West Orientation Calculation

F. WEST DISPLAY PERIMETER – This is multiplied by 6 FT to determine the west display area for glazing limits.

G. WEST EXTERIOR WALL AREA – This is multiplied by 0.40 to determine the 40% west wall window limit for the standard design.

H. ENTER THE LARGER OF F AND G – For the Maximum Standard West Area.

I. ENTER PROPOSED WEST WINDOW AREA – The total area of windows on the west wall of the proposed building is entered here.

If the PROPOSED WEST WINDOW AREA is greater than the MAXIMUM STANDARD WEST AREA, then the envelope component method may not be used.

J. WEST WINDOW WALL RATIO – This is the PROPOSED WEST WINDOW AREA divided by the WEST EXTERIOR WALL AREA.

Skylight Area Calculation

This calculation determines whether the skylight area for the building exceeds the allowable maximum for the standard envelope.

A. ATRIUM or SKYLIGHT HEIGHT - distance from the floor to the above in FT.

B. If the height distance from the floor to the above is less than or equal to 55 FT then multiply the GROSS ROOF AREA by 5% (0.05) for the STANDARD ALLOWED SKYLIGHT AREA.

C. If the height distance is greater than 55 FT then multiply GROSS ROOF AREA by 10% (0.10) for the STANDARD ALLOWED SKYLIGHT AREA.

D. STANDARD ALLOWED SKYLIGHT AREA - The maximum allowed standard skylight area is the product of the previous two numbers.

E. PROPOSED SKYLIGHT AREA - The total area of proposed skylights shown on the plans is entered here.

Skylights

SKYLIGHT NAME - Provide a name or designator for each unique type of skylight. This designator should be used consistently throughout the plan set (roof plans, skylight schedules, etc.) to identify each skylight. It should also be consistently used on the other forms in the compliance documentation.

SKYLIGHT GLAZING - Indicate if the glazing includes a curb or not and if made out of plastic. This affects the allowed U-factor and solar heat gain coefficient.

NO. OF PANES - Indicate “2” for double glazed, “1” for single glazed skylights.

U-FACTOR - PROPOSED skylight glazing U-factor is determined as discussed in Section 3.2.5. ALLOWED U-factor is taken from Standards Tables 143-A, 143-B, or 143-C.

SOLAR HEAT GAIN COEFFICIENT - Indicate PROPOSED solar heat gain coefficient. The ALLOWED value is the maximum solar heat gain coefficient taken from the prescriptive envelope criteria in the Standards for the appropriate glazing. The value is taken from Standards Tables 143-A, 143-B, or 143-C, depending on the building occupancy type.

Relocatable Public Schools Buildings

Check the applicable box for either Specific Climate Zone(s) or Any (All) Climate Zone.

Specific Climate Zone

When the manufacturer/builder certifies that the relocatable building is manufactured for use in specific climate zones and that the relocatable building can not be lawfully used in other climate zones, the energy budget must be met for each climate zone that the manufacturer/building certifies, assuming the prescriptive envelope criteria in TABLE 143-A, including the non-north window RSHG and skylight SHGC requirements for each climate zone.

The manufacturer/builder shall meet the requirements for identification labels specified in §143 (a) 8.

Any (All) Climate Zone

When the manufacturer/builder certifies a relocatable public school building for use in any climate zone, the building must be designed and built to meet the energy budget for the most severe climate zones as specified in the Nonresidential ACM Manual, Appendix ND, assuming the prescriptive envelope criteria in TABLE 143-C.

The manufacturer/builder shall meet the requirements for identification labels specified in §143 (a) 8.

ENV-2-C Part 2 of 2

Cool Roofs

The mandatory measures require that cool roofs be tested through the Cool Roof Rating Council and labeled that liquid applied products meet minimum standards for performance and durability. Note that installing cool roofs is *not* a mandatory measure.

Check the applicable boxes either Option1: CRRC-1 Tested – Initial Thermal Emittance ≥ 0.75 and Intial Solar Reflectance ≥ 0.70 or Option 2: CRRC-1 Tested - Initial Thermal Emittance < 0.75.

Option1 compares the proposed values against the standard values. The standard values are set by the prescriptive approach. If both the proposed values are below the standard then proceed with the Option 2 method. This method is for any products that have an initial thermal emittance < 0.75. The

initial solar reflectance must be calculated given the equation $\rho_{initial} = .70 + [0.34 \text{ X } (0.75 - \varepsilon_{initial})]$.

The calculated initial solar reflectance becomes the new calculated standard.

Liquid Field Applied Coatings

There are a number of qualifying liquid products, including elastomeric coatings and white acrylic coatings. The Standards specify minimum performance and durability requirements for liquid field applied coatings. Please note that these requirements do not apply to industrial coatings that are factory-applied, such as metal roof panels. The requirements address elongation, tensile strength, permeance, and accelerated weathering. The requirements depend on the type of coating and are described in greater detail in Section 3.4.

Liquid field applied coatings must meet conditions in either Option1 or Option 2 before selecting coatings. Check the applicable box that matches the applied coating or check the "Other" and enter the name and manufacture of the roof coating. The coating must be applied with a minimum dry mil thickness of 20 mils across the entire roof surface and meet minimum requirements listed in §118(i) 3 and Table 118-C.

Opaque Surfaces

1. ASSEMBLY NAME - Provide a name or designator for each unique type of opaque surface. This designator should be used consistently throughout the plan set (elevations, finish schedules, etc.) to identify each surface. It should also be consistently used on the other forms in the compliance documentation.

2. TYPE - Provide the type of assembly (e.g., wood- or metal-frame wall, other floor/soffit, etc.).

3. HEAT CAPACITY - For light-weight assemblies having HC less than 7.0 (most framed assemblies), this space may be left blank. It may also be left blank for higher heat capacity assemblies, but if it is blank, the lower U-factor requirements for walls and floors/soffits with HC of 7.0 or higher may not be used.

4. INSULATION R-VALUE - This section is used for assemblies that are shown to comply by this option under the envelope component method. If the assembly U-factor option is used, this space may be left blank. The PROPOSED value is the R-value for the insulation product alone, not the total R-value for the assembly. The MIN. ALLOWED value is taken from Standards Table 143-A, 143-B, or 143-C.

5. ASSEMBLY U-FACTOR - This section is used for assemblies that are shown to comply by this option under the envelope component method. If the insulation R-value option is used, this space may be left blank. It must be consistent with the U-factor listed on the ENV-1-C, Part 2 of 2, Opaque Surfaces. The PROPOSED value is taken from tabulated values in Joint Appendix IV. The table cell reference number (column number and row number for the specified assembly and insulation) from Joint Appendix IV should be listed next to the PROPOSED value. . The MAXIMUM ALLOWED value is taken from Standards Table 143-A, 143-B, or 143-C.

Windows

1. WINDOW NAME - Provide a name or designator for each unique type of window. This designator should be used consistently throughout the plan set (elevations, window schedules, etc.) to identify each window. It should also be consistently used on the other forms in the compliance documentation.

2. ORIENTATION - Indicate orientation of each unique type of window. A window with an overhang and a similar window without an overhang would be different types. If overhangs are not used, similar windows on non-north orientations may be grouped together.

3. U-FACTOR - PROPOSED glazing U-factor is determined from ENV-1-C Part 2 of 2 Fenestration Surfaces. ALLOWED U-factor is taken from Standards Tables 143-A, 143-B, or 143-C.

4. NO. OF PANES - Indicate “2” for double glazed, “1” for single glazed windows.

5. PROPOSED RSHG – Indicate solar heat gain coefficient (SHGC), overhang factor (OHF), and the resulting RSHG.RSHG = SHGCwin x [1 + aH/V + $b(H/V)^2$]) where

H = horizontal distance from window out to bottom of overhang

V = vertical distance from bottom of window to a plane at the same height as the bottom of lower edge of overhang.

a = -0.41 for North-facing windows, -1.22 for south-facing windows, and -0.92 for east- and west-facing windows.

b = 0.20 for North-facing windows, 0.66 for south-facing windows, and 0.35 for east- and west-facing windows.

If a given window does not have an overhang, then SHGC and RSHG are the same (See Section 3.2.6).

6. ALLOWED RSHG - The maximum relative solar heat gain allowed, taken from Standards Tables 143-A, 143-B, or 143-C for the appropriate window orientation (north or non-north).

3.10.3 ENV-3-C: Overall Envelope Method

This compliance worksheet should be used only when the envelope is shown to comply using the overall envelope method.

1. PROJECT NAME is the title of the project, as shown on the plans, on the ENV-1-C, and known to the building department.

2. DATE is the date of preparation of the compliance submittal package. It should be on or after the date of the plans, and on or before the date of the building permit application.

ENV-3-C Part 1 of 7

The first part of this form involves tests of glazing area for windows and skylights. If either of these tests does not pass, then the glazing area and associated wall area must be adjusted for the standard envelope.

Window Area Calculation

A. DISPLAY PERIMETER - This is multiplied by 6 FT to determine the DISPLAY AREA for glazing limits.

B. GROSS EXTERIOR WALL AREA -This is multiplied by 0.40 to determine the 40% of the Gross Exterior Wall Area for glazing limits.

C. Enter the Larger of A or B for the MAXIMUM STANDARD AREA.

D. PROPOSED WINDOW AREA - The total area of proposed windows shown on the plans is entered here.

If the PROPOSED WINDOW AREA is greater than the MAXIMUM STANDARD AREA, then the envelope component method may not be used.

E. WINDOW WALL RATIO – Proposed window area divided by gross exterior wall area.

West Orientation Calculation

F. WEST DISPLAY PERIMETER – This is multiplied by 6 FT to determine the west display area for glazing limits.

G. WEST EXTERIOR WALL AREA – This is multiplied by 0.40 to determine the 40% west wall window limit for the standard design.

H. ENTER THE LARGER OF F AND G – For the Maximum Standard West Area.

I. ENTER PROPOSED WEST WINDOW AREA – The total area of windows on the west wall of the proposed building is entered here.

If the PROPOSED WEST WINDOW AREA is greater than the MAXIMUM STANDARD WEST AREA then the envelope component method may not be used.

J. WEST WINDOW WALL RATIO – This is the PROPOSED WEST WINDOW AREA divided by the WEST EXTERIOR WALL AREA.

Combined Values for North East and South Walls

K. N/E/S DISPLAY PERIMETER – This is the DISPLAY PERIMETER (Box A) minus the WEST PERIMETER (Box F). The result is multiplied by 6.

L. N/E/S EXTERIOR WALL AREA – This is the GROSS EXTERIOR WALL AREA (Box B) minus the WEST EXTERIOR WALL AREA (Box G). The result is multiplied by 0.40.

M. Enter the larger of K or L.

N. PROPOSED N/E/S WINDOW AREA – This is the PROPOSED WINDOW AREA (Box D) minus the PROPOSED WEST WINDOW AREA (Box I).

O. If D is greater than C, calculate 1 or 2 below, otherwise place a check mark in the box labeled “Check IF NOT APPICABLE” on the Window area adjustment calculations portion of Part 7.

1. If I is less than H, divide the MAXIMUM STANDARD AREA (Box C) by the PROPOSED WINDOW AREA (Box D) and enter the result into the WEST WINDOW ADJUSTMENT FACTOR box; otherwise enter a 1.0 in this box.

2. If I is greater than H, Calculate a. and b. below

a. Divide MAXIMUM STANDARD WEST AREA (Box H) by the PROPOSED WEST AREA (Box I) and enter into the box for WEST WINDOW ADJUSTMENT FACTOR (WAF_w).

b. Divide MAXIMUM STANDARD N/E/S AREA (Box M) by PROPOSED N/E/S AREA and enter result into box for N/E/S WINDOW ADJUSTMENT FACTOR (WAF_{nes}).

The WINDOW ADJUSTMENT FACTOR numbers are carried to Part 7 of the form to calculate the adjusted window and wall areas. Upon completion of those calculations, Part 3, Part 4, and Part 6 may be completed.

ENV-3-C Part 2 of 7 Skylight Area Calculation

A. ATRIUM or SKYLIGHT HEIGHT distance from the floor to the ceiling in FT.

B. If the height distance from the floor to the ceiling is less than or equal to 55 FT then multiply the GROSS ROOF AREA by 5% (0.05) for the STANDARD ALLOWED SKYLIGHT AREA.

C. If the height distance is greater than 55 FT then multiply GROSS ROOF AREA by 10% (0.10) for the STANDARD ALLOWED SKYLIGHT AREA.

STANDARD ALLOWED SKYLIGHT AREA - The maximum allowed standard skylight area is the product of the previous two numbers.

D. PROPOSED SKYLIGHT AREA - The total area of proposed skylights shown on the plans is entered here.

1. If the PROPOSED SKYLIGHT AREA is greater than or equal to the STANDARD SKYLIGHT AREA, then divide STANDARD SKYLIGHT AREA by PROPOSED SKYLIGHT AREA and enter result into box for SKYLIGHT ADJUSTMENT FACTOR. Otherwise enter 1.0 in the box for SKYLIGHT ADJUSTMENT FACTOR, the skylight calculations on Part 3, Part 4, and Part 6 can be done without the adjusted skylight or roof areas.

The SKYLIGHT ADJUSTMENT FACTOR is carried to Part 7 of the form to calculate the adjusted skylight and roof areas. Upon completion of those calculations, Parts 3 through 6 may be completed.

ENV-3-C Part 3 of 7 Overall Heat Loss

This form should be used to confirm that the proposed envelope design has an overall heat loss no greater than the standard heat loss for the building.

Overall Heat Loss

A. ASSEMBLY NAME - Provide a name or designator for each unique type of surface under the appropriate heading (e.g., WALLS, ROOFS/ CEILINGS, etc.). Demising walls are not to be included in this calculation. This designator should be used consistently throughout the plan set (elevations, finish schedules, etc.) to identify each surface. It should also be consistently used on the other forms in the compliance documentation. For windows and skylights, list the number of panes of glazing; indicate “2” for double-glazed, “1” for single glazed-windows.

Proposed

B. PROPOSED AREA - Enter the actual area, in ft^2, of each assembly. Refer to Joint Appendix I for definitions by type of assembly.

C. PROPOSED HEAT CAPACITY - See Section 3.3.2 and Joint Appendix IV for discussion of how this value is determined. For light weight assemblies having HC less than 7.0 (most framed assemblies), this space may be left blank. It may also be left blank for higher heat capacity assemblies, but if it is blank then the lower U-factor requirements for walls and floors/soffits with HC of 7.0 or higher may not be used.

D. PROPOSED U-FACTOR - Enter the U-factor of the proposed assembly as designed. U-factors are taken from tabulated values in the Joint Appendix IV. The corresponding table cell reference number from Joint Appendix IV should be listed in the next column. U-factors for windows and skylights are from ENV-1-C Part 2 of 2

Note: For Wet Insulation Systems on exterior roofs in Climate Zones 1and 16, the insulating R-value of continuous insulation materials installed above the roof waterproof membrane must be multiplied by 0.8 before choosing the table column for determining assembly U-factor. See the footnotes for Tables IV.1 through IV.7 in the Joint Appendices.

JOINT APPENDIX IV REFERENCE – List the cell table reference for the proposed assembly (e.g. table cell reference is IV.9 C25).The reference number indicates the Joint Appendix IV table number, column number, and row number for the specified assembly and insulation.

E. PROPOSED UA - The numbers in columns B and D are multiplied together and the result entered in this column.

Standard

F. STANDARD AREA - If no window or skylight area adjustments are required (as demonstrated on Part 1 of 7), then the STANDARD AREA is the same as the PROPOSED AREA for each assembly. If adjustments are required, then the adjusted areas of window, wall, skylight and roof are taken from Part 7 of 7.

G. STANDARD U-FACTOR - Enter the U-factor for each assembly type, taken from Standards Tables 143-A, 143-B, or 143-C.

H. STANDARD UA - The numbers in COLUMNS F and G are multiplied together and the result entered in this column.

COLUMNS E and H are totaled at the bottom of the page and the results compared. If the COLUMN E total is no greater than the COLUMN H total, then the overall heat loss requirement has been met.

ENV-3-C Part 4 of 7 Overall Heat Gain from Conduction

The heat gain subtotals from Parts 4 and 5 are added to the subtotal on Part 6 to determine the total standard building heat gain and proposed building heat gain. Part 4 deals with the conduction heat gain through the building envelope.

A. ASSEMBLY NAME - Provide a name or designator for each unique type of surface under the appropriate heading (WALLS, ROOFS/ CEILINGS, etc.). Demising walls are not to be included in this calculation. This designator should be used consistently throughout the plan set (elevations, finish schedules, etc.) to identify each surface. It should also be consistently used on the other forms

in the compliance documentation. For windows and skylights, list the number of panes of glazing; indicate “2” for double-glazed, “1” for single-glazed windows.

Proposed

B. PROPOSED AREA - Enter the actual area, in ft^2, of each assembly.

C. TEMPERATURE FACTOR - Enter the temperature factor based on the envelope type and Climate Zone from Standards Table 143-D.

D. PROPOSED HEAT CAPACITY - See Section 3.3.2 and Joint Appendix IV for discussion of how this value is determined. For light weight assemblies having HC less than 7.0 (most framed assemblies), this space may be left blank. It may also be left blank for higher heat capacity assemblies, but if it is blank then the lower U-factor requirements for walls and floors/soffits with HC of 7.0 or higher may not be used.

E. PROPOSED U-FACTOR - Enter the U-factor of the proposed assembly as designed. U-factors are taken from tabulated values in the Joint Appendix IV. The corresponding table cell reference number from Joint Appendix IV should be listed in the next column. U-factors for windows and skylights are from ENV-1-C Part 2 of 2

Note: For Wet Insulation Systems on exterior roofs in Climate Zones 1and 16, the insulating R-value of continuous insulation materials installed above the roof waterproof membrane shall be multiplied times 0.8 before choosing the table column for determining assembly U-factor. See the footnotes for Tables IV.1 through IV.7 in the Joint Appendices.

JOINT APPENDIX IV REFERENCE – List the cell table reference for the proposed assembly (e.g. table cell reference is IV.9 C25).The reference number indicates the Joint Appendix IV table number, column and row for the specified assembly and insulation.

F. HEAT GAIN - The numbers in COLUMNS B, C, and E are multiplied together and the result entered in this column. The result is a heat gain in Btu/h for that building component.

Standard

G. STANDARD AREA - If no window or skylight area adjustments are required (as demonstrated on Part 1 of 7), then the STANDARD AREA is the same as the PROPOSED AREA for each window and skylight. If adjustments are required, then the adjusted areas are taken from Part 7 of 7.

H. STANDARD U-FACTOR - Enter the U-factor for each assembly type, taken from Standards Tables 143-A, 143-B, or 143-C of the Standards for the appropriate climate zone.

I. TEMPERATURE FACTOR - Enter the temperature factor based on the envelope type and climate zone from Table 143-D of the Standards (same as C).

J. HEAT GAIN - The numbers in COLUMNS G, H, and I are multiplied together and the result entered in this column.

Columns F and J are totaled. These subtotals are entered under ‘Part 6 Subtotal’ in COLUMNS I and M of ENV-3-C Part 6 of 7.

ENV-3-C Part 5 of 7 Overall Heat Gain from Radiation

This part of the form is used to calculate the heat gain due to solar radiation absorbed by the roof for the standard and proposed building envelopes.

Roof Absorptance Calculation

This section determines the roof absorption value for the proposed building. A cool roof certified by the CRRC-1 rating procedure is now required for low-sloped nonresidential buildings.

Case 1 Proposed

1. CRRC-1 Certified? Select *Yes* if the proposed roof has been certified and go to step 2, or if you selected *No* then go to step 8.

2. Is the initial thermal emittance ≥0.75? If yes then go to step 3, or if *No* then go to step 5.

3. Enter the initial reflectance value from CRRC then go to step 4 and insert the value in the equation and calculate.

4. Calculate the proposed absorption and enter the result in Column F.

Case 2 CRRC-1 Tested – Proposed

5. Enter the CRRC initial reflectance and emittance values, go to step 6, enter the values in the equation, and calculate the proposed reflectance.

6. Calculate the proposed reflectance, go to step 7, and enter the value into equation and calculate.

7. Calculate the proposed absorption and enter the results in Column F.

Case 3 Not CRRC-1 Tested – Proposed Default

8. Is the roof a nonresidential low-slope? If yes, the proposed default absorption value is 0.87; if not use 0.73. Enter the value in Column F.

Standard Absorptance Values

When tested in accordance with CRRC-1 - The standard absorptance values α_{std} for Column J are either 0.45 for nonresidential low-sloped roofs or 0.73 for nonresidential high-sloped roofs. The standard absorptance is based on the initial solar reflectance of 0.70 for nonresidential low-sloped roofs and 0.30 for nonresidential high-sloped roofs. See Standards Equation 143-D.

Overall Heat Gain Radiation for Roofs

A. ASSEMBLY NAME - Provide a name or designator for each unique type of roof surface (e.g., Roof-1, Roof-2, etc.). This designator should be used consistently throughout the plan set (elevations, roof plans, etc.) to identify each surface. It should also be consistently used on the other forms in the compliance documentation.

B. AREA - Enter the actual area, in ft^2, of each assembly.

C. SOLAR FACTOR - Enter the solar factor for the applicable climate zone from Table 143-D of the Standards.

D. WEIGHTING FACTOR - Enter the appropriate weighting factor based on climate zone and Nonresidential or High-Rise Residential from Standards Table 143-E.

E. PROPOSED U-FACTOR - Enter the U-factor of the proposed assembly as designed. U-factors are taken from a table in Joint Appendix IV, Roofs and Ceiling.

F. PROPOSED ABSORPTANCE (α)- Enter the absorptance of the proposed roof assembly. Use an absorptance from item 8 above for roofs not certified under CRRC-1.

G. PROPOSED HEAT GAIN - The numbers from COLUMNS B, C, D, E, and F are multiplied and entered in this column.

H. AREA (ADJUSTED) - If no skylight area adjustments are required (as demonstrated on Part 1), then the STANDARD AREA is the same as the PROPOSED AREA for each roof assembly. If adjustments are required, then the adjusted areas of skylight and roof are taken from Part 6 of 7.

I. STANDARD U-FACTOR - Enter the standard U-factor for each roof assembly, taken from Standards Tables 143-A, 143-B, or 143-C.

J. STANDARD ABSORPTANCE (α) - Enter 0.45 as the absorptance of the standard roof assembly for nonresidential buildings with low-sloped roofs and 0.73 for nonresidential buildings with high-sloped roofs, for high-rise residential buildings, and guest rooms of hotel/motel buildings.

K. STANDARD HEAT GAIN - Multiply COLUMNS C, D, H, I and J and enter the result here.

Columns G and K are totaled. These subtotals are entered under 'Part 5 Subtotal' in COLUMNS I and M of ENV-3-C, Part 6 of 7.

ENV-3-C Part 6 of 7 Overall Heat Gain from Radiation

Overall Heat Gain from Fenestration

This form should be used to calculate the radiation heat gain through fenestration for the standard building and proposed building.

A. WINDOW/SKYLIGHT NAME - Provide a name or designator for each orientation of glazing under the appropriate heading (NORTH, SOUTH, SKYLIGHTS, etc.). This designator should be used consistently throughout the plan set (elevations, roof plans, etc.) to identify each surface. It should also be consistently used on the other forms in the compliance documentation.

B. WEIGHTING FACTOR - Enter the weighting factor for each orientation and skylight. The weighting factors are taken from Table 143-E for the appropriate climate zone

C. PROPOSED AREA - The total area of proposed windows and skylights shown on the plans is entered here.

D. SOLAR FACTOR - Enter the solar factor for the applicable climate zone from Standards Table 143-D.

E. PROPOSED SHGC - The proposed solar heat gain coefficient of the glazing.

F.-H. PROPOSED OVERHANG - Indicate the overhang horizontal length (H), the overhang vertical height (V), overhang ratio (H/V) and overhang factor (OHF). Column F includes both (H for horizontal) and (V for vertical). The overhang adjustment does not apply to skylights. Note: if there is no overhang for the window, values for H and V are not required and the OHF is set to 1.

I. PROPOSED TOTAL - Multiply COLUMNS B, C, D, E & H and enter the result here.

J. STANDARD AREA - If no window or skylight area adjustments are required (as demonstrated on Part 1), then the STANDARD AREA is the same as the PROPOSED AREA for each window and skylight. If adjustments are required, then the adjusted areas are taken from Part 6.

K. STANDARD RSHG - This is the maximum relative solar heat gain taken from Standards Tables 143-A, 143-B, and 143-C for the specified window orientation (north or non-north) and the actual fenestration area if actual is less than 40% WWR; otherwise it is set to the RSHG for 40% WWR. The maximum relative solar heat gain coefficient for skylights is taken from the same table, depending on whether the skylight glazing is made of glass or plastic.

L. SOLAR FACTOR - Enter the solar factor for the applicable climate zone from Standards Table 143-D.

M. STANDARD TOTAL - Multiply COLUMNS B, J, K, & L and enter the result here.

COLUMNS I and M are totaled. Totals from COLUMNS F and J from Part 4 of 7 and Part 5 of 7 are carried forward and added to Part 6 and the results compared. If the COLUMN I total is no greater than the COLUMN M total, then the overall heat gain requirement has been met.

ENV-3-C Part 7 of 7 Window Area Adjustment Calculations

If the WINDOW AREA TEST or the SKYLIGHT AREA TEST (Part 1 and 2 of this form) determines that area adjustments are not necessary, check the NOT APPLICABLE boxes. If the tests indicate that adjustments must be made, perform the calculations in the appropriate sections below.

A. WALL NAME - Provide a name or designator for each unique type and orientation of wall that contains windows (walls without windows will have no adjustment). If an orientation has two different wall types, list each separately. This designator should be used consistently throughout the plan set (elevations, finish schedules, etc.) to identify each surface. It should also be consistently used on the other forms in the compliance documentation.

B.-D. AREAS - List the areas (in ft^2). The GROSS AREA is the Gross Exterior Wall Area for the particular wall type and orientation under consideration. The DOOR AREA and WINDOW AREA are for doors and windows included in each wall.

E. WINDOW ADJUSTMENT FACTOR is calculated on the top half of Part 1. This is taken from Part 1 of the ENV-3-C form, and may vary by orientation.

F. ADJUSTED WINDOW AREA is calculated by multiplying the values in COLUMNS D and E.

G. ADJUSTED WALL AREA is calculated by subtracting B from the sum of C and F. If this produces a negative value enter zero.

Add COLUMNS B, C, D, F, and G. As a check, the total of COLUMN B should equal the sum of the totals of COLUMNS F & G.

The total in COLUMN F and G are used in COLUMN F of the Overall Heat Loss calculation (Part 3) and Column G of the Overall Heat Gain from Conduction calculation (Part 4) and the values in COLUMN G are used in COLUMNS H of the Overall Heat Gain from Radiation, Opaque Surfaces calculation (Part 5), and values in COLUMN F are used in COLUMN J of the Overall Heat Gain from Radiation, Fenestration Surfaces calculation (Part 6).

Skylight Area Adjustment Calculations

A. ROOF NAME - Provide a name or designator for each unique type of roof that contains skylights (roofs without skylights will have no adjustment). If an orientation has two different roof types, list each separately. This designator should be used consistently throughout the plan set (roof plans, skylight schedules, etc.) to identify each surface. It should also be consistently used on the other forms in the compliance documentation.

B.-C. AREAS - List the areas (in ft^2). The GROSS AREA is the gross exterior roof area for the particular roof type and orientation under consideration; note that it does not include doors, such as roof hatches. The SKYLIGHT AREA is for skylights included in each roof.

D. SKYLIGHT ADJUSTMENT FACTOR is the skylight adjustment factor calculated on Part 2. It is the same for all skylights in the building.

E. ADJUSTED SKYLIGHT AREA is calculated by multiplying the values in COLUMNS C and D.

F. ADJUSTED ROOF AREA is calculated by subtracting E from B. If this results in a negative value enter zero.

COLUMNS B, C, E and F are added. As a check, the total of COLUMN B should equal the sum of the totals of COLUMNS E and F.

The totals in COLUMNS E and F are used in COLUMN F of the Overall Heat Loss calculation (Part 3) and in COLUMN G of the Overall Heat Gain from Conduction calculation (Part 4), and values in COLUMN F are used in COLUMN H of the Overall Heat Gain from Radiation, Opaque Surfaces calculation (Part 5), and values in COLUMN E are used in COLUMN J of the Overall Heat Gain from Radiation, Fenestration Surfaces calculation (Part 6).

3.10.4 ENV-4-C Minimum Skylight Area for Large Enclosed Spaces

This form must be filled out if the building contains an enclosed space with a floor area greater than 25,000 ft^2, a ceiling height of greater than 15 feet and an LPD of equal or greater to 0.5 W/ft^2.

If this section applies, the minimum skylight area is determined either as a fraction of the daylit area or from the minimum effective aperture area. To determine the minimum area as a fraction of daylit area, fill in steps A-E of this worksheet. To determine the minimum area based on minimum effective aperture area, fill in steps F-N of this worksheet.

This is the prescriptive minimum skylight area. If skylights are not desired, an alternative building can be built as long as the proposed building is shown to consume less energy than a building with the prescriptive number of skylights.

ENV-4-C Part 1 of 2

Minimum Fraction of Daylit Area Method

A. PROPOSED DAYLIT AREA - Enter the proposed daylit area as indicated on the plans schedule and enter the relevant page number of the plans.

B. MINIMUM DAYLIT AREA - Enter the result of the enclosed floor area and multiply by 0.50..

Checks the box if Criteria 1, “Proposed Daylit Area is equal to or greater than Minimum Daylit Area,” is met; otherwise, go to the next criteria section.

C. SKYLIGHT-DAYLIT FRACTION – Select one of the boxes corresponding to the proposed installed LPD of the enclosed space and enter the resulting percentage in the box on the right.

D. MINIMUM SKYLIGHT AREA – The product of B and C is the minimum skylight area to daylit area.

E. PROPOSED SKYLIGHT AREA – Enter the proposed total skylight area in the large enclosed space that matches the plans and include the page from the plans.

Check the box if Criteria 2, ”Proposed skylight area is equal to or greater than minimum skylight area,” is met; otherwise go to next criteria section.

Check the box if Criteria 3, ” Haze rating of skylight glazing or skylight diffuser is greater than 90%,” is met and enter the document and page number with “haze” specification of skylights. Otherwise go to the next criteria section.

Check the box if the large enclosed space complies with Criteria 1, 2, and 3 above.

ENV-4-C Part 2 of 2

Minimum Effective Aperture Ratio

F. PROPOSED DAYLIT AREA - Enter the proposed daylit area as indicated on the plans schedule and enter the relevant page number of the plans.

G. MINIMUM DAYLIT AREA - Enter the large enclosed floor area and multiply by 0.50.

Checks the box if Criteria 1, “Proposed Daylit Area is equal to or greater than Minimum Daylit Area,” is met; otherwise go to next criteria section.

H. MINIMUM EFFECTIVE APERTURE – Select one of the boxes corresponding to the proposed installed LPD of the enclosed space and enter the resulting percentage in the box on the right.

I. SKYLIGHT VISIBLE TRANSMITTANCE (VLT) – Enter the VLT value in this box from manufacturer’s literature.

J. CALCULATE THE WELL CAVITY RATIO – Determine if the well is rectangular or non-rectangular, select one of the well types, fill in columns A, B,

C and calculate the WCR with the appropriate equation. See §146 for additional details.

K. AVERAGE WELL WALL REFLECTANCE – This is used with the WCR to determine the well efficiency. This reflectance is determined as shown in the Illumination Engineering Society of North America, IESNA Lighting Handbook, Ninth Edition (2000).

L. WELL EFFICIENCY – This is determined from the nomograph in Figure 146-A in the Standards. See Chapter 5, Section 5.6 of this manual. Average skylight well wall reflectance and WCR are required.

M. MINIMUM SKYLIGHT AREA – Follow the equation listed on the form to calculate the minimum skylight area by minimum effective aperture.

N. PROPOSED SKYLIGHT AREA – Enter the proposed skylight area in this box. The proposed area must exceed the minimum requirement specified in field D or field E of Part 1 of 2 of this form.

Check the box if Criteria 2, “Proposed skylight area is equal to or greater than minimum skylight area,” is met; otherwise go to the next criteria section.

Check the box if Criteria 3, “Haze rating of skylight glazing or skylight diffuser is greater than 90%.” Enter the document and page number with haze specification of skylights. Otherwise go to the next criteria section.

Check the box if the large enclosed space complies with Criteria 1, 2, and 3 above (Section 143(c), items 1-3).