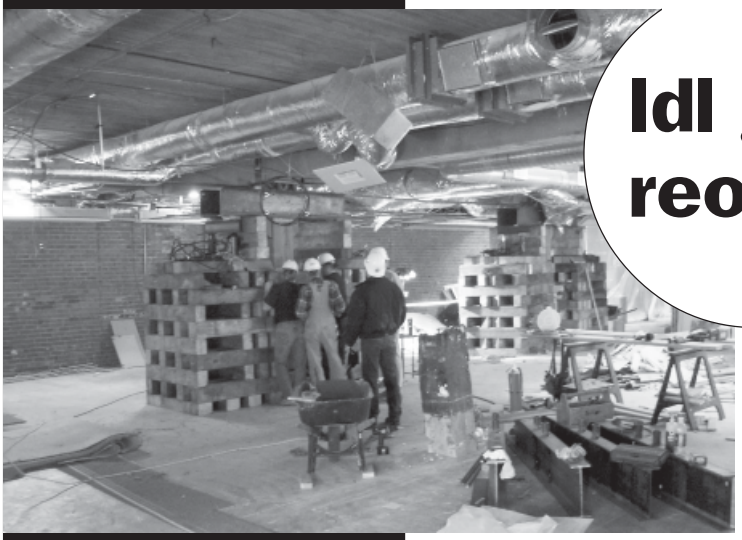
lighting design lab

ldl grand reopening



Above: view of structural repair work at the Lighting Design Lab. Problems with the building's foundation were uncovered during remodeling and had to be corrected immediately.

News

in this issue.

• a funny thing happened on the way to the Lighting Design Lab renovation...
In January we began a simple remodel. Unfortunately, we uncovered problems with the building's foundation that had to be corrected before we could proceed. We even had to move out for a while. We are moving back and will soon be open for business in our fresh new quarters. As a thank you for your patience, we are inviting everyone to our Grand Reopening. See page 5 for details and registration.

• sustainable lighting classes
The Lighting Design Lab continues our series of lighting classes that focus on creating more energy effective lighting in buildings. This quarter's series concludes the curriculum with *Energy Effective Lighting Controls* and *Lighting Retrofits*. See class descriptions on page 4, or page 6 for registration details. Secure on-line registration for all of our events is on our website at *www.lightingdesignlab.com*. Classes are eligible for continuing education credits for most organizations.

• new BetterBricks Daylighting Lab phones
As the daylighting services and staff of the BetterBricks Daylighting staff has expanded, they grew into the need for their own phone system and administrative support. You may contact the daylighting specialists or schedule a model study at 206-616-6566, and then select an option. More phone numbers are listed on page 8 of this newsletter or online at *www.lightingdesignlab.com/ldl/betterbricksphones.htm*.

• new LRC report on "full spectrum"
The National Lighting Product Information Program (NLPIP) at the Lighting Research Center has always been a terrific place to get the latest reports on lighting topics. Continuing in that tradition, they have released a new topic in their *Lighting Answers* series on "full-spectrum" lighting. This report examines the various claims for these products and provided a balanced review. You may find the report for free online at *www.lrc.rpi.edu/programs/NLPIP/publicationResults.asp?type=2*

• LIVE! from the LRC: an internet teleconference seminar series
This is a seminar series brought to you by the Lighting Research Center (LRC) of Rensselaer Polytechnic Institute, the leading research and educational institution in lighting. Each month, LIVE! from the LRC brings lighting experts to your office to give you the latest information on topics important to you and your business and allows you to have your questions answered by the leading authorities in lighting today. The LDL will be hosting some of the sessions. More details are found at *www.lrc.rpi.edu/education/outreachEducation/livefromthelrc.asp.*

high performance T-8s.

by Michael Lane LC

Super", "Premium", "Enhanced", "High-Lumen" T8's. What are they? Who makes them? Should you use them, and most importantly what should you call them? High Performance T8's is the correct name.

The basic definition is a lamp that produces 3100 or higher initial lumens and 2915 or greater mean lumens, a Color Rendering Index (CRI) of at least 82 and a rated life of 24,000 hours or greater.

The three major fluorescent lamp manufacturers make lamps that meet these specifications. The GE–Starcoat HL, the Osram/Sylvania–Octron 800 XPS and the Philips–Advantage T8 are the lamps families that comply.

There seems to be two main reasons to use this lamp – higher lumens per watt and longer lamp life.

For the lumens per watt issue, using the mean lamp lumen data (lumens at 8,000 hours) and not including the ballast data (more later on ballasts) the 70 series lamps produce around 83.6 (2675/32) mean lumens per watt, the 80 series lamps produce around 87.5 (2800/32) mean lumens per watt and the "high performance T8" lamps produce around 92.0 (2945/32) mean lumens per watt. This is a 10% increase in light output over the standard 70 series T8, using the same wattage.

Figure 1 below does not fully tell the lamp life story. Using instant start ballasts, which make up between 70% – 90% of the market, on these rapid start lamps may shorten lamp life. Operating lamps longer than the industry standard test procedure of 3 hours per start will increase lamp life (see Fig 2.).

High Performance T8 lamps should be thought of as a system (lamp+ballast). Used by themselves they will produce 10% more light and last 20+% longer than standard T8's, but will save NO energy.

Combined with an industry standard low-power instant start ballast (0.77 ballast factor) that uses 51 watts will have a 12% energy savings while producing almost as much light (96%). Using one of the new high-efficiency ballasts saves even more power (17%).

As an example: A 2-lamp F32T8/7xx at 2675 mean lumens on a standard instant start ballast (0.88 ballast factor) will use 58 watts and produce 4708 mean system lumens. A 2-lamp "high performance T8" at 2945 mean lumens on a high-efficiency low-power ballast (0.77 ballast factor) will use 48 watts and produce 4535 mean system lumens. A 4% reduction in mean lumens but it has a 17% reduction in power with a 20% increase in life.

Fig 1: High Performance T8 Systems Comparison

Manufacturer	Catalog #	Initial lumens	Mean lumens	Life	CRI
GE	F32T8/SPxx	2850	2710	20,000	75 -- 78
Philips	F32T8/TL7xx/ALTO	2850	2710	20,000	78
Sylvania	FO32/7xx	2800	2520	20,000	75
GE	F32T8/XL/SPXxx/HL/ECO	3100	2915	24,000	82 -- 85
Philips	F32T8/ADV8xx/ALTO	3100	2950	24,000	86
Sylvania	FO32/8xx/XPS/ECO	3150	2992	30,000	85

Fig 2: Lamp Life on Ballast Systems

		Lamp life at 3 hours per start		
Manufacturer	Catalog #	Instant Start ballast	Program Start Ballast	Osram PSX ballast
GE	F32T8/SPxx	15,000	20,000	
Philips	F32T8/TL7xx/ALTO	15,000	20,000	
Sylvania	FO32/7xx	15,000	20,000	
GE	F32T8/XL/SPXxx/HL/ECO	24,000	24,000	
Philips	F32T8/ADV8xx/ALTO	24,000	30,000	
Sylvania	FO32/8xx/XPS/ECO	15,000	24,000	30,000

super T-8 resources.

Consortium for Energy Efficiency (CEE)
www.cee1.org/resrc/news/03-05nl/12_t8.html

NationalgridUS
www.nationalgridus.com/non_html/shared_energyeff_super_t8.pdf

ReBuild America
www.rebuild.org/attachments/presentations/EdFacLightingBirleanu03.pdf

Public Interest Energy Research
www.archenergy.com/lrp/advlight_luminaires/4.5_presentation_Nov_2003.pdf

Energy Trust of Oregon
www.energytrust.org/Pages/trade_allies/Ally/030225_Form_190.pdf

LDL Articles - Cutting Edge Fluorescent
www.lightingdesignlab.com/ldlnews/cutting_edge_fluor_rs.pdf

Bonneville Power Administration
www.bpa.gov/energy/n/projects/conserve_augmentation/eso/high_per_fluor_faq.pdf

Energy User News
www.energyusernews.com/CDA/ArticleInformation/features/BNP__Features__Item/0,2584,95134,00.html

BETTERBRICKS

energy code corner.

by Michael Lane LC

The United States Department of Energy's Energy Policy Act of 1992 instituted a plan to make energy codes more uniform nationwide by requiring states to certify their energy codes are at least as strict as ASHRAE 90.1. So some states use ASHRAE 90.1, their own unique codes, or the International Energy Conservation Code.

Most of the commercial energy codes are based on ASHRAE 90.1, which will publish a 2004 revised Standard later this year. Energy standards and codes are in a constant state of revision, and our region adopts, enforces, evaluates and changes energy codes regularly. Oregon adopted a new code last year, and Idaho adopted a commercial energy code for the first time. Montana still uses the 1989 version of ASHRAE. Washington and Seattle are ending their current evaluation cycles. California's Title 24 is due for revision in 2005.

Michael Lane, LDL's senior lighting specialist, has been on the ASHRAE 90.1 lighting subcommittee for several years. He also is a part of a joint ASHRAE/DOE/AIA group developing a design guide for highly efficent building designs.

The following table shows that even with the effort by DOE to standardize, there is still significant variation between states.

• Comparisons of current codes for an open office space—sample lighting power budgets

	W/ft²
ASHRAE 2004	1.0
Seattle NREC	1.0
Washington NREC	1.2
Oregon NREC	1.0
Idaho IECC	1.0
Montana ASHRAE(89)	1.7
California Title 24	1.2

ecode resources

ASHRAE 90.1
www.ashrae.org

Seattle Energy Code
www.seattle.gov/dpd/energy/nonres/CHAP11.htm

Washington State Energy Code
www.sbcc.wa.gov/docs/01Anrg.pdf

Oregon Energy Code
www.energy.state.or.us/code/cdnonres.htm

Idaho Energy Code
www2.state.id.us/dbs/energy/energy_code.html

Montana Energy Code
www.discoveringmontana.com/dlj/bsd/bc

International Code Council
(includes International Energy Code)
www.iccsafe.org/

reinventing lighting design.

by Diana Grant

I suggest a new holistic integrated approach to lighting design. This approach would broaden the lighting designer job definition to plan and design with light coming from all sources, including natural light and light reflected off interior surfaces. Competencies in analysis of natural light entering the building, electric lighting design, knowledge of color theory and surface reflectivity of materials would be necessary. The proficient lighting designer would also be current on the latest research on the aging eye, light and health. Then, we may be able to design the total visual environment as if people mattered.

Currently, the daylighting consultant often doesn't deal specifically with the electric lighting and the lighting designer only specifies electric lighting fixtures and controls. The interior designer looks at surfaces, but may not be aware of the result of interaction with surface reflectances and multiple light sources. All these consultants are involved in the building design at different phases of the process. In the fifteen years I have worked at the Lab, I have seen maybe one lighting designer accompany the architect to model natural light entering the building.

As a result, we see highly polished marble floors valued and budgeted in brand new public buildings, next to large windows which turn the floor into a giant light reflector, bouncing light into our eyes and creating highly specular patches of glare. Research on the aging eye documents that falls and injuries can be traced to the fact that the elderly can't see where to put their feet. This is a problem at curbs, on stairs and highly polished floors. Who can predict the people impact of the interactions of the total visual environment?

Someone needs to be in charge of analyzing the interaction of surfaces and lighting from multiple sources, to control and combine them into a cohesive whole, making the building a pleasure to be in. I think this is the job of the Lighting Designer, if they can broaden their knowledge to include designing with light from all sources whether it is the sun, electricity or light bounced off surfaces. Perhaps, if the lighting designer expanded their professional purview they would be brought into the design process earlier, and stay involved through installation and commissioning of the visual systems.

spring & summer 2004 events.

Registration on Page 6

did you know?

Members of professional design organizations (AIA, NCQLP/LC, ALA, BOC, and others) may be able to receive continuing education credits for attending events offered by the LDL.

To self-certify your credits (sometimes called learning units) make sure you keep the Certificate of Completion that we distribute at each event.

Learning unit credits are almost always issued at a rate equal to the contact hours. So a 3 hour class would be worth 3 credits.

For information about how your organization works with continuing education credits visit their website at:

AIA
aia.org

ALA
americanlightingassoc.com

ASID
asid.org

BOC
neec.net/boc.htm

BOMA
boma.org

IFMA
ifma.org

IIDA
iida.com

NCQLP
ncqlp.org

BETTERBRICKS

All Registration **must be in advance**. All fees must be **paid in advance**. No registrations or fees will be accepted at the door. On-line registration is available at ***http://www.lightingdesignlab.com/classes***

sustainable lighting classes

1 • energy effective lighting controls. $30

Eugene:	Tuesday, May 11	• 2:00pm - 5:00pm
Portland:	Wednesday, May 12	• 2:00pm - 5:00pm
Billings:	Monday, May 17	• 1:00pm - 4:00pm
Missoula:	Thursday, May 20	• 1:00pm - 4:00pm
Boise:	Wednesday, May 26	• 2:00pm - 5:00pm
Pocatello:	Thursday, May 27	• 2:00pm - 5:00pm
Seattle:	Thursday, June 3	• 2:00pm - 5:00pm
Spokane:	Thursday, June 24	• 2:00pm - 5:00pm

The most energy efficient lighting is lighting that's not on when it's not really needed. Effective use of lighting controls requires an understanding of how occupants use buildings and where lighting energy use can be trimmed while promoting visual quality, or at least not harming it. This class reviews lighting controls strategies, currently available equipment, and proper application in the real world. The importance of commissioning is also discussed. The student will leave with an understanding of the different types of control technologies, a process for evaluation of the appropriateness of control types for different applications, and a general understanding of the typical effect of lighting controls on energy use.
(3 CEU contact hours)

2 • lighting retrofits. $30

Eugene:	Tuesday, June 8	• 2:00pm - 5:00pm
Portland:	Wednesday, June 9	• 2:00pm - 5:00pm
Boise:	Wednesday, June 16	• 2:00pm - 5:00pm
Pocatello:	Thursday, June 17	• 2:00pm - 5:00pm
Seattle:	Wednesday, June 30	• 2:00pm - 5:00pm
Billings:	Monday, July 19	• 1:00pm - 4:00pm
Missoula:	Thursday, July 22	• 1:00pm - 4:00pm
Spokane:	Monday, August 16	• 2:00pm - 5:00pm

Most lighting resides in our existing buildings. This class explains the steps to identify, catalogue, and evaluate the lighting found in a building. Identifying opportunities for improvements in energy efficiency, lighting quality, and lighting maintenance are reviewed. Determining the appropriateness of simply changing a lamp, retrofitting a ballast, replacing a luminaire, or performing a complete redesign will be examined. The student will leave with an understanding of evaluating the lighting in a building, identifying opportunities, and estimating payback periods for different measures.
(3 CEU contact hours)

• project design reviews. no cost.
The lighting specialist is available to provide schematic design review of proposed lighting strategies on your commercial and industrial lighting projects. Please contact the specialist for your territory to directly set up an appointment in your office.

 = basic  = intermediate  = expert

3 • lrc update. no charge.

Seattle: Thursday, May 6 • 3:00pm - 4:00pm
This session will be held at the Tech Room at Sparling Electrical Engineers

Russ Leslie from the Lighting Research Center will present a seminar on *Application Opportunities from Research*. This overview of recent research results covers lighting controls, daylighting, human factors, and solid state lighting. The focus will be on the implications of the research for lighting practice.

• LIVE! from the LRC Internet Teleconference Seminar Series. no charge.

Live! From the LRC is a new online educational seminar series designed for architects, engineers, facility owners and managers, developers, energy service professionals, public safety officials, and other professionals needing a better understanding of light and lighting. The Lighting Research Center (LRC) at Rensselaer Polytechnic Institute developed the series to bring lighting experts via the Internet to your desktop to provide the latest information on important lighting topics.
(1.5 CEU contact hours per session)

All sessions in Seattle

4. LEDs—The Solid-State Lighting Revolution May 12 • 10:00am - 11:30pm
This seminar will provide a clear picture of the current state of LED technology and its potential for development over the next five years.

5. Light and Health June 16 • 10:00am - 11:30pm
This seminar will explore the role that light plays in human health and wellness, including recent research findings in the areas of light and circadian disruption, light and alertness at night and during the day, lighting to help people with Alzheimer's disease, light's role in sleep disorders and seasonal affective disorder (SAD), and lighting for premature infants.

6 • ldl reopen house. no charge.

Seattle: Friday, July 9 • 2:00pm - 5:00pm
This session will be held at the Lighting Design Lab

By July, the Lighting Design Lab will have completed the structural repairs and our remodel. We will again be open for visitors to use our services and we invite everyone to stop by for a tour of our spiffy new premises. Come by the Lab and see what is new — get a tour, see the new displays, or talk to a staff member about your lighting questions and projects.

ldl class locations:

Billings: Prudential Floberg Realtors
1550 Poly Drive
Billings MT

Boise: Albertsons West Plaza
Training Room 1
220 Parkcenter Blvd
Boise ID

Eugene: EWEB Community Room
500 E 4th Ave
Eugene OR

Missoula: Univ. of Montana
Continuing Education
Todd Building
Room 203
Missoula MT

Pocatello: Idaho Power Meeting Room
301 East Benton St
Pocatello ID

Portland: Univ. of Oregon Portland Center
Portland Room #102
722 SW 2nd Ave
Portland, OR

Seattle: Lighting Design Lab
400 E Pine St
Suite 100
Seattle WA

OR

Sparling Electrical Engineering Tech Room
720 Olive Way, Suite 1400
Seattle WA

Spokane: WSU Spokane
Phase I Classroom Bldg
668 N Riverpoint Blvd
Spokane WA

registration form.

Spring & Summer 2004 Classes

PAYMENT POLICY: Fees Must Be Paid In Advance before attending class. Purchase Orders, checks, and credit cards are accepted. Complete and fax this form to 206-329-9532. Class fees are waived for university students and employees of sponsoring electric Utilities. **No Payment or Registration Will Be Accepted At The Door.**

Secure On-line registration is available at *http://www.lightingdesignlab.com/classes*

registration fee paid by. (circle one)
credit card · enclosed check · purchase order · Utility employee fee waiver · university student fee waiver

registration information.

Name ·

Company ·

Profession ·

I Pay My Electric Bill To ·

billing information. (must be complete to process card transactions)

Phone · Fax ·

E-Mail ·

Address ·

City, State, Zip ·

Credit Card Number (VISA & MasterCard ONLY) · Please include your CVV Code - last 3 digits of the number on the back of your card near your signature

Expiration Date ·

please check the circles of the class(es) and event(s) you wish to attend (on-line registration available).
event locations on page 5.

1 • controls. $30
- ❍ Eugene: Tues 5/11 · 2:00pm - 5:00pm
- ❍ Portland: Wed 5/12 · 2:00pm - 5:00pm
- ❍ Billings: Mon 5/17 · 1:00pm - 4:00pm
- ❍ Missoula: Thurs 5/20 · 1:00pm - 4:00pm
- ❍ Boise: Wed 5/26 · 2:00pm - 5:00pm
- ❍ Pocatello: Thurs 5/27 · 2:00pm - 5:00pm
- ❍ Seattle: Thurs 6/3 · 2:00pm - 5:00pm
- ❍ Spokane: Thurs 6/24 · 2:00pm - 5:00pm

2 • retrofits. $30
- ❍ Eugene: Tues 6/8 · 2:00pm - 5:00pm
- ❍ Portland: Wed 6/9 · 2:00pm - 5:00pm
- ❍ Boise: Wed 6/16 · 2:00pm - 5:00pm
- ❍ Pocatello: Thurs 6/17 · 2:00pm - 5:00pm
- ❍ Seattle: Wed 6/30 · 2:00pm - 5:00pm
- ❍ Billings: Mon 7/19 · 1:00pm - 4:00pm
- ❍ Missoula: Thurs 7/22 · 1:00pm - 4:00pm
- ❍ Spokane: Mon 8/16 · 2:00pm - 5:00pm

3 • lrc update. no charge.
- ❍ Seattle: Thurs 5/6 · 3:00pm - 4:00pm

• LIVE! from the LRC. no charge.
All in Seattle
- **4** ❍ May 12 LED Lighting · 10:00am - 11:30pm
- **5** ❍ June 16 Light & Health · 10:00am - 11:30pm

6 • ldl reopen house. no charge.
- ❍ Seattle: Fri 7/9 · 2:00pm - 5:00pm

You can register instantly and securely on-line. Payment is accepted by credit card, check and purchase order.
www.lightingdesignlab.com/classes

refining the window.

by Chris Meek

Daylighting is a lot more than adding a lot of windows to a space. We repeat this statement a lot, and for good reason. Windows can often cause as many problems as benefits. The list is long: glare, heat gain, heat loss, and contrast that can make spaces feel even darker than they are.

An effective strategy for daylighting is to separate the window into its component functions. The two primary issues (excluding ventilation) include providing diffuse light into the space and maintaining comfortable views to the exterior.

The "Daylight" window's primary function is to provide a maximum amount of daylight deep into the space from the perimeter. This window is often high in the space, to bring light deep into the building. It also keeps the brightest source of light out of the visual field. Typically the daylight provided to the interior will be approximately 2 times the head height of the window. We recommend using High Performance (selective transmissivity) glass in this application: glass which provides high visible light transmission (Tvis 70 %+) and low solar heat gain coefficient (SHGC 25% or less).

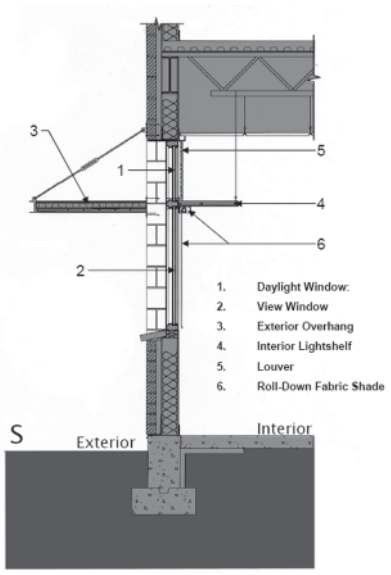
The "View" window's primary function is to provide a comfortable view to the exterior. Often this window is low in the space, to give the amenity of view corridors to the building users. This gives the occupants the ability to relax their eye muscles by allowing for deep visual focus. It also gives people a connection to the ever-changing outdoor environment which provides mental stimulation to workers who often spend significant stretches of time in fixed workstations. The glazing in the view window is often tinted to about 50% visible light transmission. This reduces the contrast ratio between the interior surfaces of the space and the much-brighter exterior view. This will help to avoid glare at the perimeter of a space.

An exterior overhang that is about as deep as the window it is shading is high (1:1 Ratio) will shade a south facing window during the hottest times of the year. It will also block direct sun from entering the space between March 21st and September 21st. This will reduce solar gain through the glazing significantly during these times of the year.

In areas where it is cloudy much of the year (i.e. west of the Cascades), this strategy will provide sun control during most clear sky days. Overcast skies diffuse direct sun during the low sun angle days of winter.

Additionally, in building types such as schools and offices where occupancy times are limited to mornings through early afternoons (until 3PM), this strategy can be used on the West elevation as well. By the time the sun comes around enough to begin entering the space, many of the occupants will have left the space. Heat gain incurred in the afternoon can be night-flushed and the space will be cool at the beginning of the occupancy cycle the next morning.

Conversely, east facing horizontal overhangs can shade glazing after 10AM during most of the year. This can work well in buildings, such as libraries, where occupancy is primarily during the afternoon. The space-planning ramifications of this suggest that interior functions be organized around the patterns of direct sun.



An interior lightshelf provides three major benefits to a space. First, it can serve to block direct sun from penetrating into the space through the upper "daylight" window. Second, it reduces light levels at the perimeter, creating a more evenly distributed illuminance across the section of a room. Third, it reflects diffuse light onto the ceiling plane, where much of our perception of the brightness of a space comes from. Since the glazing in the "daylight" window is not shaded from the exterior it is crucial that the glass have properties of low solar heat gain coefficient (SHGC).

When designing a lightshelf, it is important to consider that a bright white (or translucent) matte finish surface will provide the most light diffusing quality, and will have less contrast with the light source it is obscuring. Nothing can be more frustrating to users than the inability to exert some basic level of control over their windows. Often a continuous louver blind is used over the entire window. When direct sun is a problem, occupants close the blinds, eliminating daylight and blocking views. One strategy to deal with this is to differentiate the interior sun control devices by the window "type" they serve.

Interior louver blinds in the upper "daylight" window can provide direct sun control without significantly reducing the amount of diffuse daylight entering the space. They can be adjusted seasonally to block direct sun when low sun angles threaten to come in over the interior lightshelf.

An interior roll-down shade can control glare at "view" windows without significantly reducing the ability of the window to provide views to the exterior. Always use a dark colored surface on the interior of the roll-down shade fabric. This allows for a comfortable view through the fabric, and provides room-darkening capabilities.

Newer, woven fiberglass fabrics provide a dark interior surface while maintaining a light colored exterior surface. The bright exterior surface reflects much of the solar heat gain back out through the window while the dark interior surface allows for a maintained view corridor from the interior.

North windows need to be clear (high visible light transmittance), due to the fact that north sky, especially on clear sky days provides much less light than the south sky. Ideally, north windows will be larger than south windows for this reason. Heat-loss is a major issue on the north side, so this often controls the size of glazing allowable in this orientation. We always recommend low-e glass for north facing applications.

In most climate zones, for typical occupancy times, direct sun is not a critical concern- making sun control devices (excepting louver blinds) unnecessary.

These strategies can be employed as shown in the simple window diagram, although the concepts can be applied across any formal approach or scale. For more information on this and other daylighting related topics contact the BetterBricks Daylighting Lab at (206) 616-6566.

lighting design lab

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Tacoma Power
British Columbia Hydro
University of Washington
State of Alaska

BetterBricks is a nonprofit initiative of the Northwest Energy Efficiency Alliance. Our free service connects commercial building professionals with the information, tools, training and consultation needed to design and construct high performance buildings. To learn more about our services, call 1.888.216.5357 or visit our website at BetterBricks.com.

With support from:

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