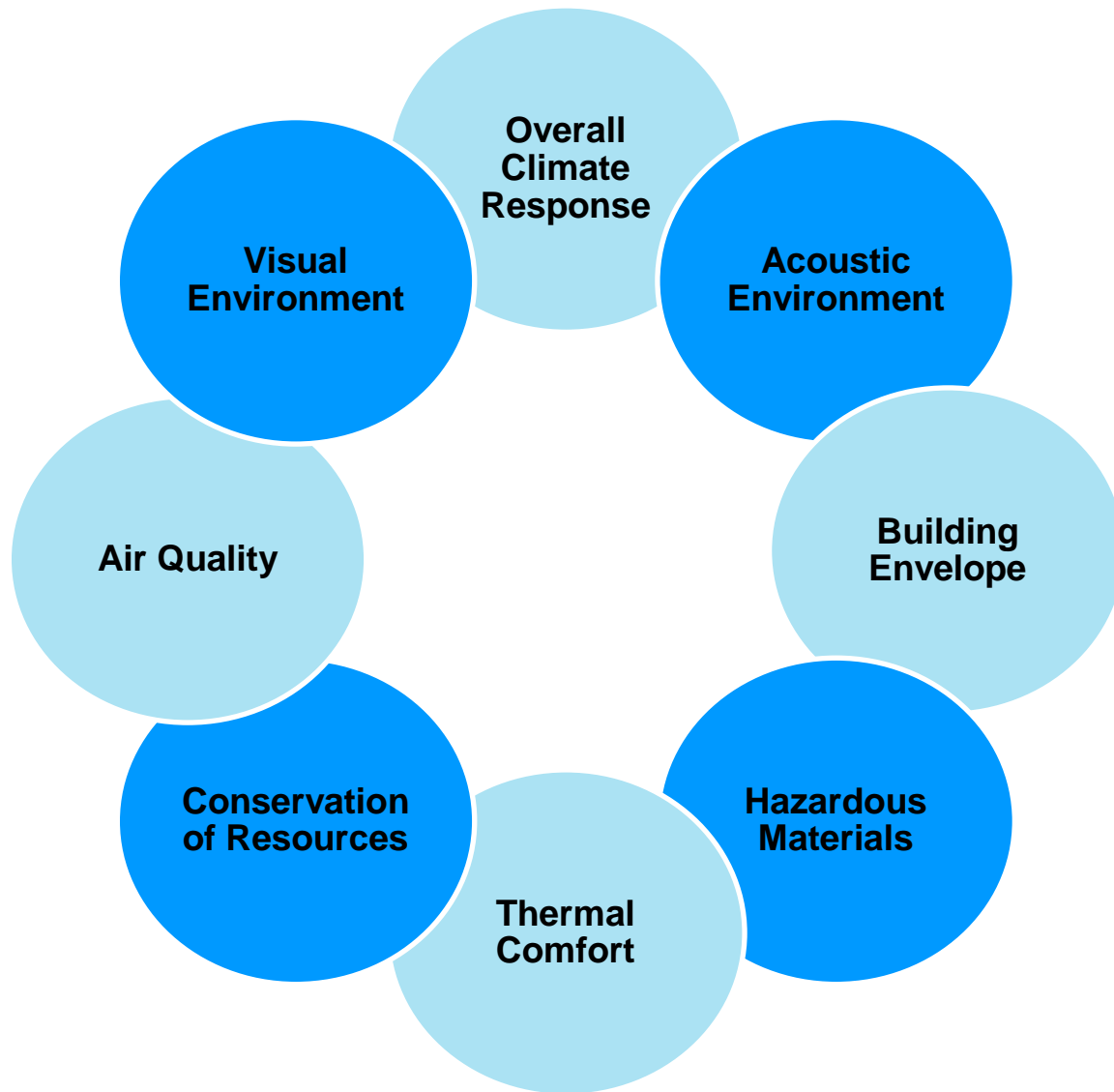
# USGBC Program Timeline



# Framework



# Framework Categories for USGBC Project



# Metrics and Data Collection

- Metrics: Measurements used to collect outcome data.

<b>Design Strategy</b>	Reduce noise through building modifications
<b>Metrics</b>	<ul style="list-style-type: none"><li>•Number of sound peaks</li><li>•Sound level (dB)</li><li>•Frequency range (Hz)</li></ul>
<b>Desired Outcome</b>	Improve patient satisfaction
<b>Metric</b>	Perceived ability to sleep

- Data Collection: Develop standard protocols for collecting data on environmental design strategies and outcomes.



# RIPPLE Database

Welcome!  
REGISTER | Sign In

## WELCOME TO RIPPLE BETA

THE CENTER FOR HEALTH DESIGN

Welcome to the new beta version of RIPPLE, which is now available for public testing. RIPPLE is an open source, searchable database containing useable and relevant information to help you to learn more about evidence based design. As the database grows, you will be able to compare design decisions made by multiple health systems and see the results of those decisions. In addition, you can interact with our

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### WHAT'S NEW

- Building Green**  
Massachusetts Requires Health Care Facilities to Build Green
- EDAC**  
Evidence-Based Design Accreditation and Certification
- GIVE US YOUR FEEDBACK**  
Share your ideas and opinions about Ripple.
- Visual Reference for Evidence-Based Design**  
New Book on Evidence-Based Design Now Available
- Download New Material Fact Sheets from the GHSI website**  
Formaldehyde, Insulation, Toxicants (Created by Healthy Building Network <http://www.healthybuilding.net/>)
- Practice Greenhealth**  
Learn about sustainability in Health Care
- Global Health and Safety Initiative** (<http://globalhealthandsafety.org>)

### POPULAR SEARCHES

- Scales EDAC (evidence based design accreditation and certification) Hazardous waste Left hand waiting
- Culture** Project manager ACHA (American college of healthcare architects) measurement cool roof

[more searches](#)

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WORKER SAFETY	OPERATIONAL STRATEGIES	RESEARCH	
<b>ENVIRONMENTAL SAFETY</b>	CULTURAL STRATEGIES	LESSONS LEARNED	
COST EFFECTIVENESS	TECHNOLOGY STRATEGIES	CASE STUDIES	
STAFF EFFECTIVENESS	INDUSTRY STANDARDS	ARTICLES / WHITEPAPERS	
QUALITY OF CARE			

SEARCH:  **GO**

[Learn](#) > [Environmental Safety](#) > [Design Strategies](#) > [Research](#)


## RESEARCH

- » Cleaner Water Discharge
- » Conservation, Recycling
- » Improve Air Quality
- » Infection Control
- » Reduce CO2 emissions
- » Reduce energy use
- » Reduce Water Use
- » Reduce Workplace Injuries

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SEARCH:  **GO**

Learn > Environmental Safety > Design Strategies

## DESIGN STRATEGIES

Energy-efficient designs can significantly mitigate the risks to hospitals from energy costs. Activities to increase energy efficiency - such as the addition of natural lighting and updating heating and cooling systems - contribute to not only more attractive and comfortable environments, they may promote faster healing and increase retention of staff. Energy smart hospitals can reduce cost and reduce the impact on the environment.

Click on one of the topics below to see Kaiser Permanente's Environmental Safety related design strategies.

- » Cleaner Water Discharge
- » Conservation, Recycling
- » Improve Air Quality
- » Infection Control
- » Reduce CO2 emissions
- » **Reduce energy use**

**Specify punched windows throughout. Storefront windows may be used at public areas, such as building corridors, lobbies, etc.**  
*Reduces heat gain in hot seasons and heat loss in cold seasons. Helps reduce the required size of HVAC units and therefore decreases energy usage...*

**Position buildings on east-west axis when possible.**


**Specify a roof with high reflectivity and low emissivity (Cool Roof).**  
*Reflective roofs reduce energy usage and \"heat island\" effect.*

**Utilize low temperature electronic ballast for light fixtures.**  
*As they run off a circuit board and are more efficient, these light fixtures uses less energy and emit fewer greenhouse gases*

**Specify occupancy sensors for light fixtures where practical.**  
*Shuts off lights when space is unoccupied thereby reducing energy use. Assists in reducing the carbon footprint of the facility.*

**Eliminate the use of can down lights above workstations.**  
*Reduces glare creating more appropriate lighting for various tasks, especially computer usage. Reduces risk of eye strain.*


**Specify low-e glass.**  
*Reduces glare, energy use, and heat gain.*



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SEARCH:  **GO**

Learn > Environmental Safety > Design Strategies > Research

## RESEARCH

### **Guenther and Vittori (2007). Sustainable healthcare architecture, John Wiley & Sons, Inc.**

**Details:** Multiple case studies suggest situating buildings on an east-west axis while specifying glazing, other geometry features to shade glazing, and vegetative plantings to shade the east and west facades. No articles were found that directly relate east-west.

**Authors:** Guenther and Vittori (2007). Sustainable healthcare architecture, John Wiley & Sons, Inc.

**Research Abstract:**  
None listed in EndNotes

**This Research is in Indirect Support of the following strategy(s):**

- Specify punched windows throughout. Storefront windows may be used at public areas, such as building corridors, lobbies, etc.
- Position buildings on east-west axis when possible.
- Specify the use of high recycled content in building materials and other products.
- Reduce or eliminate turf in landscaping.
- Employ construction waste management program.
- Specify native/drought resistant plants.
- Specify low water usage irrigation systems, such as drip systems, in landscaping.
- Eliminate turf that requires artificial irrigation.

**Topics Related To This Research Include:**

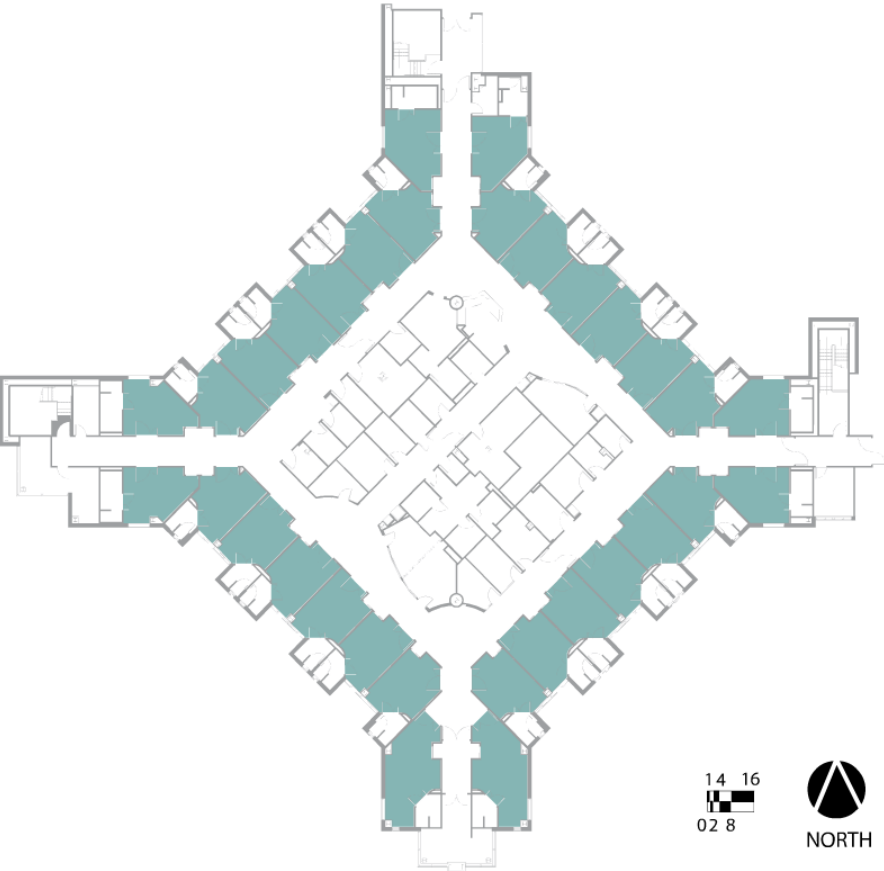
- » Reduce energy use
- » Reduce energy use
- » Conservation, Recycling
- » Reduce Water Use
- » Conservation, Recycling
- » Reduce Water Use
- » Reduce Water Use
- » Reduce Water Use
- » Reduce Water Use
- » Cleanse Water Discharge



# RIPPLE Database

http://www.ripple.healthdesign.org/floorplan?id=13 - Microsoft Internet Explorer

close window



	Number of the Rooms	Area of the Rooms SFT	Ratio: Area/Total
Staff Lounge	2	432.23	0.022
Patient Room	32	8,361.14	0.409
Patient Bathroom	32	1,924.42	0.098
Circulation	NA	4,842.15	0.237
Nurse Station	18+1	463.93	0.024
House Keeping O.	1	35	0.0018
Nourishment	2	139.94	0.007
Drug Rooms	2	135.46	0.007
Utility Rooms	4	398.78	0.020
Meeting Room	1	311.36	0.016
Common Family Area	2	551.70	0.028
Service Areas	6	952	0.048
Family M. Restroom	1	64	0.003
Staff RestR.+Lock.+Shower	2	469.66	0.024
Storages	4	563.56	0.029
Staff Office	2	214	0.011
Testing	2	381	0.019
Clinical Center	1	199	0.010
<b>TOTAL</b>		<b>20,436.77</b>	


14 16  
02 8

NORTH

start

Microsoft PowerPoint ... RIPPLE - Microsoft In... http://www.ripple.he...

3:30 PM Friday 5/1/2009





Kaiser Permanente Antioch Medical Center

# Kaiser Permanente Strategies

# Eliminating Hazardous Materials



Kaiser Permanente Antioch  
Medical Center

- **Eliminating BFRs (brominated flame retardants) from textiles**
  - Eliminate or significantly reduce use of persistent bio accumulative toxic compounds (PBTs) with known links to the production of dioxins in the life cycle of the product
- **Eliminate Polyvinyl Chloride (PVC) in resilient flooring - substitute with rubber flooring**
  - Rubber flooring provides good ergonomics (standing comfort; reduces fatigue); reduces trips and falls; reduces toxic materials; and improves noise reduction

- **Eliminate PVC in carpet**

Carpeting backed with chlorine-free polyvinyl butyral (PVB) recovered from recycled safety glass laminate

- **Specify PVC-free alternative for furniture and PVC-free upholstery for exam tables and stools**

Reduces risk of toxic chemical release in the event of a fire. Reduces risk of exposure to bioaccumulative toxins and VOCs



# Eliminating Hazardous Materials

- **Specify low VOC (volatile organic compounds) paint**
  - Reduces indoor air pollution and toxins in the environment and risk of potential exposure to paint toxicants
- **Eliminate PVC in wall/corner protection and piping**
  - Reduces volatile organic compounds within facilities; removes asthma triggers associated with PVC and bioaccumulative toxins
- **Eliminate PVC in roofing material - for membrane roofing, specify PVC-free material**
  - Reduces volatile organic compounds (VOCs) and removes asthma triggers associated with PVC



# Air Quality



Kaiser Permanente Modesto Medical Center

- **Use Chlorofluorocarbon (CFC)-free refrigerant compatible with Green Seal GS-31 Standard, the most current Air Conditioning and Refrigeration Institute (ARI) and American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) standards**
  - Reduces ozone depleting emissions; eliminates workplace exposure to toxic chemicals; reduces the unnecessary manufacture of toxic chemicals.
  - Helps mitigate the problem of proper and safe disposal of toxic chemicals at the end of useful life
- **May use Ground Granulated Blast Furnace Slag (GGBFS) as (optional) substitute for cement. Must be by-product of acceptable recycled and sustainable fueled processes**

GGBFS is a common admixture in Portland cement. Use of GGBFS decreases landfill disposal and CO2 emissions. Use of slag reduces the embodied energy required to manufacture concrete.



# Conservation of Resources



Kaiser Permanente Modesto Medical Center

- **Reduce or eliminate turf in landscaping**
  - Reduces water usage; reduces or eliminates landscaping chemicals; reduces the need for maintenance and equipment
- **Specify low water usage irrigation systems, such as drip systems, in landscaping**
  - Reduces water consumption
- **Specify native/drought resistant plants**
  - Reduces water usage; reduces or eliminates landscaping chemicals; reduces the need for maintenance and maintenance equipment.



# Conservation of Resources



Kaiser Permanente Modesto Medical Center

- **Permeable Paving**

- The medical center parking lot is the largest permeable paving system in the western United States
- pavement lets rainwater soak into the ground, recharging groundwater rather than being diverted into storm drains





Kaiser Permanente Antioch Medical Center

# Kaiser Permanente Metrics

# Facility Metrics



Kaiser Permanente Modesto Medical Center

- Greenhouse gas: CO<sub>2</sub> emissions per square foot (in metric tons of CO<sub>2</sub>, publicly reported via The Climate Registry)
- Electricity use: In kilowatt hours, reported internally
- Natural gas use: In therms reported internally
- Water use: Gallons of water per bed (107,143 gallons/bed at KP hospitals;) the national average is 182,699 gallons/bed
- Waste volumes: clinical versus domestic waste



# Variables to Consider



- Facility square feet
- Number of beds
- Utilization rates
- Acuity rates
- Local weather

Kaiser Permanente Sand Canyon



# Metrics to be Calculated



Kaiser Permanente Modesto Medical Center

- Pounds of waste per bed
- Greenhouse gas emissions per bed
- Eco-Health Footprint (expressed in metric tons of greenhouse gas emissions and lbs of toxics)
- Supply-chain information such as trips generated and product purchased).
- EnergyStar performance ratings



# Next Steps

- Finalize Frameworks
- Complete List of Metrics
- Complete Data Collection Protocol
- Collect Data at Multiple Sites
- Make Changes to RIPPLE
- Enter final data into RIPPLE



# DISCUSSION

- Is there anything we are missing?
- Ideas/suggestions about collecting data around outcomes?
- What are some common metrics that will be valuable to you?
- Would you like to be a focus group participant?

