OKLAHOMA STATE UNIVERSITY - BUILDING DESIGN STANDARDS

PART 1 GENERAL

1.01 SYSTEM DESCRIPTION

A. Requirements:

1. This standard, when applied, is intended to meet both House Bill 3394 (High Performance Buildings) and the following Oklahoma State University System energy efficiency and environmental building goals:

    a. Achieve the highest performance certification attainable when constructing or renovating public buildings, where the increased cost for high-performance certification can be recouped from decreased operation costs within five (5) years, including the time value of money (HB 3394).

    b. The increased initial cost is limited to five percent (5%) of the total cost of design and construction (HB 3394).

    c. The certification is per either the US Green Building Council's LEED design rating system (Leadership in Energy and Environmental Design) or Green Building Initiative's Green Globes rating system (HB 3394).

    d. Meet ENERGY STAR designation from the United States Environmental Protection Agency (HB 3394).

    e. Determine optimal performance level using life-cycle cost analysis (HB 3394).

    f. Confirm performance through third-party post construction review and verification (HB 3394).

    g. Applies to buildings that:

        i. Are constructed or renovated in whole or in part with state funds or with funds guaranteed by a state agency and the state funds constitute at least fifty percent (50%) of the project cost (HB 3394).

        ii. Contains ten thousand (10,000) or more gross square feet (HB 3394).

        iii. Includes a heating, ventilation, or air conditioning system (HB 3394).

        iv. Has not entered the design phase prior to July 1, 2008 (HB 3394).

    h. Exempt buildings include: public schools (as defined in Section 1-106 of Title 70), buildings constructed or renovated where the primary purpose is for storage of archived documents (HB 3394).

i. Minor construction (< 5,000 s.f.) and small renovations shall, to the greatest extent possible, be consistent with the standards for high-performance certification (HB 3394).

j. Laboratories will be designed using Labs 21 guidelines. This is an Oklahoma State University - Stillwater campus requirement.

B. Strategies:

1. The strategies, beginning with Paragraph C (below), are provided to help meet the requirements listed in Paragraph A above. These guidelines, in concert with LEED or GreenGlobes and Energy Star rating systems, will provide a measurable impact on building performance by promoting a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

2. Summary expectations in building planning, design and construction follow:

a. Incorporate environmentally responsible and sustainable concepts and practices into the planning, design and construction, using the U.S. Green Building Council's LEED® Rating system and ANSI/ASHRAE/IESNA Standard 90.1 latest edition as a general guideline. The goal is to exceed the ASHRAE energy standard for new construction by 20 percent and by 10 percent for major renovations.

b. To achieve the highest energy efficiency and lowest energy consumption, life-cycle costing will justify, as determined by the Design team.

c. To incorporate the most energy-efficient materials, products, equipment and systems consistent with program and budget.

d. To incorporate renewable energy technologies at the earliest possible stages of design, whenever they are technically and economically feasible, as determined by the Design team.

e. To use energy sources with low environmental impact.

f. To consider the project's impact on the utility infrastructure of the existing building and institution.

g. To utilize an integrated design approach with all disciplines working together starting from conceptual design, to evaluate the energy performance of architectural design concepts (e.g.: orientation, massing, fenestration, treatment of façade, materials, insulation), mechanical and electrical design criteria and concepts to produce high performance buildings with low first costs and operating costs.

C. General Strategy Applications:

1. Integrate building design with mechanical and electrical design to reduce building energy consumption (Reference ASHRAE 2007 Applications, Chapter 57). Work cooperatively as a team using building modeling and life cycle cost analysis to evaluate and revise the basic building concepts such as orientation, massing, envelope, materials, fenestration, shading, space programming and finishes to minimize heating, cooling, lighting and electrical requirements and energy consumption. Periodically collaborate in Design team peer review during conceptual, preliminary and Contract Document phases of design, to re-evaluate energy use and achieve an integrated energy conserving design.

   a. All new buildings and major renovations (in excess of 5,000 g.s.f.) will be designed to exceed by 20% for new construction and 10% for major renovations ANSI/ASHRAE/IESNA Standard 90.1 latest edition, Energy Standard for Buildings Except Low-Rise Residential Buildings.

   b. Optimizing Building Placement and Configuration for Energy Performance: Place, orient and configure the building on the site to minimize energy use by means of daylighting, solar heating, natural ventilation and shading from vegetation or other buildings. All new buildings and major remodeled buildings will be sub-metered for energy use (steam, electricity and chilled water) and water use for both domestic and irrigation systems. Optimize building mechanical and electrical systems to meet anticipated building operating schedules.

   c. For projects over $1,000,000 and for other projects as directed by the project's College or University, provide life cycle cost analysis of major building systems, including envelope materials, building heating, air conditioning and domestic water heating systems. Take into account first cost, energy cost, maintenance cost, replacement cost, annual recurring and non-annual costs. Select system and equipment types for lowest life cycle and operating cost.

D. Landscaping:

1. Select shade trees and shrubbery adjacent to buildings for reduction of cooling loads. Select plantings for minimal watering. Minimize turf areas and select native species and grasses. Specify mulches for plantings to retain soil moisture.

E. Irrigation and Specialty-use Water:

1. Minimize the need for irrigation. Consider and apply the appropriate strategies:

   a. Select drought tolerant plant species.

b. Use efficient irrigation systems that utilize technologies such as drip irrigation, moisture sensors and weather data-based controllers.

c. Match system to water use.

d. Use University or College-approved nozzles on irrigation heads.

e. Incorporate gray water systems. Lake Carl Blackwell in Stillwater, for example, could be an opportunity to provide raw, untreated water for the irrigation of the campus.

f. Utilize a subsoil drainage system to capture site and rain water and reuse for irrigation.

F. Building Envelope:

1. Design for low infiltration and highest practical insulation values. Detail envelope structural penetrations, soffits, window and door openings, pipe and conduit penetrations for low air infiltration and high weather resistance.

   a. Specify Low-E double or triple glazing with low shading coefficients and thermal breaks, high performance tint and medium reflective coating.

   b. Provide solar shading of window units.

   c. Limit building envelope fenestration to 25-percent of exposed perimeter surfaces.

   d. Minimum average insulation R-Values shall not be less than R-19 for walls and R-30 for roofs.

   e. Skylight systems, which are a part of roof assemblies, will not exceed 5-percent of the gross roof area. Skylights will be Low-E double glazed with thermal break, performance tint and medium reflective coating.

   f. Building envelope will be computer modeled to simulate energy performance using the PR Method. The building design must meet or exceed the minimum energy performance requirements of LEED® NC EAp2.

   g. Shading and Lighting systems to be used consistent with an appearance that respects the architectural style of the campus

G. Daylighting:

1. Provide Daylighting Integrated with Electric Lighting Controls: Ensure that daylighting is designed in coordination with the electric lighting system to reduce

energy consumption, while maintaining desired lighting characteristics. Consider and apply the appropriate strategies below:

a. Shape the architectural plan and section and use appropriate strategies to maximize the amount of useful, controlled daylight that penetrates into occupied spaces (e.g., roof monitors, clerestory windows, atriums and courtyards).

b. Use shading devices such as overhangs, louvers, vertical fins and vegetation on the south, east and west elevations to let in natural light, reduce glare and eliminate overheating.

c. Use light shelves combined with higher, more reflective ceilings, to bring natural light deeper into perimeter spaces and control glare and excessive contrast.

d. Select clear films or spectrally-selective low-e glazing to increase daylight, while minimizing heat gains.

e. Show through calculation, a minimum glazing factor of 2% in a minimum of 75% of all regularly occupied areas.

f. Or demonstrate, through computer simulation, that a minimum daylight illumination level of 25 footcandles has been achieved in a minimum of 75% of all regularly occupied areas.

g. Or demonstrate, through records of indoor light measurements, that a minimum daylight illumination level of 25 footcandles has been achieved in at least 75% of all regularly occupied areas.

h. Maximize natural daylighting throughout the facility.

i. Utilize solar tubes, fiber optic solar assemblies and associated systems to daylight building interiors. Types and locations will be approved by the Facilities Planning and Space Utilization Committee during Design development.

H. Lighting Systems and Controls:

1. Design the electric lighting systems and components to minimize electric lighting energy use, while still meeting project requirements and high visual quality. Consider and apply the appropriate strategies:

a. Use high efficiency lamps and luminaries with electronic ballasts.

b. Use controls to reduce energy use (e.g., dimmers, occupancy sensors, light system control and time clocks). Use sensors to control lighting levels in daylight spaces.

c. Use low levels of ambient light with task lighting where appropriate. Direct/indirect lighting fixtures illuminate ceilings and walls, producing low-level ambient light that minimizes glare in computer rooms.

d. Use compact fluorescents, in lieu of incandescent lamps.

e. Where functional requirements permit, lighting design should combine task and ambient lighting to reduce the high overall light levels.

f. Employ various photosensing technologies to conserve energy.

g. Designer's should consider induction lighting for street, parking lot, building exterior lights and other forms of exterior lighting on campus.

I. Mechanical System Performance:

1. Design the building heating, ventilating and air conditioning (HVAC) system to minimize energy use, while maintaining standards for indoor air quality and occupant comfort. Consider and apply the appropriate strategies below:

   a. Group occupancies and functions based on operating schedules and ventilation requirements to allow zoning of mechanical and electrical systems for minimum equipment and fixture operating hours.

   b. In building air conditioning systems, make extensive use of economizer cooling to use outside air instead of utilizing mechanical means to produce energy for cooling, whenever temperatures allow.

   c. Air handling systems will incorporate variable frequency drives to reduce fan energy and prolong motor life.

   d. Chilled water from the Central Chilled Water Plant and Distribution System is the preferred means to provide heat rejection. This allows the University or Colleges a savings in avoided costs related to individual air-cooled condensing units.

   e. Provide heat recovery systems to reduce energy costs by tempering (heating and/or cooling) ventilation air.

   f. The HVAC systems for all new buildings and major remodeled buildings will be controlled through the campus wide Energy Management System (EMS) and where possible, each HVAC system has an unoccupied mode sequence of controls. Cooling for communications equipment will be controlled at the minimum conditions established by the BDS (Building Design Standard) Section 16740 Voice/Data/Video Communications Systems.

   g. Apply direct/indirect evaporation cooling and/or pre-cooling for conditioned spaces.

h. When not using central chilled water or steam, design boilers, heat rejection, etc. using high efficiency equipment.

i. Modulate outside air according to occupancy, activities and operations. Use occupancy sensors and variable air volume distribution systems to minimize unnecessary heating or cooling.

j. Do not use domestic water for heat rejection, except as an emergency backup to another system.

k. Use heat recovery systems to reduce heating energy use.

l. Use zero CFC-based refrigerants in HVAC and refrigeration equipment. Phase out CFC-based refrigerants for renovation projects.

m. T.A.C. Niagara I/A system is Oklahoma States University's desired energy management system for all new buildings on the Stillwater campus.

n. Maintain condenser water as cool as possible, but not less than 20 degrees above chilled water supply temperature. (Recommended Strategy)

o. Correctly size mechanical equipment by improving estimates of heat gain from laboratory equipment.

p. Use control systems for variable speed drives on pumps, fans, and compressors only if the controls will be regularly maintained and calibrated.

q. Insulate hot water, steam, and chilled water piping.

r. Install an economizer at the boiler. (The water-side economizer will help with humidity controls.)

s. Capture waste heat from server and UPS rooms and use to pre-heat outside air.

t. Propose effective filter-replacement schedules to help keep indoor air quality high and conserve energy.

u. Reuse wasted heat with a heat recovery system.

v. Select an optimal minimum ventilation rate considering user needs, health and safety protection, and energy consumption.

w. Use efficient on-site energy-generation systems to reduce source energy use, including wind, biomass, micro generation, etc.

x. Recommended to use electronic air cleaners to help minimize air resistance from filters.

J. Equipment and Appliances:

1. Design and/or select all building equipment to optimize energy efficiency. Consider and apply the appropriate strategies below:

    a. Use equipment with high efficiency motors and variable speed drives.

    b. Select new equipment (including transformers) and appliances that meet EPA ENERGY STAR® criteria.

    c. Use efficient equipment to heat and supply service water to the building. When feasible, consider the use of tankless hot-water heating.

    d. All equipment shall be web based and send alarms from critical areas to the server. Alarms must be able to display on cell telephones and other mobile electronic devices, when there is a critical problem.

    e. During design development, a list of known equipment must be provided, so the HVAC system can be better defined and not based on watts per square foot. Equipment shall be documented for load (mechanical and electrical requirements) and be used to design per actual load.

K. Renewable and Alternate Energy Sources:

1. Consider the use of alternative energy sources and supply systems to reduce the building's total energy load and minimize environmental impacts of burning fossil fuels such as air pollution and global warming.

    a. Evaluate possibilities for the use of renewable energy (such as solar water heaters, geothermal heating and cooling systems, and solar walls).

    b. Evaluate feasibility of geothermal systems.

L. Erosion Control:

1. Consider and apply the appropriate strategies below:

    a. Prevent soil erosion before, during, and after construction by controlling storm water runoff and wind erosion. Consider silt fencing, sediment traps, construction phasing, stabilization of slopes, and maintaining and enhancing vegetation and groundcover.

    b. Protect hillsides using adequate erosion control measures such as hydro seeding, erosion control blankets and/or sedimentation ponds to collect runoff.

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M. Building Water Consumption:

1. Design building systems to reduce building water use to exceed the requirements of the Energy Policy Act (EPACT) of 1992. Consider and apply the appropriate strategies below:

    a. Use infrared faucet sensors and delayed action shut-off or automatic shut-off valves.

    b. Use low flow toilets, preferably dual-flush, which have been tested and rated to function reliably. EPACT requirement: 1.6 gallons (6 liter) per flush (GPF).

    c. Use waterless urinals or 0.5 gallons per flush urinals. EPACT requirement: 1.0 GFP.

    d. Use lavatory faucets with flow restrictors for a maximum rate of 0.5 gallons per minute (GPM) or use metering faucets at 0.25 gallons per cycle. EPACT requirements: 2.5 GPM.

    e. Use low-flow faucets. EPACT requirement: 2.5 GPM.

    f. Use low-flow shower heads. EPACT requirement: 2.5 GPM.

    g. Use dishwashers that use 10 gallons per cycle or less. Use commercial dishwashers that use 120 gallons per hour (conveyer type) or one gallon or less per rack (door type).

    h. Use clothes washers that meet EPA ENERGY STAR ® requirements.

    i. Provide filtration to provide a properly treated water source for low-flow fixtures, misters, steam generators, back-flow preventers, etc.

N. Labs and Research Areas :

1. Consider and apply the appropriate strategies below, when allowed by project budget:

    a. Implement Laboratories for the 21st Century (Labs21) guidelines. Labs 21 are co-sponsored by the U.S. Environmental Protection Agency (EPA) and U.S. Department of Energy (DOE).

    b. Employ variable geometry damper technology for fume stack discharge velocity control to reduce energy consumption.

    c. Use physical and computational modeling to assess and reduce the impact of air effluents.

d. Prevent the release of hazardous materials to sanitary sewers.

e. Use containment and engineering controls.

f. Eliminate the use of potable water for open loop cooling of laboratory equipment.

g. Maintain condenser water as cool as possible, but not less than 20 degrees above chilled water supply temperature.

h. Perform a comprehensive study of the supply/exhaust air system established minimum airflow requirements for laboratory temperature control and occupant safety.

i. Reduce energy consumption through the use of energy-efficient laboratory systems and equipment, such as high-performance fume hoods, energy-recovery devices, and low-pressure drop-ventilation-system design.

j. Reduce internal heat gain load design criteria for lab spaces and heavy equipment.

k. Use energy-efficient laboratory equipment, such as refrigerators and freezers.

l. Use a VAV system (e.g., VAV fume hoods) rather than a constant-volume system.

m. Utilize outside air efficiently and install a mechanical unit that introduces 100 percent outside air into classrooms and lecture halls. Return air from these areas is reconditioned and ducted to the laboratories as supply air. The supply air to the laboratories is exhausted.

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2. The following table is an example of sustainable design criteria for a specific laboratory. Each criterion must be reviewed for each specific project.

Sustainable Design Criteria				
Parameter	**Code Minimum**	**Code Reference**	**Standard Practice**	**Design Target**
Ventilation	10 cfm/person	ASHRAE 62/89	Same	Maximize outdoor air in the breathing zone
Filtration	none		35-80%	65% pre filter 85% final filter
Indoor Design Temperature	75° F summer 72° winter		Same	
Humidity Control	uncontrolled		uncontrolled	60% RH summer 40% RH winter
Equipment Heat Dissipation	NA		3-4W/sf	1.5W/sf or 2W/sf with 75% diversity factor
Toilet Exhaust	50 cfm/fixture	ASHRAE 62/89	Same	2 cfm/sf
Connected Lighting Heat Load	NA		2W/sf	0.5-0.75W/sf Total task/ambient with occupancy sensors and daylight sensors
Lighting Levels	100 ft. candles all direct		Same	20-30 ft. candles with ambient and task lighting

O. Indoor Air Quality (IAQ):

1. Consider and apply the appropriate strategies below, when allowed by project budget:

a. Meet the minimum requirements of Sections 4 through 7 of ASHRAE 62.1-2004, Ventilation for Acceptable Indoor Air Quality.

b. Mechanical ventilation systems will be designed using the Ventilation Rate Procedure or the applicable local code, whichever is more stringent.

c. Naturally ventilated buildings will comply with ASHRAE 62.1-2004, paragraph 5.1.

d. Install permanent monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements.

e. Provide additional outdoor air ventilation to improve air quality for improved occupant comfort, well being, and productivity.

f. For Mechanically Ventilated Spaces Increase:

   i. Breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004.

g. For Naturally Ventilated Spaces Design:

   i. Natural ventilation systems for occupied spaces to meet the recommendations set forth in the Carbon Trust “Good Practice Guide 237,” latest edition.

h. Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building.

i. Meet or exceed the recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, latest edition, Chapter 3.

j. Protect stored on-site or installed absorptive materials from moisture damage.

k. If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 will be used at each return air grille, as determined by ASHRAE 52.2-1999.

l. Replace all filtration media immediately prior to occupancy.

m. Base on LEED minimum requirement for a building flush out.

o. After construction ends and prior to occupancy, utilize testing protocols consistent with the United States Environmental Protection Agency Compendium of Methods for the Determination of Air Pollutants in Indoor Air.

Contaminant	Maximum Concentration
Formaldehyde	50 parts per billion
Particulates (PM10)	50 micrograms per cubic meter
Total Volatile Organic Compounds (TVOC)	500 micrograms per cubic meter
* 4-Phenylcyclohexene (4-PCH)	6.5 micrograms per cubic meter
Carbon Monoxide (CO)	9 part per million and no greater than 2 parts per million above outdoor levels

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P. Low-Emitting Materials: Adhesives & Sealants

1. Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.

2. Requirements for all adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of the following reference standards:

   a. Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management District (SCAQMD) Rule #1168. Use latest version of the (SCAQMD)

Q. Low-Emitting Materials: Paints & Coatings

1. Reduce the quantity of indoor air containments that are odorous, irritating, and/or harmful to the comfort and well-being of the installers and occupants.

2. The requirements for architectural paints, coatings, and primers applied to interior walls and ceilings:

   a. Do not exceed the VOC content limits established in Green Seal Standard GS-11, Paints, First Edition, May 20, 1993 or latest edition.

   b. Flats: 50 g/L

   c. Non-Flats: 150 g/L

3. Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates:

   a. Do not exceed the VOC content limit of 250 g/L established in Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.

4. Clear wood finishes, floor coatings, stains, and shellacs applied to interior elements:

   a. Do not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.

   b. Clear wood finishes: varnish 350 g/L; lacquer 550 g/L.

   c. Floor coatings: 100 g/L.

   d. Sealers: waterproofing sealers 250 g/L; sanding sealers 275 g/L; all other sealers 200 g/L.

   e. Shellacs: Clear 730 g/L; pigmented 550 g/L.

f. Stains: 250 g/L.

R. Low-Emitting Materials: Carpet Systems

1. Reduce the quantity of indoor air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of installers and occupants.

2. All carpet installed in the building interior shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program.

3. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.

4. All carpet adhesive shall meet VOC limit of 50 g/L.

S. Low-Emitting Materials: Composite Wood and Agrifiber Products

1. Reduce the quantity of indoor air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of installers and occupants.

2. Composite wood and agrifiber products used on the interior of the building (defined as inside of the weatherproofing system) shall contain no added urea-formaldehyde resins.

3. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

4. Composite wood and agrifiber products are defined as:

a. Particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

b. Materials considered fit-out, furniture, and equipment (FF&E) are not considered base building elements and are not included.

T. Indoor Chemical & Pollutant Source Control

1. Minimize exposure of building occupants to potentially hazardous particulates and chemical pollutants.

2. Design to minimize and control pollutant entry into buildings and later cross-contamination of regularly occupied areas.

a. Employ permanent entryway systems at least ten feet long in the primary direction of travel to capture dirt and particulates.

b. Acceptable entryway systems include permanently installed grates, grilles, or slotted systems that allow for cleaning underneath.

c. Exhaust hazardous gases or chemicals sufficiently to create negative pressure with respect to adjacent spaces with the doors closed.

d. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media prior to occupancy that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better.

U. Interiors Environmental Initiative Statement

1. Manufacturer will comply with all environmental laws, regulations and ordinances.

2. Manufacturers will implement an environmental policy to be upheld by all employees and all processes used in manufacturing the products.

3. Paints, stains, sealers, adhesives etc. should be formulated with low VOCs (Volatile Organic Compounds) and HAPs (Hazardous Air Pollutants) ingredients, both in the product production process and throughout the product's life-cycle.

4. Voluntary manufacturer and product participation in various environmental testing and certification programs (GreenGuard, U.S.Green Building Council, BIFMA, ANSI, U.L., and Energy Star) would be preferred.

5. Manufacturers will recycle various by-products from production process, e.g., recycle as fuel for heating physical plant or operating equipment; clean and re-circulate water used in process; reuse pallets; recycle scrap materials or re-use as feed stock for other products, etc.

6. Preference in using linoleum, rubber, wood laminate or PVC free composition tiles for resilient flooring.

7. Preference in using non-PVC products.

8. All wood sources should be from certified forests. Certification from various agencies assured that the wood is coming from responsibly-managed forests or tree farms and not from non-sustainable forests or tropical rain forests. Forest Stewardship Council (FSC) www.fscus.org is a third-party certification organization established to promote sustainable growth and harvesting practices throughout the world's forests. A companion group, the Certified Wood and Paper Association (CWPA) www.cwpa.info has information related to obtaining LEED credits using certified wood products.

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9. Preference for broadloom and modular carpets to be made from recycled/reclaimed or recyclable materials.

10. Preference for water-based or powder-coat finishes that reduce or eliminate VOCs.

11. Preference for products (finishes and furnishings) that are made from post-industrial recycled/reclaimed or recyclable materials. Preference is placed on materials with a higher recycled content.

12. Manufacturers will use reclamation processes in their shipping practices, such as blanket wrapping, using recycled or recyclable packaging to protect product, etc.

13. Preference for products that are manufactured in as close proximity to the building project as is practicable to reduce carbon emission “footprint” of transportation.

14. Preference for classroom ceilings to be at least 10’-0” in height with acoustically “hard” surfaces located along the “teaching” wall and in the middle. The more reflective “hard” surfaces will help reflect speech towards the back of the room.

15. Preference for classrooms in providing wall finishes as a 6’-8” wainscot (7’-0” with 7’-0” doors) surrounding the classroom with the remaining wall height being painted white. With the increase reflectiveness for the room the ceiling and the upper walls enhance of the lighting system.

16. Preference in using multi-scene indirect/direct linear pendant luminaries for general classroom lighting. Provide separate direct lighting for the “teaching” wall. Incorporate occupancy and day lighting sensor(s) to control lighting levels. Controls will have manual override. The occupancy and day lighting sensors will automatically reduce the light fixture lighting levels when day light is sufficient or the room is not occupied.

END OF SECTION 18115