

# WMU Facility Life Cycle Design Guidelines

Revised 4.25.2008

## A. Design Goals

1. Minimize building life cycle costs, direct and indirect, relating to energy use, maintenance, waste disposal and occupant health & productivity.
2. Minimize environmental impacts throughout the building life cycle, including product manufacturing, construction, use/occupancy, and demolition or renovation/reuse.
3. Optimize indoor environmental quality.

## B. Design Process

1. The Project Design Team is to determine design strategies appropriate for project program, site and budget.
2. US Green Building Council LEED Rating System is to be used on all projects over \$1 million cost as a performance standard and design tool/ checklist. The highest rating level that is feasible should be achieved, with the LEED Certified level as the minimum requirement. All projects are to follow the Design Guidelines listed below, which incorporate LEED and WMU specific criteria.
3. Evaluate life cycle costs of design alternatives to reduce costs of major building systems. Use energy simulation/modeling software on projects greater than \$1 million cost. Life cycle cost saving strategies used should have maximum payback period of 5-10 years.
4. Architectural/Engineering consultants are to include the above services in the Professional Services Agreement.

## C. Design Guidelines

### Energy Use

1. Integrate Buildings with the Site: Consider local climate & site influences on building energy use. Utilize "free" energy sources where feasible, such as solar energy, daylight, exterior temperature variations and winds.
2. Optimize Energy Performance: Select building envelope, mechanical and electrical systems for improved energy efficiency. Typical strategies & technologies:
  - Building Envelope
    - Control & utilization of solar heat gain
    - Daylighting of interior spaces
    - High performance windows/glazing
    - Optimized insulation values
    - Reduced air infiltration
  - Mechanical Systems
    - High efficiency equipment
    - Direct Digital Control System (DDC) for HVAC
    - Occupancy sensors/CO2 monitoring
    - Heat recovery systems

- Economizer cycle cooling
- Zoning of HVAC system based on building orientations & loads
- Variable speed drives on motors and fans
- Low flow plumbing fixtures
- Time of day scheduling
- Separate controls for individual spaces, where feasible

- Electrical Systems

- High efficiency lighting fixtures (no incandescent)
- Occupancy sensors
- Daylight sensors
- Separate ambient and task lighting
- Lighting dimmers

3. CFC/HCFC/Halon Reduction: Avoid use of these products in HVAC refrigerants and fire suppression systems.
4. Building Systems Commissioning: Key mechanical & electrical systems are to go thru a Commissioning process, which includes the following:
  - Inspection & testing for functional performance in accordance with project objectives & University guidelines.
  - Documentation of criteria, inspections/testing & acceptance
  - Training of WMU operations & maintenance staff

All projects shall implement a Commissioning plan, with the scope to be determined by the project team.

### Building Materials

1. Recycled Content Materials: Use materials with post-consumer or post-industrial recycled content where feasible. Common products with recycled content include structural steel, aluminum windows, gypsum board, acoustical ceiling tiles, rubber floor tiles, carpeting and toilet partitions.
2. Durable & Flexible Materials: Utilize components and systems which are durable and easy to maintain. Where feasible, use materials which provide flexibility for future changes and modifications to occur.
3. Renewable Materials: Consider use of products that are comprised of raw materials that are in abundant supply or come from renewable sources. When feasible, obtain wood products from suppliers certified as utilizing sustainable harvesting methods.
4. Local Materials: Use products produced regionally where possible. See WMU General Requirements for use of Michigan products.
5. Construction Waste Management: Contractors are to develop a plan for sorting, storing & recycling of waste materials on projects. "Waste Spec" is to be used as a specification for this work. All projects shall implement a Construction Waste Management Plan, with the scope to be determined by the project team. A minimum of 50% of construction waste is to be salvaged, recycled or otherwise diverted from landfill or incineration.

6. Recycling Facilities: Plan for convenient areas in buildings for sorting & storage of recyclable items by the building occupants. See WMU Recycling Coordinator for type of items to be recycled & number of bins needed.

### Indoor Environmental Quality

1. Design for Human Health: Consider environmental needs of people in terms of daylight, ventilation, exterior views and thermal/acoustic/visual comfort for interior spaces. A direct line of sight to exterior vision glazing from 90% of all regularly occupied spaces is a long term goal.
2. Ventilation Requirements: Optimize the amount of fresh air provided to building spaces. Connect occupancy sensors & carbon dioxide monitors to HVAC systems, where feasible.
3. Low Emitting Materials: Utilize materials which have low levels of volatile organic compound off-gassing. Minimum requirements for 45% of materials (by cost):
  - Adhesives & sealants: VOC content less than limits of South Coast Air Quality Management District Rule No. 1168. Sealants used as fillers to comply with Bay Area Air Quality Management District Regulation 8, Rule 51.
  - Paints & coatings: VOC emissions that do not exceed Green Seal's Standard GS-11
  - Carpet: Comply with CRI Green Label Plus Testing program
  - Carpet cushion: Comply with CRI Green Label Testing program
  - Composite panels: No added urea formaldehyde resins.
4. Construction Air Quality Management: Protect ductwork and equipment from contamination during construction. At a minimum:
  - During construction, comply with SMACNA IAQ Guideline for Occupied Buildings Under Construction, 1995, Chapter 3.
  - Protect stored on-site or installed absorptive materials from moisture damage
  - If air handlers are used during construction, filtration media with a MERV value of 8 are to be used at each return grille, per ASHRAE 52.2-1999.
  - Replace all filtration media immediately prior to occupancy.
  - Conduct a 2 week building flush-out with new filtration media with 100% outside air after construction ends & prior to occupancy. After flush out, replace filtration media.or
  - Conduct a baseline indoor air quality testing procedure to demonstrate that concentration of air contaminants are below specified levels. Meet the testing requirements listed in LEED IEQ Credit 3.

### Site Work

1. Minimize Site Disturbance: Consider the impact of project on the surrounding ecosystem. Investigate methods to minimize impacts on natural habitats and watersheds.
2. Stormwater Management: Limit off site storm water runoff and employ methods to increase on-site infiltration. See WMU Campus Stormwater Plan.
3. Alternative Transportation: Provide site facilities to encourage pedestrian, bicycle and bus transport, where feasible.

4. Light Pollution Reduction: Minimize site lighting levels & off-site light spillover/ glare, while providing for adequate levels for security and wayfinding.
5. Water Efficient Landscaping: Utilize drought resistant plant materials and low flow irrigation techniques, where feasible. Consider use of native plant species.
6. Erosion & Sedimentation Control: Employ techniques such as silt fencing, sediment traps/filters, topsoil stockpiling and slope stabilization to minimize erosion of soil during construction. At a minimum, comply with EPA Document No. 832/R-92-005 (1992) Stormwater Management for Construction Activities, Chapter 3: Sedimentation & Erosion Control.

#### D. References

##### General

US Green Building Council- LEED Green Building Rating System, [www.usgbc.org](http://www.usgbc.org).

##### Energy Use

- ASHRAE Standard 90.1-1999 Energy Standard for Buildings except Low Rise Residential Buildings
- US DOE/EPA Energy Star Guidelines

##### Building Materials

- EPA Comprehensive Guide for Procurement of Products Containing Recovered Materials; Recovered Materials Advisory Notice III; Final rule (1/19/00) 40 CFR Part 247
- Forest Stewardship Council Guidelines
- Triangle J Council of Governments, "Waste Spec"- Model Specification for Construction Waste Reduction.
- South Coast Air Quality Management District Rule No. 1168- Adhesive Applications
- Bay Area Resources Board Regulation 8, Rule 51- Adhesive and Sealant Products
- Green Seal Paints and Coatings Requirements- Paints (GS-11), First Edition, 5/20/1993
- Carpet and Rug Institute Green Label Indoor Air Quality Test Program

##### Indoor Environmental Quality

- ASHRAE 62-1999: Ventilation for Acceptable Air Quality
- ASHRAE Standard 55-1992, Addenda 1995- Thermal Environment Conditions for Human Occupancy, Including ANSI/ASHRAE Addendum 55a-1995
- Sheet Metal & Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995

##### Site Work

- EPA Storm water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices
- IESNA Recommended Practice Manual: Lighting for Exterior Environments (RP-33-99)