



Orness Plaza: Integrating Health & Sustainability

Charrette to Grand Opening and Beyond– Integrated Design for Health and Environmental Improvement in Green Buildings—The Orness Plaza Study



OUTLINE

Orness Plaza Project Overview

Building the Integrated Team/Charrette Process

- Identifying key issues –envelope and mechanical systems
- Working groups for key areas
- Qualitative and quantitative factors in decision making

Design and Construction

- Enclosure of the balconies (simplifying the building envelope)
- Exterior envelope details (increasing insulation)
- Geothermal system (heating & cooling)
- Building ventilation (indoor air quality)
- Plumbing fixtures (water conservation)

Testing Outcomes

- Ventilation and exhaust systems
- Energy and water use and cost (pre and post)
- TVOC and Formaldehyde testing
- Temperature and Rh monitoring outcomes
- CO2 monitoring

Health Study Outcomes



Orness Plaza - Before



ORNESS PLAZA OPTIONS

Do nothing?



Pre - Charrette Decisions



Topics for the During Charrette

Type of Heating and Cooling



More Topics



Goals for the Project

Energy Conservation

Modeling/Commissioning/Testing

Water Conservation

LEED, or Leadership in Energy &
Environmental Design with the U.S.
Green Building Council

Minnesota Green Communities

Health Impacts

Buying American





CHARRETTE OVERVIEW

Kick-off of the design stage for Orness

Gain understanding between building
and health

Set Project Goals

Work the Checklist.

- review criteria

- set performance goals

Introduce and outline critical issues.

- envelope

- mechanical systems

 - heating/cooling

 - solar hot water

Design Options



brainstorming

What are the critical issues in the design of the envelope?

...the heating and cooling.

...the ventilation system.

...how are the systems integrated.



Envelop options

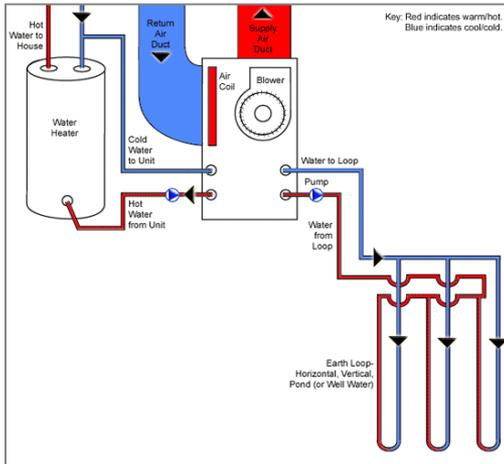
remove replace existing concrete

1. insulated panel;
2. un-insulated panel with insulation on the interior



retrofit existing exterior without removal of concrete panels

1. EFIS over existing
2. metal pan finish over existing



Mechanical systems options

heating/cooling

1. geothermal full system

2. conventional system

3. hybrid - piggyback geothermal on to existing system

ventilation

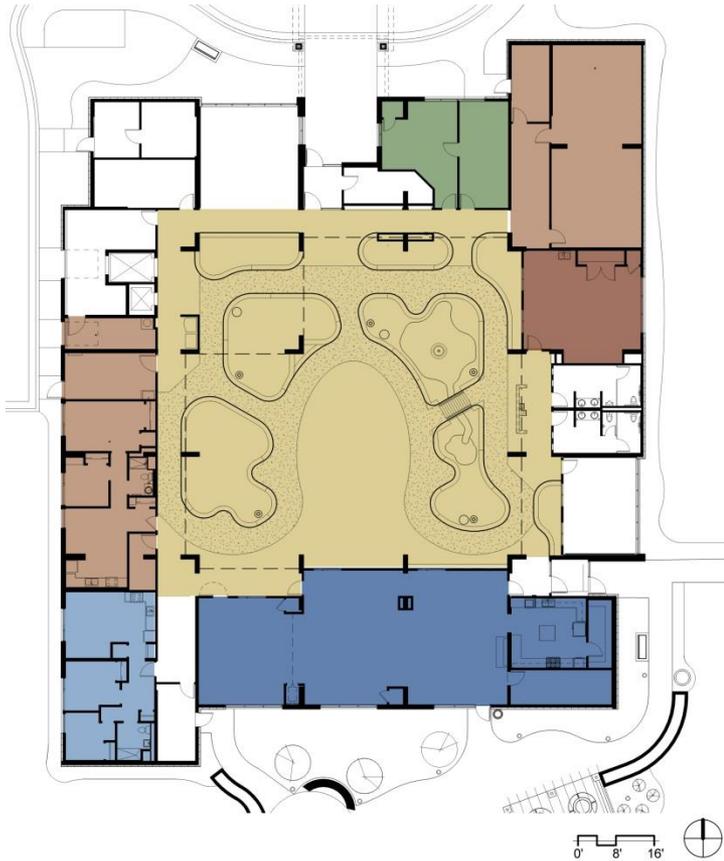
1. exhaust only

2. supply/exhaust



Orness Plaza

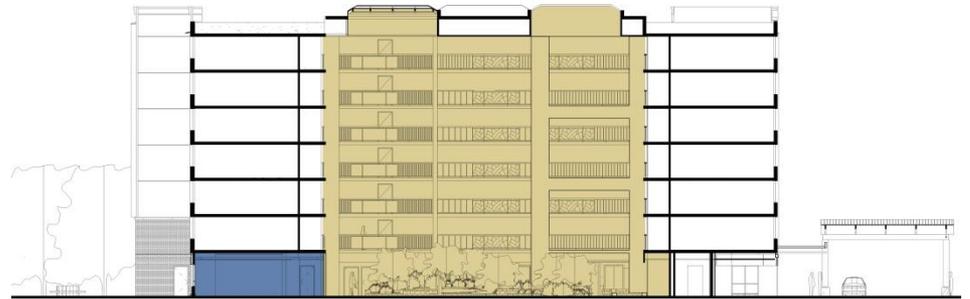
Design & Construction



First Floor Plan

First Floor

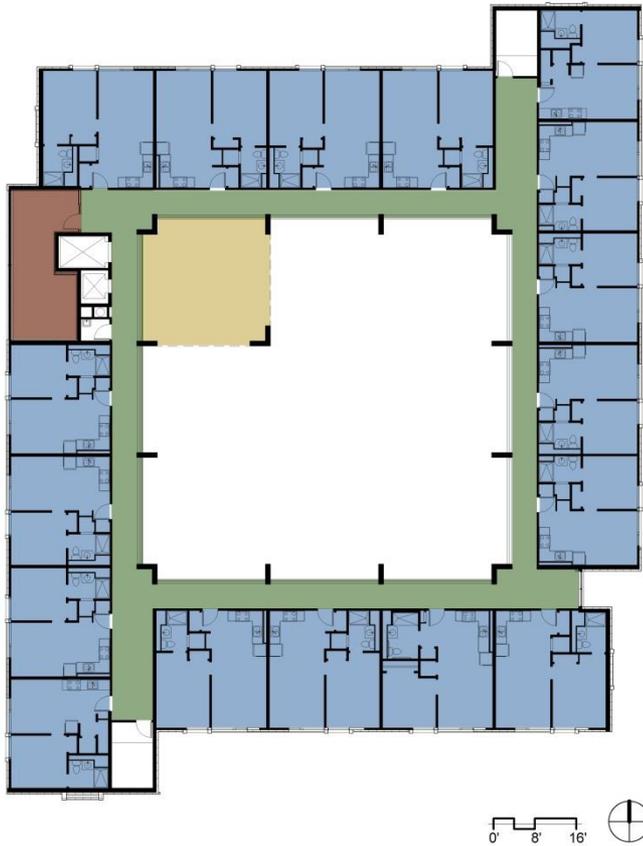
-  Atrium
-  Community Room
-  Game Room
-  Office
-  Mechanical/Maintenance
-  Unit



Building Section

Orness Plaza

Design & Construction



Upper Level Plans

Upper Levels

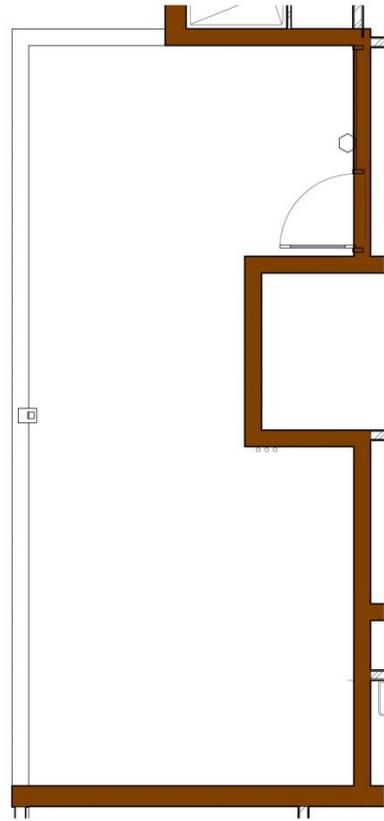
-  Atrium
-  Community Room
-  Units
-  Corridors
-  Exterior Balconies
-  Interior Balconies



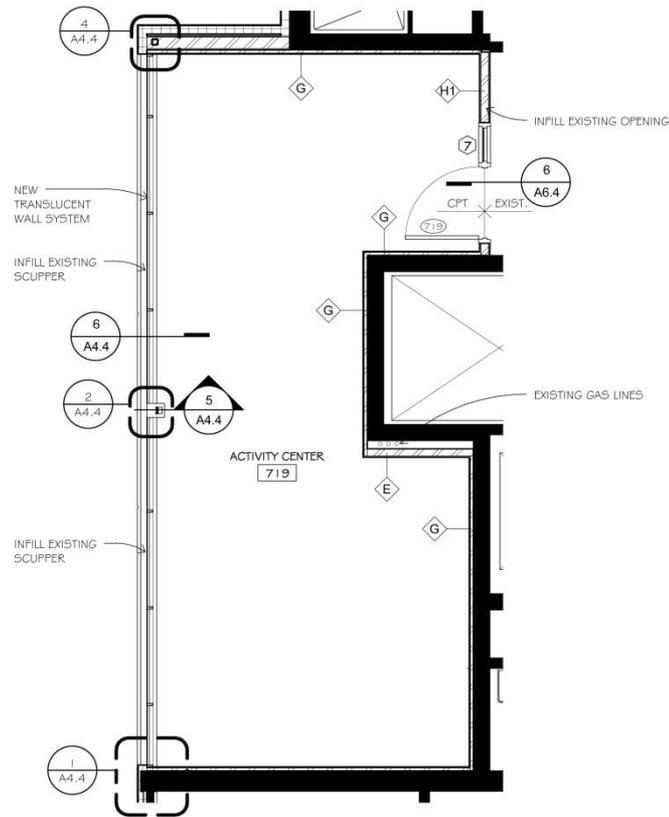
Building Section

Orness Plaza

Design & Construction



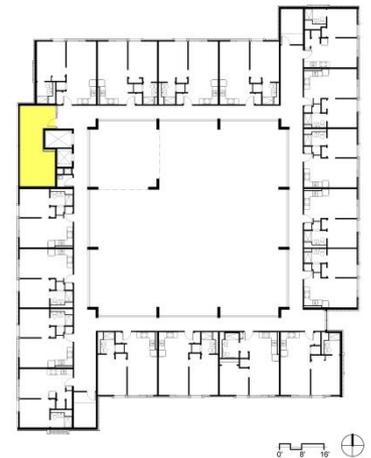
Before



After

Balconies

- Simplify the envelope
- Year-round usable space



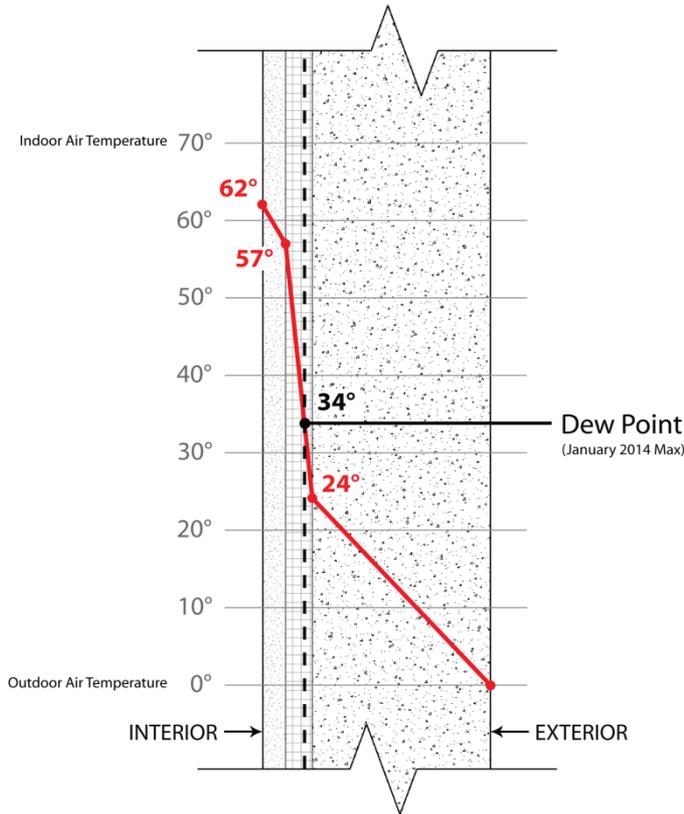
Key Plan

Orness Plaza

Design & Construction

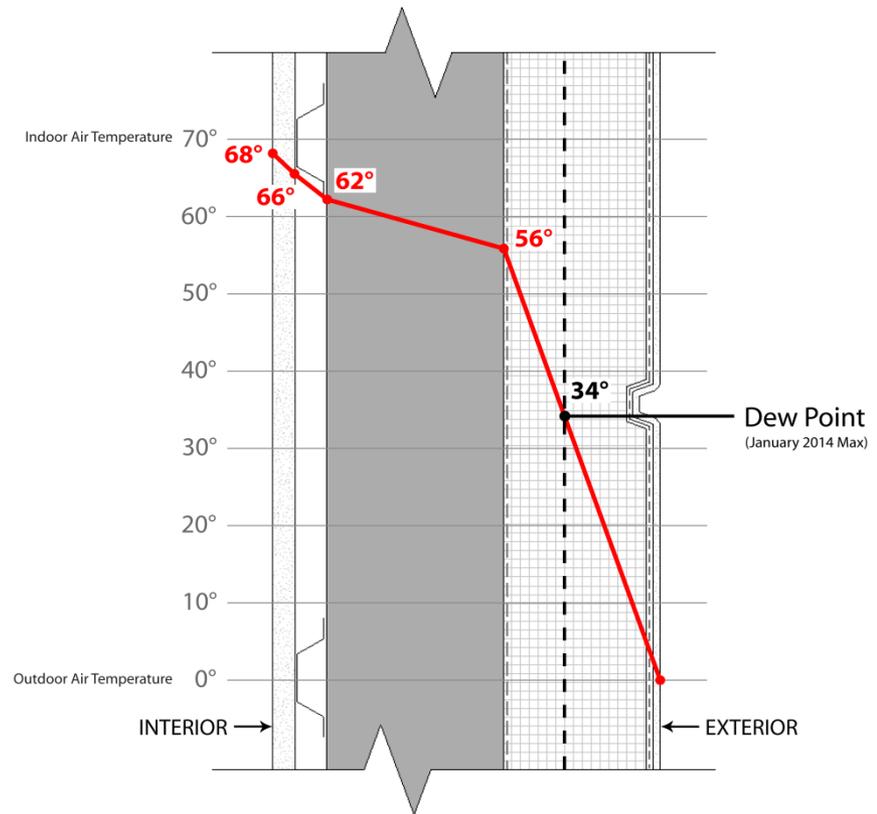
Typical Wall Section

ORIGINAL WALL CONSTRUCTION



Approx. R-5 insulation value

NEW WALL CONSTRUCTION



Approx. R-19 insulation value

Nearly a 400% increase in thermal resistance!

Orness Plaza

Building Commons – Atrium Before Construction



- Empty space
- Dated color scheme
- Uninspired landscaping

Orness Plaza

Building Commons – Atrium Final Results



Orness Plaza

Building Commons – Community Room Before Construction



- Cool colors
- Closed-off kitchen
- Dated look

Orness Plaza

Building Commons – Community Room Final Results



Orness Plaza

Building Commons – Balconies Before Construction



- Three balconies
- Exterior exposure
- 7th floor open to sky
- Unused during cooler months
- Uninviting

Orness Plaza

Building Commons – Balconies During & After Construction



- Added roof at 7th floor
- Enclosed all spaces
- Included filtered light, but with views

Orness Plaza

Exterior— Entrance Canopy



Orness Plaza

Interior— Fitness Room



Orness Plaza

Interior— Game Room



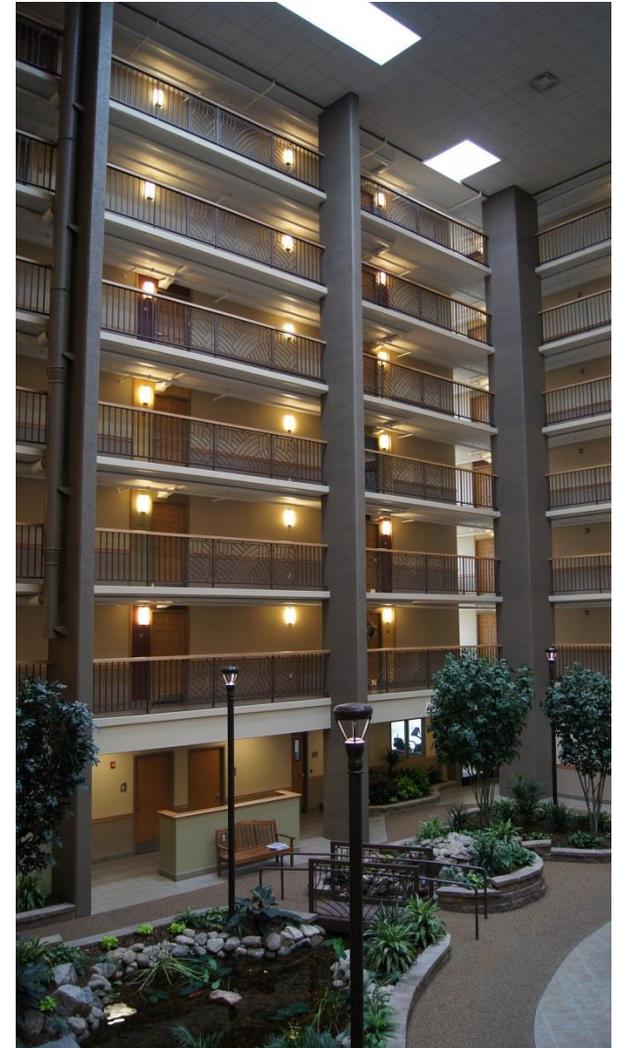
Orness Plaza

Exterior—Patio



Orness Plaza

Design & Construction : Before and After



Orness Plaza

Design & Construction

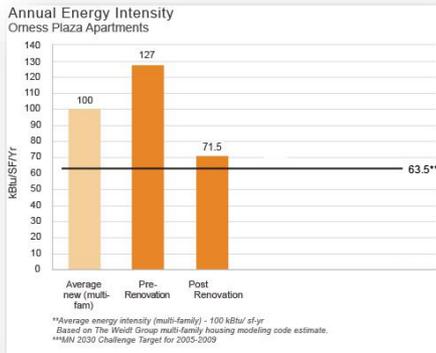


Orness Plaza

Design & Construction



Testing/Evaluation/Outcomes



Expanded Commissioning

confirm ventilation and exhaust rates in units and commons

Air Testing (pre + post)

TVOC, formaldehyde, allergens

Monitoring

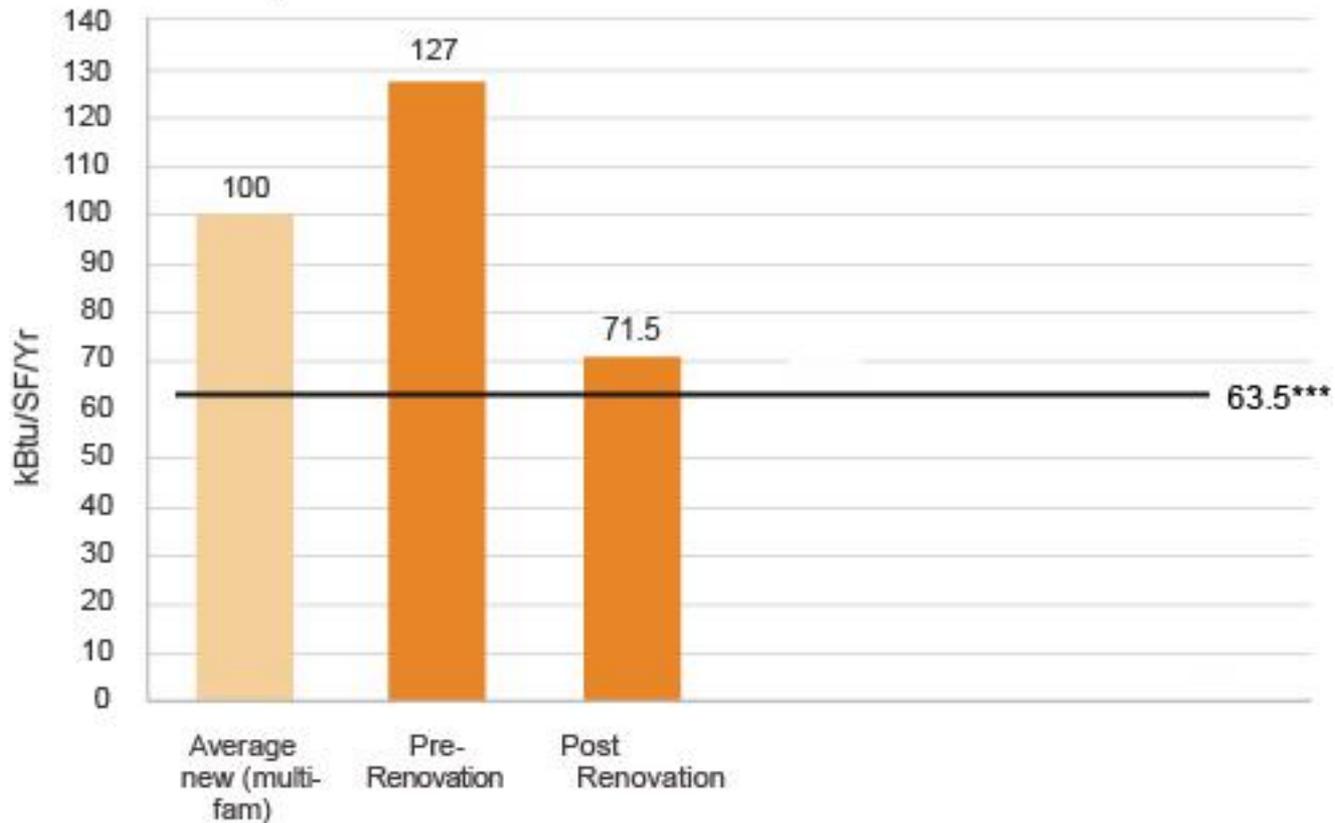
Unit temperature, relative humidity, CO₂ and CO

Utility Bill Analysis

electric, gas and water



Annual Energy Intensity Ormess Plaza Apartments



**Average energy intensity (multi-family) - 100 kBtu/ sf-yr

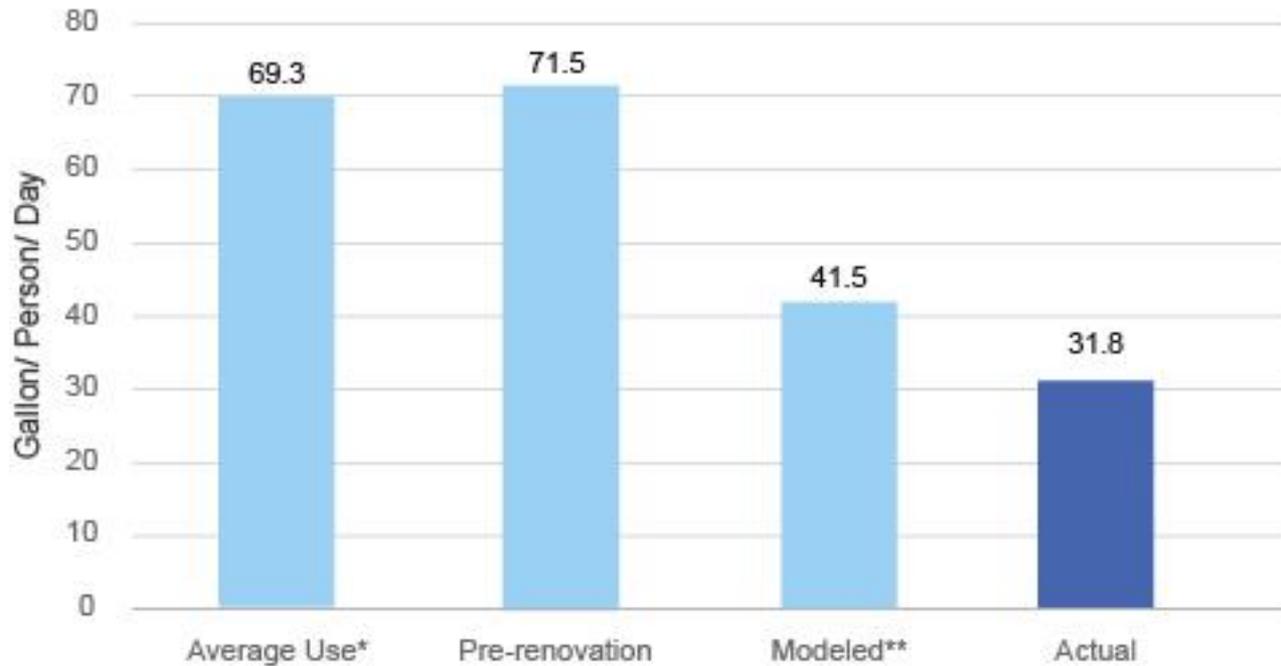
Based on The Weidt Group multi-family housing modeling code estimate.

***MN 2030 Challenge Target for 2005-2009

44% reduction in energy use



Indoor Water Use Omness Plaza Apartments



**Average energy intensity (multi-family) - 100 kBtu/ sf-yr
Based on The Weidt Group multi-family housing modeling code estimate.
***MN 2030 Challenge Target for 2005-2009

54% less water use per person





Green Communities and Health

Studies of Green Housing & Health Outcomes

Conclusions

Health Criteria



Health Criteria include:

- ASHRAE 62 & kitchen and bath exhaust ventilation
- No carpet in kitchens/baths
- Low VOC paints/adhesives
- Integrated Pest Management
- Radon testing & mitigation
- Moisture & mold mitigation
- Other

Health Outcomes and Green Renovation of Affordable Housing

JILL BREYSSE, MHS^a
DAVID E. JACOBS, PHD^a
WILLIAM WEBER, MARCH^b
SHERRY DIXON, PHD^a
CAROL KAWECKI, MA, RN^a
SUSAN ACETI, MSW^a
JORGE LOPEZ, BS^c

ABSTRACT

Objective. This study sought to determine whether renovating low-income housing using “green” and healthy principles improved resident health and building performance.

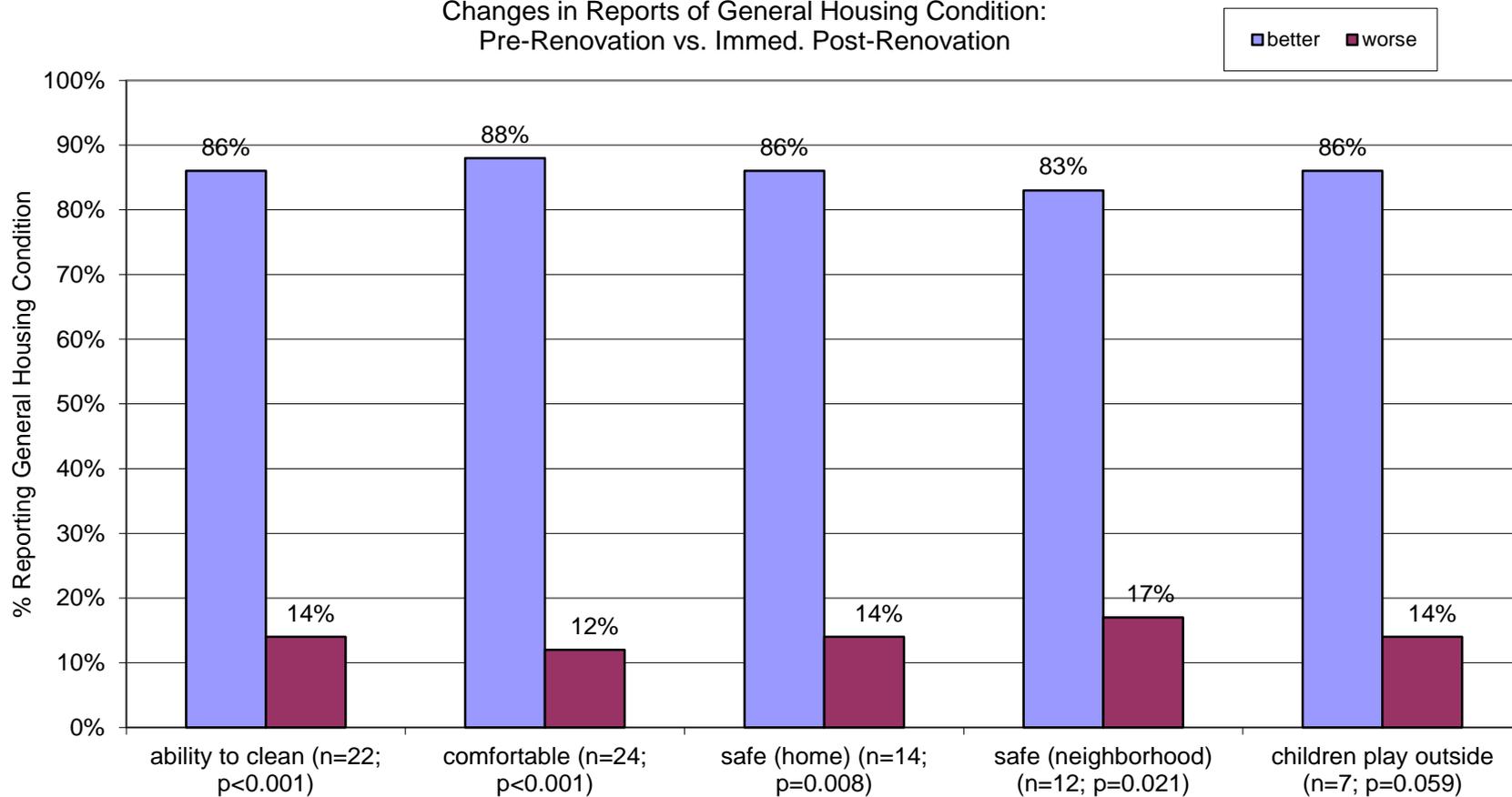
Methods. We investigated resident health and building performance outcomes at baseline and one year after the rehabilitation of low-income housing using

PUBLIC HEALTH REPORTS / 2011 SUPPLEMENT 1 / VOLUME 126



Results

Changes in Reports of General Housing Condition:
Pre-Renovation vs. Immed. Post-Renovation



Adults

(1-year followup)

General health reported as either very good or excellent increased from 33% to 62% ($p=0.052$)

- Chronic bronchitis 10% → 0% ($p=0.025$);
- Hay fever (12% → 4% ($p=0.046$);
- Sinusitis (12% → 2%; $p=0.025$);
- Asthma (12% → 4%; $p=0.046$);
- Hypertension (10% → 4%; $p=0.083$).

Moisture

Fewer people reported that their newly renovated homes had:

- moisture problems (29% → 4%; $p=0.020$)
- evidence of water or dampness due to broken pipes, leaks, heavy rain, or flooding
 - (39% → 18%; $p=0.083$)
- a need for either a dehumidifier
 - (24% → 3%; $p=0.014$)
- or a humidifier (17% → 7%; $p=0.083$).



Pests

Fewer problems with cockroaches

– (17% → 7%; $p=0.083$).

Lower use of insecticides by residents

– (21% → 4%; $p=0.059$)

Lower use of insecticides by
exterminators or maintenance
personnel (37% → 4%; $p=0.003$)

Fewer problems with mice or rats (25% →
0%; $p=0.257$).

