## CASE STUDY#3 A SUSTAINABLE SITE & BUILDING

# Portland Community College Newberg Center

By: Mengna Zhong, Yan Gong, Johnelle Fifer

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

## BUILDING DESCRIPTION

Portland Community College (PCC), Oregon's largest insitiution of higher learning, serves residents in five countries. As part of a bond measure to expand classroom space, PCC purchased a 15-acre site in Newberg, a small town in the Willamette Valley, to develop a new educational facility. The 13,500 sq/ft PCC Newberg Center is the initial building in the master plan.

**Project Owner:**
Portland Community College

**Location:**
135 Werth Blvd.
Newberg Oregon 97132. United States

**Submitting Architect:**
Hennebery Eddy Architects, Inc.

**Project Completion Date:**
August, 2011

**Project Site Context/Setting:**
Rural, previously undeveloped land

**Project Type:**
Education – College/University (campus-level)

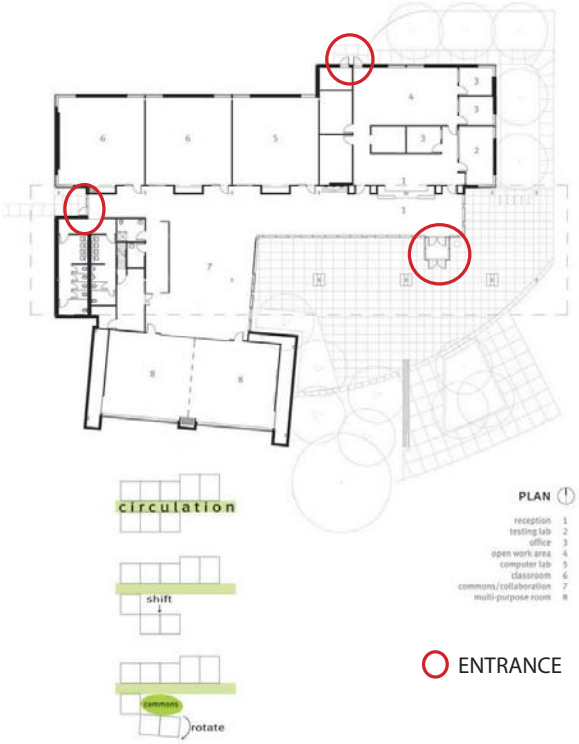
**Building or Project Gross Floor Area:**
13,500 square feet

**Hours of Operation:**
8:30am to 8:30pm M-F,
8:30am to 2pm Saturday

**Total project cost at time of completion, land excluded:**
$7,200,000.00

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# BUILDING DESCRIPTION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**SITE PLAN**

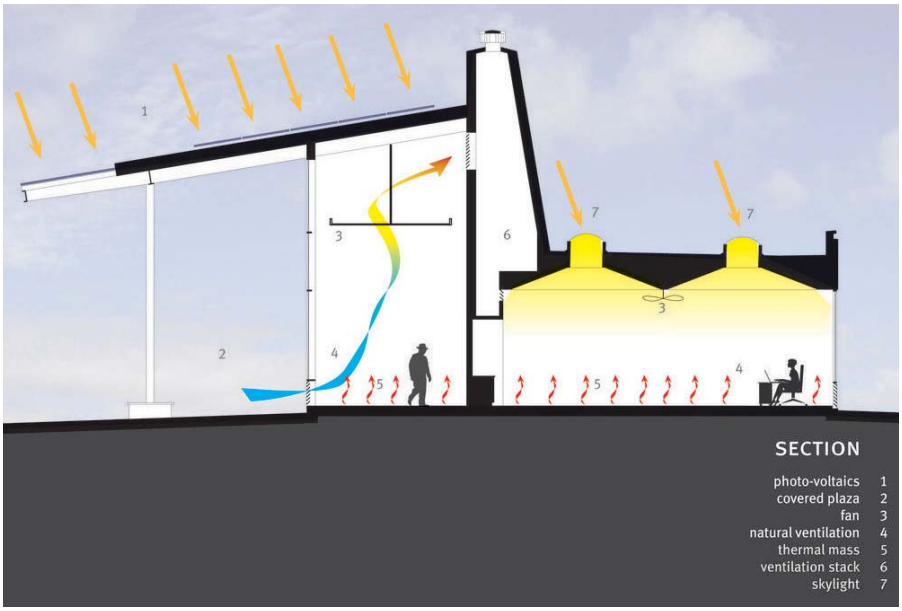
**BUILDING PLAN**

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# SUSTAINABLE STRATEGIES

Designed to be the first net-zero-energy higher education building in Orgen (and the second in the US), the Newberg Center supports PCC's sustainable mission to reduce greenhouse gas emission 80% by 2050.

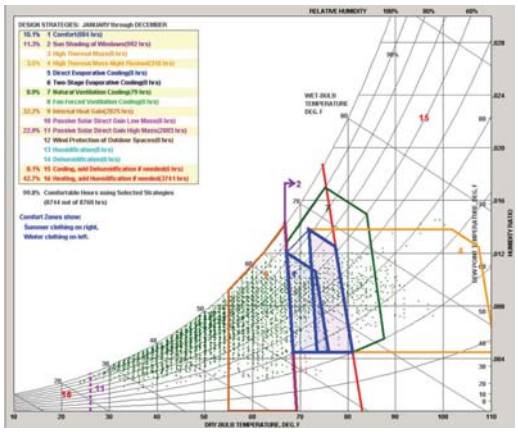
As the first project of a constrcation bond, the building serves as a living laboratory for PCC to study energy use and strategies for its reduction. The designed focused on four approaches to minimizing energy use to achieve net-zero: creating a highly effcient envelope; maximizing passive strategies; utilizing efficient systems; engaging the user.



PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# SUSTAINABLE STRATEGIES: Bioclimatic Design

*" Located roughly 60 mile inland of the Oregon coast, the city of Newberg enjoys the mild weather of the Pacific Northwest, characterized by wet winters and dry, breezy summers. "*



01 The majority of classroom and office spaces are located on the north side of the building, allowing spaces to be daylit with diffuse north light.

02 A deep overhang on the south side of the building protects openings from glare while providing outdoor spaces that can be used even during the wet winter.

03 Taking advantage of the Pacific Northwest's climate, the building incorporates natural ventilation and passive cooling articulated by the ventilation stacks that organize the circulation spine. Spinning ventilation turbines on each stack draw fresh air through louvers along the building's perimeter and release hot air through their tops.

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# SUSTAINABLE STRATEGIES: Light & Air

*Daylighting at levels that allow lights to be off during daylight hours:* ***98%***

*Views to the Outdoors:* ***98%***

*Within 15 feet of an operable window:* ***70%***

01 The Center's reliance on passive systems means the light in the building changes throughout the day as the sun makes its path across the sky. As the seasons shift from summer to winter, so will the indoor temperature subtly shift from warmer to cooler, and the introduction of fresh air brings a sense of the outside environment and climate.

02 Large panes of frosted glass, between the classrooms and the commons, light the classroom from two sides while minimizing distraction.

03 In the commons, the curtainwall pattern reflects a window-to-wall ratio that balances daylighting with overall building R-value, while north-facing clerestory slot windows evenly light the space.

04 The cost-effective daylighting design combines common skylights and acoustical ceiling tiles in a unique sloped ceiling system to wash the classrooms and open offices with even, diffused daylight - eliminating the need for electric lights during rhe day.

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# SUSTAINABLE STRATEGIES: Energy Future

*" To drive down the building's peak energy load, passive strategies included maximizing north and south building exposures, deep overhangs, daylight, natural ventilation, concrete floors for thermal mass and a super-insulated envelope using structural insulated panels."*

01 When outside temperatures are below 55° F, heat-recovery ventilators provide energy-efficient fresh air. The building's concrete slab heats users directly, not the air around them, by circulating 90° water through the closed-loop radiant system.

02 The ceiling fans provides a 3° dropin ambient temperature through air movement while using a fraction of the energy of air-conditioning units.

03 Lighting controls dim lights when daylight is sufficient, and vacancy sensors (which turn lights off when a room is empty but do not automatically turn lights on when someone enters) prevent lights being left on in unoccupied rooms.

| ECM # | Description | Incremental Cost $ | kWh Savings | Energy Cost Savings $ | Simple Payback (yrs) |
|---|---|---|---|---|---|
| 1 | Structural Insulated Wall/Roof Panels | $18,240 | 10322 | $713 | 25.6 |
| 2 | Reduced Lighting Power Density | $5,150 | 13299 | $889 | 5.8 |
| 3 | High Performance Glazing | $8,300 | | | |
| 4 | Daylighting | $12,213 | | | |
| 3 & 4 | Combined ECM | $20,513 | 10455 | $770 | 26.6 |
| 5 | Reduced Exterior LPD | $8,000 | 6040 | $328 | 24.4 |
| 6 | Heat Recovery Ventilation | ($7,325) | | | |
| 8 | ASHP serving Radiant floor Htg/backup Clg system | $100,000 | | | |
| 6 & 8 | Combined ECM | $92,675 | 51627 | $6,726 | 13.8 |
| 7 | Natural Ventilation | $92,000 | 5450 | $107 | 859.8 |
| 9 | Laptop Comp. vs Desktops | $2,000 | 6784 | $465 | 4.3 |
| 10 | Heat Pump DHW | $200 | 139 | $27 | 7.4 |
| | NZE Model (Proposed) (includes all ECM) | $238,778 | 122090 | $11,807 | 20.2 |
| | Interactive (Proposed) select ECM | $146,778 | 119997 | $11,693 | 12.6 |

*The energy conservation measures (ECM)*

*The project saving **51%** of the energy compared to baseline.*
*A total of **122,090 kWh/year** electrical energy savings is projected.*

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# SUSTAINABLE STRATEGIES: Material & Construcation

01 SIPS (structural insulated panels) used for the roofs and walls provide a high R-value and greatly reduce heat loss from thermal bridging and air infiltration.

02 Double-dampers behind the natural ventilation louvers provide a tight seal when closed to prevent drafts.

03 Close attention and coordination with the contractor during construction, including mock-ups and air leakage tests of the louver assembly and installation, provided confirmation of a tight, well-sealed envelope.

04 The project also focused on minimizing material use, such as using the structural concrete slab and concrete shear walls as final finishes and strategically placing FSC-certified white oak where it would have the greatest impact, at classroom entries and the reception desk.

05 the building included 29% local materials, including brick, gypsum board, and gravel used for the roadway extension, and 25% materials with recycled content; and 85% of construction waste was diverted from local landfills.

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# SUSTAINABLE STRATEGIES: Longevity

*" The Newberg Center was designed not only to provide classroom spaces and function as the campus front door but also would one day be transformed into the student union. The design used a lot of material that provide flexibility for the transition. "*

01 Use structural steel frame to allow all interior walls to be easily removed or reconfigured.

The 30'x 30' structural bay with steel columns in the corner, allow multiple areas to be combined to create larger spaces for use.

02 frosted glass partitions throughout the building share light between spaces and function as additional "white board" space for classroom.

03 wood-clad cable tray, located in the circulation spine and doublling as an entry soffit at classroom, make maintenance possible without disrupting classes and allow for easily changing out technology.

04 large sliding glass walls between the multi-purpose room and the commons, and between the commons and the outdoor plaza, allow the building to be opened up, creating a dynamic flow of spaces for large events.

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# RENGENERATION-BASED CHECKLIST

**Regeneration-Based Checklist for Design and Construction**

© SBSE @ Tadoussac 1999

Project:

| | degeneration | | | | sustainability | | | | regeneration | |
|---|---|---|---|---|---|---|---|---|---|---|
| | -100 always | -75 usually | -50 sometimes | -25 a bit | 0 balances | 25 a bit | 50 sometimes | 75 usually | 100 always | |
| the site | pollutes air | | | | | ● | | | | cleans air |
| | pollutes water | | | | | | | ● | | cleans water |
| | wastes rainwater | | | | | ● | | | | stores rainwater |
| | consumes food | | | ● | | | | | | produces food |
| | destroys rich soil | | | | | | ● | | | creates rich soil |
| | dumps wastes unused | | | | | | ● | | | consumes wastes |
| | destroys wildlife habitat | | | | | | | ● | | provides wildlife habitat |
| | imports energy | | | | ● | | | | | exports energy |
| | requires fuel-powered transportation | | | | | ● | | | | requires human-powered transportation |
| | intensifies local weather | | | | | ● | | | | moderates local weather |
| the building | excludes daylight | | | | | | | | ● | uses daylight |
| | uses mechanical heating | | | | | | | ● | | uses passive heating |
| | uses mechanical cooling | | | | | | | ● | | uses passive cooling |
| | needs cleaning and repair | | | | | | ● | | | maintains itself |
| | produces human discomfort | | | | | | | ● | | provides human comfort |
| | uses fuel-powered circulation | | | | | | ● | | | uses human-powered circulation |
| | pollutes indoor air | | | | | | | ● | | creates pure indoor air |
| | is built of virgin materials | | | | | ● | | | | is built of recycled materials |
| | cannot be recycled | | | | | | | ● | | can be recycled |
| | serves as an icon for the apocalypse | | | | | | | ● | | serves as an icon for regeneration |
| | is a bad neighbor | | | | | | | ● | | is a good neighbor |
| | is ugly | | | | | | ● | | | is beautiful |

| negative score 2200 possible | positive score 2200 possible |
|---|---|
| -75 | 1000 |

final score: **925**

## THE SITE

**Air= 0**
plants, trees, no specific stratus for cleaning the air on the site

**Water=75**
native plants in bio-swale, the landscape design improving water quality

**Rainwater=0**
While the rainwater catchment system was eliminated for budgetary reasons

**Food Production =-50**
No food production on the site

**Soil=25**
reuse all the native topsoil on site and minimize importing soil amendments

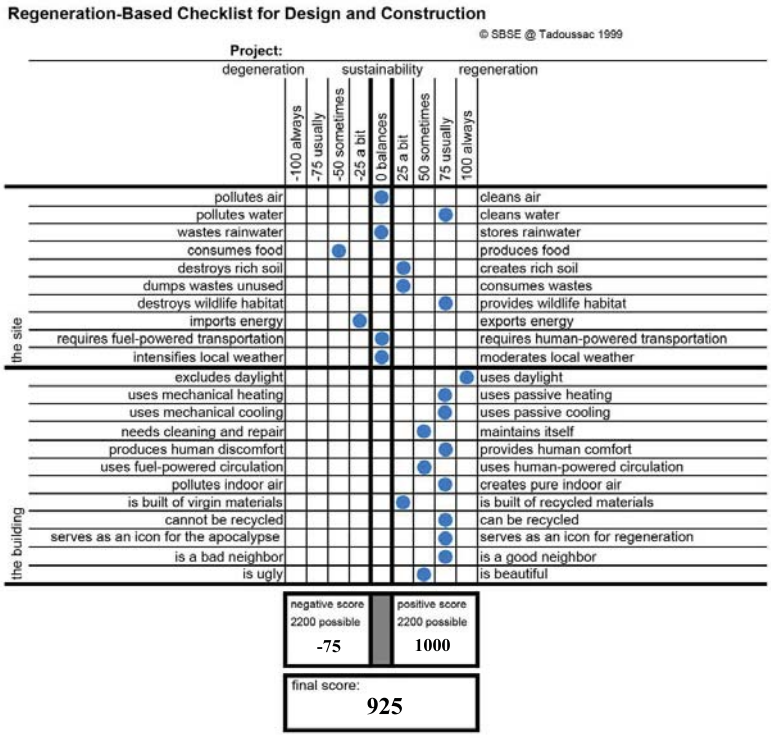
**Wildlife Habitat= 75**
large masses of shrubs and groundcover provide substantial shelter for birds and insects, while large street trees provide convenient perching for local hawk species.

**Energy= -25**
0nly 51% renewable energy, 49% imports energy form city.

**Transportation= 0**
estimated percent of occupants using public transit, cycling or walking is only 3%, but the site still provides bike and pedestrian paths.

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# RENGENERATION-BASED CHECKLIST



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| | | | | | ● | | | | | wastes rainwater |
| | | | ● | | | | | | | consumes food |
| | | | | | | ● | | | | destroys rich soil |
| | | | | | | ● | | | | dumps wastes unused |
| | | | | | | | | ● | | destroys wildlife habitat |
| | | | | ● | | | | | | imports energy |
| | | | | | ● | | | | | requires fuel-powered transportation |
| | | | | | ● | | | | | intensifies local weather |
| the building | | | | | | | | | ● | uses daylight |
| | | | | | | | | ● | | uses mechanical heating |
| | | | | | | | | ● | | uses mechanical cooling |
| | | | | | | | ● | | | needs cleaning and repair |
| | | | | | | | | ● | | produces human discomfort |
| | | | | | | | ● | | | uses fuel-powered circulation |
| | | | | | | | | ● | | pollutes indoor air |
| | | | | | | ● | | | | is built of virgin materials |
| | | | | | | | | ● | | cannot be recycled |
| | | | | | | | | ● | | serves as an icon for the apocalypse |
| | | | | | | | | ● | | is a bad neighbor |
| | | | | | | | ● | | | is ugly |

| negative score 2200 possible | positive score 2200 possible |
|---|---|
| -75 | 1000 |

final score: **925**

## THE BUILDING

**Daylight=100**
98% daylighting at levels that allow lights to be off during daylight hours.

**Heating=75**
concrete floor for thermal mass and super-insulated envelope using structural insulated panels.

**Cooling=75**
ventilator provides energy-efficient fresh air, ceiling fans provide a 3o drop in ambient temperature through air movement

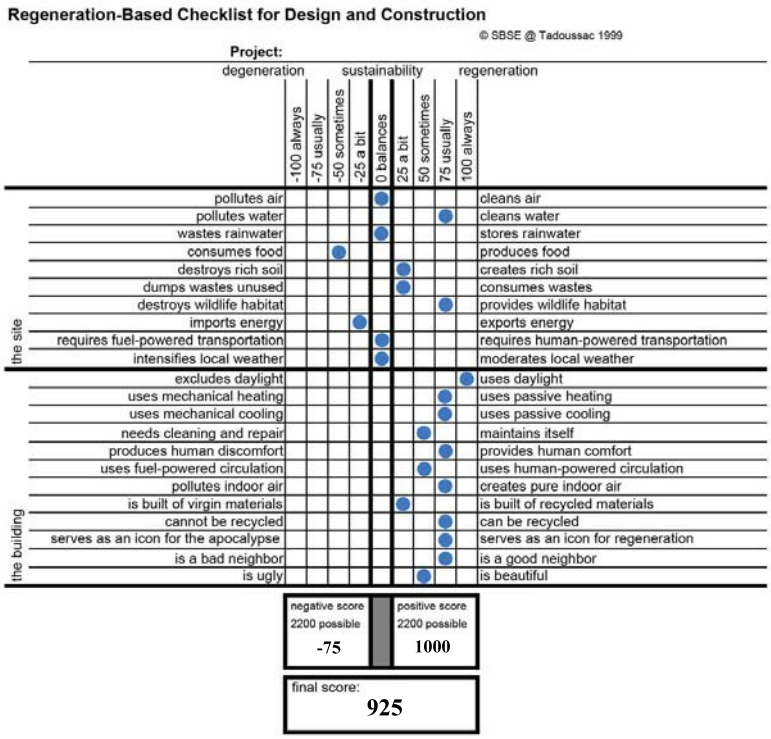
**Maintenance= 50**
vacancy sensor and natural ventilation.

**Human feeling=75**
the north daylight was provides on the majority of classroom and office spaces, a deep overhang on south side of the building protects openings form glare. On the site, there are green space and trees that provides shading area. Natural ventilation that allow fresh air in the building.

**Circulation= 50**
there is no preference for elevator and the stair is on the next door, which has large space for that.

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

RENGENERATION-BASED CHECKLIST



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| | | | | | | ● | | | | dumps wastes unused |
| | | | | | | | | ● | | destroys wildlife habitat |
| | | | | ● | | | | | | imports energy |
| | | | | | ● | | | | | requires fuel-powered transportation |
| | | | | | ● | | | | | intensifies local weather |
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| | | | | | | | ● | | | is ugly |

| negative score 2200 possible | positive score 2200 possible |
|---|---|
| -75 | 1000 |

final score: **925**

## THE BUILDING

**Indoor air= 75**
natural ventilation, the building's air quality is monitored by CO2 sensors and the green housekeeping policy prevents the use of toxic chemicals in or around the building. Good passive system introduce the fresh air into the building and brings a sense of the outside environment and climate.

**Materials= 25**
25% materials with recycled content

**Recyclability=75**
25% materials with recycled content, 85% of construction waste was diverted from local landfills.

**Icon= 75**
Designed to be the first net-zero energy higher education building in Oregon and the second in the United Stated.

**Neighbor= 75**
it is sustainable building, which is good for neighbor and provides habitat area in exterior of site.

**Aesthetics= 50**
creating a highly efficient envelope is a one of design goal.

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# LEED CHECKLIST

**LEED 2009 for New Construction and Major Renovations**
Project Checklist

Project Name
Date

| Y | ? | N | | | |
|---|---|---|---|---|---|
| **22** | | | **Sustainable Sites** | **Possible Points:** | **26** |
| Y | | | Prereq 1 | Construction Activity Pollution Prevention | |
| 1 | | | Credit 1 | Site Selection | 1 |
| 5 | | | Credit 2 | Development Density and Community Connectivity | 5 |
| 1 | | | Credit 3 | Brownfield Redevelopment | 1 |
| 6 | | | Credit 4.1 | Alternative Transportation—Public Transportation Access | 6 |
| 1 | | | Credit 4.2 | Alternative Transportation—Bicycle Storage and Changing Rooms | 1 |
| | | N | Credit 4.3 | Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles | 3 |
| 2 | | | Credit 4.4 | Alternative Transportation—Parking Capacity | 2 |
| 1 | | | Credit 5.1 | Site Development—Protect or Restore Habitat | 1 |
| 1 | | | Credit 5.2 | Site Development—Maximize Open Space | 1 |
| | | N | Credit 6.1 | Stormwater Design—Quantity Control | 1 |
| 1 | | | Credit 6.2 | Stormwater Design—Quality Control | 1 |
| 1 | | | Credit 7.1 | Heat Island Effect—Non-roof | 1 |
| 1 | | | Credit 7.2 | Heat Island Effect—Roof | 1 |
| 1 | | | Credit 8 | Light Pollution Reduction | 1 |
| **8** | | | **Water Efficiency** | **Possible Points:** | **10** |
| Y | | | Prereq 1 | Water Use Reduction—20% Reduction | |
| 2 | | | Credit 1 | Water Efficient Landscaping | 2 to 4 |
| 2 | | | Credit 2 | Innovative Wastewater Technologies | 2 |
| 4 | | | Credit 3 | Water Use Reduction | 2 to 4 |
| **33** | | | **Energy and Atmosphere** | **Possible Points:** | **35** |
| Y | | | Prereq 1 | Fundamental Commissioning of Building Energy Systems | |
| Y | | | Prereq 2 | Minimum Energy Performance | |
| Y | | | Prereq 3 | Fundamental Refrigerant Management | |
| 19 | | | Credit 1 | Optimize Energy Performance | 1 to 19 |
| 7 | | | Credit 2 | On-Site Renewable Energy | 1 to 7 |
| | ? | | Credit 3 | Enhanced Commissioning | 2 |
| 2 | | | Credit 4 | Enhanced Refrigerant Management | 2 |
| 3 | | | Credit 5 | Measurement and Verification | 3 |
| 2 | | | Credit 6 | Green Power | 2 |
| **10** | | | **Materials and Resources** | **Possible Points:** | **14** |
| Y | | | Prereq 1 | Storage and Collection of Recyclables | |
| | | N | Credit 1.1 | Building Reuse—Maintain Existing Walls, Floors, and Roof | 1 to 3 |
| | | N | Credit 1.2 | Building Reuse—Maintain 50% of Interior Non-Structural Elements | 1 |
| 2 | | | Credit 2 | Construction Waste Management | 1 to 2 |
| 2 | | | Credit 3 | Materials Reuse | 1 to 2 |

| Y | ? | N | | | |
|---|---|---|---|---|---|
| **Materials and Resources, Continued** | | | | | |
| 2 | | | Credit 4 | Recycled Content | 1 to 2 |
| 2 | | | Credit 5 | Regional Materials | 1 to 2 |
| 1 | | | Credit 6 | Rapidly Renewable Materials | 1 |
| 1 | | | Credit 7 | Certified Wood | 1 |
| **10** | | | **Indoor Environmental Quality** | **Possible Points:** | **15** |
| Y | | | Prereq 1 | Minimum Indoor Air Quality Performance | |
| Y | | | Prereq 2 | Environmental Tobacco Smoke (ETS) Control | |
| 1 | | | Credit 1 | Outdoor Air Delivery Monitoring | 1 |
| 1 | | | Credit 2 | Increased Ventilation | 1 |
| | ? | | Credit 3.1 | Construction IAQ Management Plan—During Construction | 1 |
| | ? | | Credit 3.2 | Construction IAQ Management Plan—Before Occupancy | 1 |
| | ? | | Credit 4.1 | Low-Emitting Materials—Adhesives and Sealants | 1 |
| | ? | | Credit 4.2 | Low-Emitting Materials—Paints and Coatings | 1 |
| 1 | | | Credit 4.3 | Low-Emitting Materials—Flooring Systems | 1 |
| | | N | Credit 4.4 | Low-Emitting Materials—Composite Wood and Agrifiber Products | 1 |
| 1 | | | Credit 5 | Indoor Chemical and Pollutant Source Control | 1 |
| 1 | | | Credit 6.1 | Controllability of Systems—Lighting | 1 |
| 1 | | | Credit 6.2 | Controllability of Systems—Thermal Comfort | 1 |
| 1 | | | Credit 7.1 | Thermal Comfort—Design | 1 |
| 1 | | | Credit 7.2 | Thermal Comfort—Verification | 1 |
| 1 | | | Credit 8.1 | Daylight and Views—Daylight | 1 |
| 1 | | | Credit 8.2 | Daylight and Views—Views | 1 |
| **6** | | | **Innovation and Design Process** | **Possible Points:** | **6** |
| 1 | | | Credit 1.1 | Innovation in Design: Specific Title | 1 |
| 1 | | | Credit 1.2 | Innovation in Design: Specific Title | 1 |
| 1 | | | Credit 1.3 | Innovation in Design: Specific Title | 1 |
| 1 | | | Credit 1.4 | Innovation in Design: Specific Title | 1 |
| 1 | | | Credit 1.5 | Innovation in Design: Specific Title | 1 |
| 1 | | | Credit 2 | LEED Accredited Professional | 1 |
| **4** | | | **Regional Priority Credits** | **Possible Points:** | **4** |
| 1 | | | Credit 1.1 | Regional Priority: Specific Credit | 1 |
| 1 | | | Credit 1.2 | Regional Priority: Specific Credit | 1 |
| 1 | | | Credit 1.3 | Regional Priority: Specific Credit | 1 |
| 1 | | | Credit 1.4 | Regional Priority: Specific Credit | 1 |
| **93** | **5** | **5** | **Total** | **Possible Points:** | **110** |

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

SCORE: 93/110

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# BUILDING REDESIGN PROPOSAL

Overall, the Newberg Center is very well designed that is was actually challenging to create a redesign. We chose to implement systems that scored low on the check lists. In a general sense, we are design the building to get better scores on both checklists.

We chose to focus on 3 areas:

1) Create Food Production:
   - Erect raised beds on site

2) Redesign The Transportation:
   - Add bicycle racks
   - Add carpool parking spots closer to the building to encourage better transportation practices.

3) Make the Building More Energy Efficient:
   - Install composting toilets that use no energy

We were going to install more pvs, or possibly thermal pvs, but came to the conclusion that instead of making more energy, it would be better to lessen the amount of energy the building uses.

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# BUILDING REDESIGN

☹ No food production on the site

☺ Using raised bed gardens

- it can produce food.
- the plants in the garden can help absorbing the dust, make the exterior air fresh.

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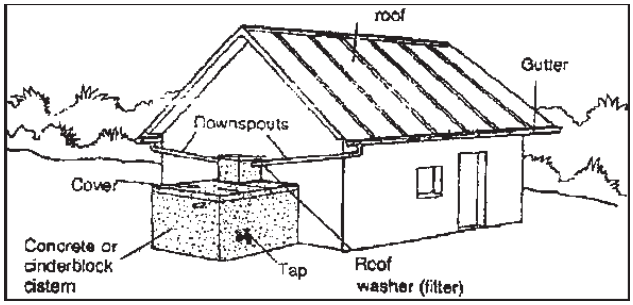
☹ Rainwater catchment system was eliminated for budgetary reasons

☺ Adding a cistern

- catch rain water and reuse it in the building & garden.

☺ Adding a gutter on the roof




PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

BUILDING REDESIGN

☹ 49% imports energy form city

☺ Lessen the amount of energy used by composting waste and using composting toilet.

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☹ Estimated percent of occupants using public transit, cycling or walking is only 3%

☺ Adding bike racks

☺ Carpool spots

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# BUILDING REDESIGN REGENERATION-BASED CHECKLIST

**Regeneration-Based Checklist for Design and Construction**

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Project:

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| | | | | | | | ● | | | wastes rainwater |
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| the building | | | | | | | | | | |

| negative score | positive score |
|---|---|
| 2200 possible | 2200 possible |
| 0 | 1200 |

final score: **1200**

SCORE INCREASD
275 THAN BEFORE

PORTLAND COMMUNITY COLLEGE NEWBERG CENTER

# BUILDING REDESIGN LEED CHECKLIST

**LEED 2009 for New Construction and Major Renovations**

Project Checklist

Project Name

Date

**Sustainable Sites** — Possible Points: 26

| Y | ? | N | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Construction Activity Pollution Prevention | |
| 1 | | | Credit 1 | Site Selection | 1 |
| 5 | | | Credit 2 | Development Density and Community Connectivity | 5 |
| 1 | | | Credit 3 | Brownfield Redevelopment | 1 |
| 6 | | | Credit 4.1 | Alternative Transportation—Public Transportation Access | 6 |
| 1 | | | Credit 4.2 | Alternative Transportation—Bicycle Storage and Changing Rooms | 1 |
| 1 | | | Credit 4.3 | Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles | 3 |
| 2 | | | Credit 4.4 | Alternative Transportation—Parking Capacity | 2 |
| 1 | | | Credit 5.1 | Site Development—Protect or Restore Habitat | 1 |
| 1 | | | Credit 5.2 | Site Development—Maximize Open Space | 1 |
| | | N | Credit 6.1 | Stormwater Design—Quantity Control | 1 |
| 1 | | | Credit 6.2 | Stormwater Design—Quality Control | 1 |
| 1 | | | Credit 7.1 | Heat Island Effect—Non-roof | 1 |
| 1 | | | Credit 7.2 | Heat Island Effect—Roof | 1 |
| 1 | | | Credit 8 | Light Pollution Reduction | 1 |

**Water Efficiency** — Possible Points: 10

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Water Use Reduction—20% Reduction | |
| 2 | | | Credit 1 | Water Efficient Landscaping | 2 to 4 |
| 2 | | | Credit 2 | Innovative Wastewater Technologies | 2 |
| 4 | | | Credit 3 | Water Use Reduction | 2 to 4 |

**Energy and Atmosphere** — Possible Points: 35

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Fundamental Commissioning of Building Energy Systems | |
| Y | | | Prereq 2 | Minimum Energy Performance | |
| Y | | | Prereq 3 | Fundamental Refrigerant Management | |
| 19 | | | Credit 1 | Optimize Energy Performance | 1 to 19 |
| 7 | | | Credit 2 | On-Site Renewable Energy | 1 to 7 |
| | ? | | Credit 3 | Enhanced Commissioning | 2 |
| 2 | | | Credit 4 | Enhanced Refrigerant Management | 2 |
| 3 | | | Credit 5 | Measurement and Verification | 3 |
| 2 | | | Credit 6 | Green Power | 2 |

**Materials and Resources** — Possible Points: 14

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Storage and Collection of Recyclables | |
| | | N | Credit 1.1 | Building Reuse—Maintain Existing Walls, Floors, and Roof | 1 to 3 |
| | | N | Credit 1.2 | Building Reuse—Maintain 50% of Interior Non-Structural Elements | 1 |
| 2 | | | Credit 2 | Construction Waste Management | 1 to 2 |
| 2 | | | Credit 3 | Materials Reuse | 1 to 2 |

**Materials and Resources, Continued**

| | | | | | |
|---|---|---|---|---|---|
| 2 | | | Credit 4 | Recycled Content | 1 to 2 |
| 2 | | | Credit 5 | Regional Materials | 1 to 2 |
| 1 | | | Credit 6 | Rapidly Renewable Materials | 1 |
| 1 | | | Credit 7 | Certified Wood | 1 |

**Indoor Environmental Quality** — Possible Points: 15

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Minimum Indoor Air Quality Performance | |
| Y | | | Prereq 2 | Environmental Tobacco Smoke (ETS) Control | |
| 1 | | | Credit 1 | Outdoor Air Delivery Monitoring | 1 |
| 1 | | | Credit 2 | Increased Ventilation | 1 |
| | ? | | Credit 3.1 | Construction IAQ Management Plan—During Construction | 1 |
| | ? | | Credit 3.2 | Construction IAQ Management Plan—Before Occupancy | 1 |
| | ? | | Credit 4.1 | Low-Emitting Materials—Adhesives and Sealants | 1 |
| | ? | | Credit 4.2 | Low-Emitting Materials—Paints and Coatings | 1 |
| 1 | | | Credit 4.3 | Low-Emitting Materials—Flooring Systems | 1 |
| | | N | Credit 4.4 | Low-Emitting Materials—Composite Wood and Agrifiber Products | 1 |
| 1 | | | Credit 5 | Indoor Chemical and Pollutant Source Control | 1 |
| 1 | | | Credit 6.1 | Controllability of Systems—Lighting | 1 |
| 1 | | | Credit 6.2 | Controllability of Systems—Thermal Comfort | 1 |
| 1 | | | Credit 7.1 | Thermal Comfort—Design | 1 |
| 1 | | | Credit 7.2 | Thermal Comfort—Verification | 1 |
| 1 | | | Credit 8.1 | Daylight and Views—Daylight | 1 |
| 1 | | | Credit 8.2 | Daylight and Views—Views | 1 |

**Innovation and Design Process** — Possible Points: 6

| | | | | | |
|---|---|---|---|---|---|
| 1 | | | Credit 1.1 | Innovation in Design: Specific Title | 1 |
| 1 | | | Credit 1.2 | Innovation in Design: Specific Title | 1 |
| 1 | | | Credit 1.3 | Innovation in Design: Specific Title | 1 |
| 1 | | | Credit 1.4 | Innovation in Design: Specific Title | 1 |
| 1 | | | Credit 1.5 | Innovation in Design: Specific Title | 1 |
| 1 | | | Credit 2 | LEED Accredited Professional | 1 |

**Regional Priority Credits** — Possible Points: 4

| | | | | | |
|---|---|---|---|---|---|
| 1 | | | Credit 1.1 | Regional Priority: Specific Credit | 1 |
| 1 | | | Credit 1.2 | Regional Priority: Specific Credit | 1 |
| 1 | | | Credit 1.3 | Regional Priority: Specific Credit | 1 |
| 1 | | | Credit 1.4 | Regional Priority: Specific Credit | 1 |

| | | | | |
|---|---|---|---|---|
| 96 | 5 | 4 | **Total** | Possible Points: 110 |

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

# CONCLUSION

For conclusion, the Newberg Center is a well-designed building that used many good sustainable strategies; so we focused on small but doable changes to get better scores on both checklists, and instead of making more energy, it would be better to lessen the amount of energy the building use. We proposed an investment in raised garden, rainwater catchment system, lessen the amount of imports energy from city, adding bike rack, carpool spots.

Sometimes little things can make big impact...

As a result of our intervention, the project **gained 275 points** on the regeneration-based checklist than before, and added LEED platinum **from 93 points to 96 points**.