DAYLIGHTING STANDARDS FOR STATE FACILITIES

GENERAL

In order to improve the human, energy and environmental performance of state facilities, the Division of Facilities Development (DFD) has developed these daylighting standards. It is the intent of these standards to create better-performing facilities that will:

1) Promote human health, comfort and performance;
2) Conserve natural resources and reduce detrimental effects on the environment; and
3) Reduce energy consumption.

These standards set forth concepts and minimum requirements for daylighting state facilities—admitting natural light of appropriate quantity and quality while controlling electric lighting in response to the daylight.

INTEGRATED DESIGN APPROACH

The concepts underlying these daylighting standards are an attempt to balance the contradictory influences of the sun's energy in contributing to heat, lighting, comfort and glare. Achieving a practical balance requires that these issues be understood and approached through an integrated, interdisciplinary process from the earliest stages of design. An integrated approach requires that the architect consider HVAC, electrical and lighting loads in making fundamental decisions about the basic building concept, functional relationships and architectural form (including orientation, massing, fenestration, treatment of façade, interior finishes and lighting). See the DFD Policy & Procedure Manual for Architects/Engineers and Consultants for policy on "Energy Conservation" (Section 4.G.) and "Integrated Design Process" (Section 4.G.2).

DFD expects the prime A/E to evaluate and challenge program requirements that add to HVAC and electrical loads and to demonstrate commitment and leadership towards achieving the goals and daylighting strategies stated herein. The mechanical, electrical and lighting subconsultants are expected to be involved early and to provide critical and timely feedback on architectural issues affecting energy use. Through such an interactive, multi-disciplinary approach the design team will find creative, common sense, synergistic solutions that satisfy these performance criteria, as well as the functional program requirements of the users.

OBJECTIVES

Compared to conventional, code-compliant buildings, DFD expects state-owned facilities to be designed to achieve the following general objectives without significantly increasing total construction cost:

- Promote user health and comfort, and enhance satisfaction and productivity;
- Incorporate more sustainable, environmentally-responsible design and construction practices;
- Reduce peak electrical demand;
- Reduce total installed air-conditioning capacity and total fan power;
- Reduce total installed lighting power density;
- Reduce building-related energy use significantly below building code requirements;
- Minimize lifetime building utility, maintenance and repair costs.

APPLICABILITY

These daylighting standards apply to all buildings with windows, air-conditioning, and significant daytime occupancies. DFD expects that all new construction and renovation projects that involve the installation, replacement, reconfiguration or re-glazing of windows will incorporate these daylighting performance criteria, as possible. Compliance with the "Acceptable" performance level shown in Table 1 is required. The "Preferred" levels of compliance listed in Table 1 are encouraged, but not mandated at this time.

If the A/E believes that a particular program requirement will be compromised by these daylighting standards, DFD expects the A/E to discuss the special circumstances with the DFD Project Manager prior to beginning design. The A/E shall balance these daylighting requirements against program requirements on a space-by-space basis.

COOLING LOAD AVOIDANCE

One of the primary goals of these daylighting performance standards is reducing cooling loads. Appropriate fenestration, reducing the amount of glazing (which is generally more costly than solid exterior wall construction), improving glass performance, and decreasing the connected lighting power can significantly reduce peak cooling loads. This, in turn, will permit downsizing of HVAC equipment, one of the main objectives of cool daylighting[1]. Equipment downsizing, along with subsequent reductions in supply air fan horsepower and duct sizes, will reduce the first cost as well as life-cycle cost of the building, and will typically offset the cost of the necessary high-performance glazing, window treatments and lighting systems. It is generally more economical on a life-cycle basis to mitigate lighting and solar cooling loads architecturally than by adding capacity to the HVAC system.

LIGHTING QUALITY AND DISTRIBUTION

Another primary goal of these design standards is enhancement of the indoor visual and thermal environment. Human health, comfort and productivity should always be enhanced, and never compromised, in the fulfillment of these requirements. For each project DFD expects designers to carefully examine the stated program goals related to lighting, glazing, views, and activities which require or shun light, in the context of the practical lighting needs of the contemporary computer-equipped office and computer/video-based learning environment. Too much light is as unacceptable as too little. Lighting quality and contrasts are as important as simple foot-candle requirements[2]. Localized user control of both daylight and electric light should also be considered in order to enhance user satisfaction as well as energy savings.

Avoiding unwanted glare and heat gain sometimes results in architectural solutions with minimal window areas. However, human health and performance are enhanced by a significant degree of transparency and exposure to natural light and views to the changing outside environment. Effective “transparency” means that there are multiple view lines outward, allowing views of horizon and sky. The A/E shall endeavor to provide natural light and views to the greatest possible number of occupants—meaning that space is planned with enclosed offices located toward the interior, leaving open offices along the perimeter, and service spaces (toilets, storage, vertical circulation, etc.) and intermittent occupancies located deeper within the windowless interior. Interior glazing should be used to allow views above and through perimeter offices for occupants of interior zones. Architectural form can be extended/narrowed to increase the percentage of perimeter to core space.

DAYLIGHTING PERFORMANCE CRITERIA

Successful daylighting design takes many forms, varying with building type, site parameters and program requirements. Specific design solutions, features and methods are not as important as overall results. Incorporating these strategies holistically into every design will prevent the most common problems associated with daylighting—increased cooling loads, peak power demands and visual glare. The following cool daylighting criteria, listed in order of importance, represent a simple, straightforward, integrated approach. This approach is intended to permit great flexibility and to encourage innovation. The design team is encouraged to use additional means to achieve these goals.

***REQUIRED* DAYLIGHTING STRATEGIES:**

The following seven daylighting performance criteria, summarized in Table 1, are the foundation of the cool daylighting approach and are mandatory for state-owned facilities.

Criterion 1: Glass Area

While transparency and daylighting are important, over-glazing is possible and must be avoided. A typical contemporary office building with fenestration based on traditional visual and aesthetic criteria commonly has more glazing than required for adequate daylighting. Sizing and placement of glass must be judicious, intentional and without waste. Decreasing the ratio of windows to exterior wall area is one of the most cost-effective architectural design strategies for enhancing the energy performance of internal-load-dominated commercial buildings. The window-wall ratios (WWR) must be applied at the schematic design stage, since they have a significant effect on a building’s appearance as well as energy performance. The window-wall ratios must be checked regularly throughout schematics and design development and kept within the limits of Table 1.

The window-wall ratio is the ratio of window area to gross exterior wall area. Window area includes glass plus framing for all windows and glazed doors. The gross exterior wall area is the total exterior wall surface from the lowest floor level up to the top of the roof deck for all spaces that will be mechanically cooled. The WWR is calculated for each elevation separately.

If special site or program requirements conflict with these window-wall ratios, the A/E may propose alternatives for DFD approval. The window-wall ratio is an important design consideration, but it must be balanced with other energy design strategies, daylighting features and glazing performance. On the north elevation heat loss and occupant comfort are of more concern than heat gain, so the WWR is less restrictive. For east, and especially west elevations, it is desirable to reduce below these design targets.

The use of skylights (non-vertical glazing, 60° or less from horizontal)) is generally not recommended, because of the significant heat gain they contribute and the difficulty of adequately shading them. For some buildings or spaces—large, single-story, high-bay, non-air-conditioned spaces, such as warehouses, sheds, or gymnasiums—top lighting may be an appropriate strategy.

Fenestration has a great effect on the distribution of light within a space. The A/E must attempt to optimize the placement of glass to provide uniform interior light. Locating glass as high as possible will generally permit deeper penetration of light and take better advantage of ceiling reflection. Placement of glass near side partitions can also provide advantageous light reflection into the space. Glass which is too low is essentially "wasted" for daylighting purposes; therefore, windowsill should generally not be lower than desk height.

For optimal overall cooling load avoidance and advantageous daylighting of primary building spaces, the ideal building configuration will orient the primary spaces toward north and south, often resulting in a building form that is elongated in an east-west direction.

Criterion 2: Glass Performance

Glass that controls glare and unwanted solar heat gain improves human performance and energy efficiency. Glass type must be selected relatively early in the design process, since it has a significant impact on cooling loads and therefore on the design of the HVAC system and sizing of equipment and ductwork. The selection of glass involves a thoughtful balance between limiting solar heat gain (appropriate shading coefficient) and controlling glare/brightness (appropriate visible transmittance), while still providing a sense of transparency. Spectrally neutral, insulating, low-e glass is recommended. The use of reflective glass should be minimized.

View Glass

Without exterior shading, the key to limiting solar heat gain is the shading coefficient (SC) of the glass. DFD requires strict adherence to the maximum SC of .38 given in Table 1. A low shading coefficient, however, does not necessarily control brightness and glare. If visible light transmittance (V_T) is too high, the window opening will appear too bright, and occupants will have a tendency to close window blinds, thereby defeating the attempt to provide natural lighting. On the other hand, if V_T is too low, a dull or "dreary" environment can be created, even when there is adequate light on the work surface.

At primary entries or at ground level areas (for multi-story buildings) where a stronger visual connection between outside and inside is desired, and there are no activities/tasks that are sensitive to glare, clearer glass may be permitted, exceeding the maximum V_T in Table 1. If V_T is increased under such circumstances, then solar heat gain is not to be increased.

Daylighting Glass

Since daylighting glass is by definition out of the normal field of vision, restricting the visible light transmittance is less a concern, as long as glare and excessive brightness ratios are avoided. Limiting solar heat gain is *equally* important with both view glass and daylighting glass. If for some reason A/E wishes to use higher V_T for daylighting glass, then glare and direct-beam sunlight must be controlled by architectural form (interior light shelves or fixed interior louvers, with or without fixed exterior shading). The cost of these architectural features must be compared to the cost of using the low-V_T glass. DFD expects that using the glass recommended herein will generally be more cost-effective.

Criterion 3: Lighting Power Density
Most offices and classrooms can be illuminated with better-quality light and less power (one watt per sq. ft., or less) than typical current practice. An approach combining ambient and task lighting is recommended whenever possible.

For ambient lighting the A/E shall specify high-quality, energy-efficient luminaires that:

- Provide indirect light where possible, with 84% or more of lamp lumens leaving the luminaire;
- Are lamped with high-quality electric lamps selected for compatibility with daylight. Minimum color rendering index (CRI) of 83 is expected.
- Are arranged and controlled parallel to the daylighting glass, whenever possible.

For offices, an indirect lighting system is recommended, providing ambient illuminance levels based on *The IESNA Lighting Handbook* "Lighting Design Guide". Indirect lighting can decrease lighting power requirements while maintaining or improving illumination levels. Where there is extensive use of computers, ambient lighting levels less than IESNA recommendations may be appropriate. For classrooms, direct/indirect luminaires with superior lamp shielding and 82%-85% efficiency or higher are recommended, where possible. Lighting design should take maximum advantage of the reflectiveness of the room cavity. See also "DFD Electrical System Standards and Design Guidelines" for other lighting design requirements.

Low-wattage task lighting (desktop, as part of systems furniture, or built-in fixtures) is an essential component of these lighting recommendations. Desktop task lights will be budgeted as movable equipment and provided by the user-agency; therefore the A/E, user-agency and DSF Project Manager must discuss and reach a common understanding during the Preliminary Design Phase of what will be provided and by whom. DSF expects the A/E to make recommendations regarding task lighting. Office task lights using energy-efficient compact fluorescent lamps that provide excellent glare control and user adjustability are available and recommended.

The A/E may assume *annual* luminaire maintenance for purposes of figuring the luminaire dirt depreciation factor. Dirt accumulation on lamps, lenses and reflectors is a primary contributor to loss of lighting efficiency and DSF expects the user-agency to be pro-active in providing the annual cleaning on which the lighting design will be based. User-agencies are referred to *IESNA Lighting Handbook* Chapter 28 "Lighting Maintenance".

Criterion 4: Window Treatments
On predominantly east, south and especially west-oriented view windows, there is a need to reduce glare from direct sunlight, while trying to maintain transparency. Therefore, specify window treatments that will, in the closed position, eliminate glare from sunlight, but still maintain some view and connection to the outdoors.

Dark and medium-colored, perforated, interior manual roller screens accomplish this very well on all exposures. Horizontal blinds will provide acceptable performance on south exposures. Slats should be at least an inch wide and may be perforated to provide visual connection to the exterior. On east and west exposures vertical blinds are better than horizontal for screening low-angle sun (true for exterior shading on these exposures, also). Provide separate, dedicated window treatments for view glass and for daylighting glass, so that when brightness through view glass needs to be controlled, daylighting glass can remain open to admit useful light. For maximum visual comfort for computer/video-based tasks, light "leaks" may be prevented by detailing the roller screen to overlap mullions and/or walls.
Note: Interior window treatments for *daylighting* glass may not be necessary, if exterior shading is provided and room darkening for a/v presentation purposes is not needed.

Criterion 5: Ceiling Heights
Proper ceiling heights are fundamental to good daylighting design. Increased ceiling heights enhance openness and permit deeper penetration and better distribution of daylight. Higher ceilings also facilitate indirect lighting schemes using higher-quality, pendant-mounted, indirect or direct/indirect electric light fixtures. Reducing the building's cooling loads generally results in smaller perimeter air supply ducts, requiring less "plenum" space, so that ceiling heights may be increased without necessarily increasing floor-to-floor height. Minimum ceiling heights listed may be averaged across the room for a ceiling that is

sloping inwardly downward. If pendant-mounted light fixtures are provided with sloped ceilings, then it will be necessary to have *at least* 9'-0" ceiling height at all fixture locations.

Criterion 6: Interior Finish Reflectances

The reflectance of interior finish materials is very important to efficient lighting design and effective daylighting. Standard acoustic ceiling tiles are available which will meet the "Acceptable" standard; high reflectance ceiling tiles are not required. If lighter colors are undesirable for the entire wall, DSF recommends incorporating picture rails on upper walls with flat ceiling-white paint above and other preferred colors below. The finishes of office cubicle partitions (systems furniture) and tops of upper cabinets should also comply with indicated minimum reflectances.

Criterion 7: Lighting Controls

Use simple, inexpensive, easy-to-commission-and-maintain electric lighting control strategies to automatically turn off unnecessary electric lighting in the daytime, particularly at building perimeter. Daytime power densities for perimeter daylighted spaces must drop to 2/3 or less of the indicated one w/sf lighting power density. The HVAC engineer must be made aware at the earliest stages of design that cooling loads may be calculated on this basis. If lighting will be switched off at perimeter daylighted zones during peak daylight hours, then the cooling loads for those zones should not include the lighting heat gain.

Stepped or multilevel on/off switching controlled by photo-sensors is a viable technology that is significantly less costly than continuous dimming controls. Because of cost and maintenance issues, continuous dimming controls are not required. Occupancy sensors shall be specified, as required under "DFD Electrical System Standards and Design Guidelines", and shall override photo-sensors in individual rooms.

Assuring that all elements of the system perform interactively as designed and that users understand how the system is intended to function is crucial to the success of daylighting design and is required under DFD Policy and Procedures for Commissioning of State Facilities. DSF expects the A/E to carefully review and edit, as appropriate, DFD Master Specifications, in particular, the following sections: 01 91 01 or 01 91 02 *"Commissioning Process"*, 26 05 00 "*Common Work Results for Electrical"*, 26 27 26 "*Wiring Devices*", *26 51 13 "Interior Lighting Fixtures, Lamps, and Ballasts"* and 26 51 15 "*Low Voltage Lighting Control".* The A/E shall include the following requirements in the specifications:

- Additional site visits by the electrical contractor after substantial completion for the purpose of adjusting lighting controls;
- Specific training for operations and maintenance personnel.

DSF also recommends that specific training and/or informational material be provided to users/occupants, explaining design intent and use of lighting controls and window treatments, as appropriate.

RECOMMENDED STRATEGY:

Criterion 8: Exterior Shading

Exterior solar shading for south-facing glass should be designed to provide four-to-five months of total shade—i.e. from May to September. If feasible, it should be year-round. Similar or even more extensive shading should be provided on the east and west than on south. Exterior solar shading has little benefit on the north elevation.

Note that Table 1 does not provide glass characteristics for *shaded view glass* because view glass, being lower in the wall, is more difficult to shade and therefore less commonly shaded. If budget will permit, full shading of all view glass is also desirable.
Exterior shading is of limited value unless the preceding criteria are incorporated; and it may be the least cost-effective daylighting element based on first cost, since the seven previously listed measures will have already greatly reduced solar heats gains. Exterior shading, therefore, is listed last. Shading does, however, make the system passive and foolproof, eliminating the need for window treatments for daylighting apertures, unless required for room darkening. For this reason, and because it is fundamentally good practice to design with the sun in mind, DFS strongly encourages *fixed* exterior shading. *Operable* exterior shading is not recommended.

DSF encourages creativity, tempered by an awareness of maintenance requirements. Horizontal louvers or grilles are not permitted unless they are designed for long-term durability, low maintenance and safety, so that ice and snow removal is not required.

TABLE 1: COOL DAYLIGHTING PERFORMANCE CRITERIA

CRITERIA		ACCEPTABLE	PREFERRED
REQUIRED:			
1. WINDOW-WALL RATIO[1] MAXIMUM ALLOWABLE EXTERIOR GLASS AREA AS A % OF GROSS EXTERIOR WALL AREA [2, 3]	NORTH ELEVATION	70% max	50%
	EAST ELEVATION	30% max	22%
	SOUTH ELEVATION	30% max	26%
	WEST ELEVATION	30% max	22%
2. GLASS PERFORMANCE[1, 4]			
2A. VIEW GLASS	Shading Coefficient, SC	0.38 max	0.22
	Visible Transmittance, V_T	40% max	18%
2B. DAYLIGHTING GLASS SHADED	Shading Coefficient, SC	0.38 max	0.38
	Visible Transmittance, V_T[5]	40% max	38%
UNSHADED	Shading Coefficient, SC	0.38 max	0.26
	Visible Transmittance, V_T	40% max	23%
3. LIGHTING POWER DENSITY (LPD)[6, 7]		1.0 w/sf or less	0.8 w/sf or less
4. WINDOW TREATMENTS[8]		Separate daylighting & view glass mini blinds	Mini-blinds for daylighting glass & perforated roller shades @ view glass.
5. CEILING HEIGHTS (FOR DAYLIGHTED ZONES)		9'-0" min.	9'-6" to 10-'0" min.
6. INTERIOR FINISH REFLECTANCES[9] FOR DAYLIGHTED ZONES		min. 80% ceiling min. 50% wall	80-90%+ ceiling min. 80% wall **OR** 80%+ above picture rail 50%+ below picture rail
7. LIGHTING CONTROLS		Photo-sensor-controlled on/off switching	Photo-sensor-controlled multi-level switching
RECOMMENDED:			
8. EXTERIOR SOLAR SHADING		Some shading of daylighting glass	Shading of daylighting glass 4 to 5 months of the year

TABLE 1 FOOTNOTES:

1 This Standard does not specify a minimum WWR or minimum V_T or SC; A/E is expected to use best judgement in balancing fenestration, lighting and other program needs (within the maximums allowed).

2 The WWRs identified with building elevations assume a rectilinear building form, oriented within 20°± of true north. If the building is oriented more than 20°± off of the north-south axis, then the "30% Minimum Std. / 24% Preferred" limit applies to all elevations (SE, SW, NE, NW).

[3] For buildings with greater than average (12' to 13') floor-to-floor height, the WWR should be proportionately decreased.
[4] Glass performance values refer to "center-of-glass".
[5] If A/E can demonstrate that daylighting glass is fully shaded, then V_T may be increased.
[6] Indoor only, excluding task lighting, and excluding special occupancies, such as labs, food service, retail, auditorium/special-purpose lecture rooms.
[7] Clear day LPD target is expected to be two-thirds of total connected LPD, in perimeter zones.
[8] For portions of the windows (particularly daylighting glass) that are fully shaded, window treatments may not be necessary.
[9] Photo-sensors located in individual rooms or areas, subject to control by occupancy sensors.

PROCEDURES

The following procedures apply in addition to the standard procedures contained in the *DSF Policy and Procedure Manual for Architects/Engineers*.

PRELIMINARY DESIGN PHASE

At the project Kick Off Meeting the A/E, user-agency and the DSF project manager will discuss daylighting—opportunities / constraints / program / functional implications.

At the conclusion of schematic design, or midway through design development, the A/E shall submit to the Project Manager the Daylighting Criteria Form (page DC-1, attached) showing how the design meets the criteria. Submittal of this form by the architect is required prior to the mechanical engineer completing preliminary cooling load calculations. Cooling load calculations shall consider cooling load reductions based on the lighting control scheme submitted by the electrical engineer.

At the completion of the Preliminary Design Phase the A/E will re-submit the *Daylighting Criteria Form* with the Design Report (Policy and Procedure Manual for Architects/Engineers & Consultants, Section 4.K) providing updated information. If any of the building characteristics indicated on the form change after the completion of Preliminary Design, the net effect of those changes shall not increase building energy use without specific explanation by the A/E and approval by DSF's project manager. (For example, if glass area is increased then the shading coefficient could be improved to offset the increase in glass area).

CONSTRUCTION DOCUMENT PHASE

At completion of Construction Documents, with the Final Review submittal to DSF (Policy and Procedure Manual for Architects/Engineers & Consultants, Section 5.D), the A/E will re-submit the *Daylighting Criteria Form*, confirming and updating these criteria based on the final design. At this time window treatments and actual, specified interior finish reflectances will be included, if not previously.

CONCLUSION

DSF expects all applicable building types/occupancies to meet the "Acceptable" performance level. A/Es' efforts to achieve the "Preferred" performance level will be recognized in the DSF Consultant Performance Review.

DSF wishes to support A/E's efforts to successfully implement these daylighting concepts into the design of state facilities. For a better understanding of the cool daylighting principles and desired lighting quality, DSF strongly encourages the A/E and user-group(s) to visit a room or building so designed. Locations and other information may be found at The Daylighting Collaborative (www.daylighting.org) web site.

[1] These daylighting standards are based on the "Cool Daylighting" approach promoted by Lightforms, Inc (lightforms@aol.com) and The Daylighting Collaborative of The Energy Center of Wisconsin (www.ecw.org). The Division of Facilities Development gratefully acknowledges their support, as well as the technical assistance of Midwest Sustainable Collaborative (http://www.midwestsustainablecollaborative.com/) in the development of these guidelines.

[2] A/Es are advised to refer to The *IESNA Lighting Handbook, 2000, Ninth Edition*, for further information on Vision and Perception (Chapter 3) and Lighting Design Guide and Quality of the Visual Environment (Chapter 10).
The *Advanced Lighting Guidelines, 2003 Edition*, published by New Buildings Institute, Inc. is another useful reference.

GLOSSARY

Ambient Lighting	General illumination throughout an area.
Color Rendering Index (CRI)	A measure of a lamp's ability to make the color of things appear as expected.
Color Temperature	A measure of the color appearance of a light source.
Cool Daylighting	The practice of admitting light from the sun and sky into a building in a way which controls heat gain and glare and reduces the use of electric lighting.
Commissioning (CX)	A systematic process to assure that all elements of the daylighting system perform interactively and continuously according to documented design intent and needs of the state.
Daylighted Zone	Any room or space where all or part of the lighting needs are met with natural light.
Daylighting Glass (or aperture)	Glazed opening above the normal field of view with the primary purpose of admitting light.
Fenestration	The design and placement of windows in a building.
Gross Exterior Wall Area	The gross area of exterior wall separating air-conditioned spaces from the outdoors as measured on the exterior above grade, including window and door areas. Penthouses, active louvers/grills, parapets and exterior wall area below grade are excluded. Note: This definition differs slightly from the definition in Wisconsin Commercial Building Code, Chapter Comm 363.
Illuminance/Illumination	The amount of light incident upon a surface (foot-candles).
Lighting Power Density (LPD)	A measure of the amount of electric lighting in a space or building as measured in watts per square foot.
Luminaire	A complete electric lighting unit; a light fixture.
Picture Rail	A horizontal molding fixed to the wall near the ceiling, often at the height of the door head, traditionally used for picture hanging.
Shading Coefficient (SC)	The ratio of total solar heat gain through a window to that through 1/8" clear glass.
Task Lighting	Lighting provided for a specific task.
View Glass	Glazed opening placed at or near eye level for the primary purpose of allowing views to the outside.
Window Area	The area of the surface of a window, plus the area of the frame, sash, and mullions.
Window-Wall Area (WWR)	The ratio of the window area, including glazed areas of doors, to the gross exterior wall area.
Visible Light Transmittance(V_T)	The percentage of visible light that is transmitted through the glass.

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DAYLIGHTING CRITERIA FORM[1]

USED TO SHOW COMPLIANCE WITH DSF DAYLIGHTING STANDARDS FOR STATE FACILITIES

CRITERIA		SCHEMATIC DESIGN[2]	PRELIMINARY DESIGN	FINAL DESIGN
1. WINDOW-WALL RATIO	NORTH ELEVATION [70% /50%]			
	EAST ELEVATION [30%/22%]			
	SOUTH ELEVATION [30%/26%]			
	WEST ELEVATION [30%/22%]			
2. GLASS PERFORMANCE				
2A. VIEW GLASS				
	SC [.38 Std./0.22 Pref.]			
	V_T [38% Std./18% Pref.]			
	U-VALUE (optional)			
2B. DAYLIGHTING GLASS				
SHADED	SC [0.38 Std./0.38 Pref.]			
	V_T [38% Std./38% Pref.]			
	U-VALUE (optional)			
UNSHADED	SC [0.38 Std / 0.26 Pref.]			
	V_T [38% Std./23% Pref.]			
	U-VALUE (optional)			
ORIENTATION OF BUILDING DEGREES E OR W OF NORTH/SOUTH AXIS				
3. LIGHTING POWER DENSITY (LPD) [1.0 Std/ 0.8 Pref. W/sf]				
4. WINDOW TREATMENTS		*Provide Statement*	*Provide Statement*	*Provide Statement*
5. CEILING HEIGHTS [9'-0" min/9'-6" to 10'0" pref.]				
6. INTERIOR FINISH REFLECTANCES CEILING [80% Std./ 80-90%+ Pref.] WALL ABOVE PICT. RAIL [50% Std./ 80%+ Pref.] BELOW PICT. RAIL [50% Std./ 50%+ Pref.]				
7. LIGHTING CONTROLS		*Provide Statement*	*Provide Statement*	*Provide Statement*
8. EXTERIOR SOLAR SHADING		*Provide Statement*	*Provide Statement*	*Provide Statement*

THE FOLLOWING ARE NOT DESIGN CRITERIA, BUT ARE USEFUL IN ASSESSING HVAC COOLING LOAD REDUCTIONS:

CALCULATED COOLING AIR FLOW TOTAL SUPPLY FAN OUTPUT IN CFM PER NET S.F. OF AIR-CONDITIONED SPACE			
CALCULATED AIR CONDITIONING LOAD NET S.F. PER INSTALLED TON OF AIR CONDITIONING			

[1] For large structures (esp. if multi-wing and/or irregularly shaped) the needed information may not neatly or clearly fit into this form. It is the A/E's responsibility to submit multiple forms, or to re-format so that typical conditions for the entire building are *clearly* shown.

[2] Design intent is adequate at schematic design stage.