Designation: E2351 – 04a (Reapproved 2013)

An American National Standard

Standard Guide for Specifying and Evaluating Performance of Single Family Attached and Detached Dwellings—Functionality[1]

This standard is issued under the fixed designation E2351; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

This guide, L-Functionality is part of a set which together presents a complete performance standard guide for specifying and evaluating single family attached and detached dwellings. The complete set in the series, when finished, is to include the attributes given in Table 1.

The series provides a framework for specifying and evaluating qualities of building products and systems to meet user needs without limiting ways and means. The format for this guide includes performance statements that consist of four components (Objectives-Criteria-Evaluation-Commentary) which together provide a systematic performance based approach for the intended purpose. These performance statements are presented in Appendix X2 against a Hierarchy of Building Elements as tabulated in Table 2.

To some extent, the Hierarchy of Building Elements reflects the structure of the housing industry, and therefore, the organization of the provider teams. For example, a homebuilder or developer is likely to be the systems integrator responsible for "0. Whole Building System." The provider teams may include separate subcontractors for "2.1 Foundation," "2.2 Superstructure," "5. Plumbing," "6. HVAC," and so forth, and separate suppliers for components such as "3.2.2 Windows," "4.1.2 Doors, "3.4 Joint Sealants," "5.1 Plumbing Fixtures," and so forth.

The purpose of these standard guides is to provide a standardized methodology for describing performance parameters of single family attached or detached dwellings. This methodology standardizes the descriptions of performance of a single family dwelling, attached or detached, that can be expressed as performance statements (O-C-E-C) for a particular attribute, agent, and user need.

These standard guides are intended for use by those who need to prescribe required levels of performance and those who need to rate a product which forms a single family dwelling or part thereof. The standard guides include examples of performance statements which may be used for the specification and evaluation of design, materials, products, components, subsystems, and systems.

1. Scope

1.1 This guide provides examples of performance statements for functional and operable, spaces, products, components, and subsystems for single family attached and detached dwellings. These include the location, relationships, and dimensions of Spaces and Fittings, Furnishings and Equipment, and the operability and other parameters of Functionality of the Exterior Enclosure, Interior Space Division, Plumbing, HVAC, Fire Protection Subsystems, Electrical Network, Communication and Security Networks, Fuel Networks and Fittings, and Furnishings and Equipment that are not covered by the performance statements of the other attributes. See Fig. 1, Matrix of Parameters of Functionality.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.*

[1] This guide is under the jurisdiction of ASTM Committee D33 on Protective Coating and Lining Work for Power Generation Facilities and is the direct responsibility of Subcommittee D33.09 on Protective Lining for FGD Systems.

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TABLE 1 Attributes Addressed in the Series of Performance Standards

A— Structural Safety and Serviceability
B— Fire Safety
C— Accident Safety
D— Health and Hygiene
E— Indoor Air Quality
F— Light
G— Acoustics
H— Durability
I— Accessibility
J— Security
K— Economics
L— Functionality
M— Aesthetics
N— Adaptability
O— Maintainability
P— Sustainability

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C976 Test Method for Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box (Withdrawn 2002)[3]

E119 Test Methods for Fire Tests of Building Construction and Materials

E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

E241 Guide for Limiting Water-Induced Damage to Buildings

E283 Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

E330 Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

E331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

E547 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference

E631 Terminology of Building Constructions

E783 Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

E1105 Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference

E1486 Test Method for Determining Floor Tolerances Using Waviness, Wheel Path and Levelness Criteria

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

TABLE 2 Hierarchy of Building Elements Included in the Series of Performance Standards for Single Family Attached and Detached Dwellings

0. Whole Building System
0.1 All Building Subsystems
0.2 Groups of Buildings Subsystems
1. Spaces
1.1 Entries
1.2 Living Spaces
1.3 Dining Spaces
1.4 Kitchens
1.5 Sleeping Spaces
1.6 Bathrooms
1.7 Water Closets
1.8 Outdoor Living Spaces
1.9 Storage Spaces
1.10 Other
1.10.1 Laundry
1.10.2 Garage
1.10.3 Work Space
1.10.4 Mechanical Space
2. Structure
2.1 Foundation
2.2 Superstructure
3. Exterior Enclosure
3.1 Grade Enclosure
3.1.1 Floor on Grade
3.1.2 Floor over Air Space
3.1.3 Other
3.2 Vertical and Sloped Enclosure
3.2.1 Walls
3.2.2 Windows
3.2.3 Doors
3.2.4 Other (for example, railings, louvers, screens etc.)
3.3 Roofs
3.3.1 Roof Coverings
3.3.2 Skylights
3.3.3 Other Roof Openings
3.4 Joint Sealants
4. Interior Space Division
4.1 Vertical Space Dividers
4.1.1 Partitions
4.1.2 Doors
4.1.3 Other
4.2 Horizontal Space Dividers
4.2.1 Floors
4.2.2 Ceilings
4.2.3 Floor/Ceiling Openings
4.2.4 Other
4.3 Stairs and Ramps
5. Plumbing
5.1 Plumbing Fixtures
5.2 Domestic Water Distribution
5.3 Sanitary Waste
5.4 Rain Water Drainage
6. HVAC
6.1 Heating
6.1.1 Heating Generation
6.1.2 Heating Distribution
6.1.3 Heating Terminal and Package Units
6.1.4 Heating Controls and Instrumentation
6.2 Cooling
6.2.1 Cooling Generation
6.2.2 Cooling Distribution
6.2.3 Cooling Terminal and Package Units
6.2.4 Cooling Controls and Instrumentation
6.3 Ventilation
6.3.1 Ventilation Distribution
6.3.2 Ventilation Terminal and Package Units
6.3.3 Ventilation Controls and Instrumentation
7. Fire Protection Subsystems
7.1 Suppression
7.2 Detection
7.3 Notification
7.4 Fire Protection Specialties
8. Electrical Network
8.1 Electrical Service and Distribution

TABLE 2 *Continued*

8.2 Lighting and Branch Wiring
9. Communication and Security Networks
9.1 Telephone
9.2 Intercom
9.3 Television
9.4 Security
9.5 Other
10. Fuel Networks
10.1 Gas
10.2 Oil
10.3 Other
11. Fittings, Furnishings and Equipment

E1486M Test Method for Determining Floor Tolerances Using Waviness, Wheel Path and Levelness Criteria (Metric)
E1677 Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls
E1825 Guide for Evaluation of Exterior Building Wall Materials, Products, and Systems
E2151 Terminology of Guides for Specifying and Evaluating Performance of Single Family Attached and Detached Dwellings
MNL18 Moisture Control in Buildings

2.2 *AAMA Standards:*[4]
AAMA 901-96 Voluntary Specification for Rotary Operators In Window Applications
AAMA 902-99 Voluntary Specification for Sash Balances (Revised)
ANSI/AAMA 1002.10-93 Voluntary Specifications for Insulating Storm Products for Windows and Sliding Glass Doors
ANSI/AAMA/NWWDA 101/I.S.2-97 Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors

2.3 *ANSI Standards:*[5]
ANSI Z124.2 Plastic Shower Receptors and Shower Stalls
ANSI Z765-1996 American National Standard for Single family Residential Buildings, Square Footage—Method for Calculating

2.4 *ANSI/AHAM Standard:*[6]
ANSI/AHAM HRF-1-1988 Household Refrigerators, Combination Refrigerator-Freezers and Household Freezers

2.5 *ANSI/DASMA Standard:*[7]
ANSI/DASMA 102-1996 Specification for Sectional Overhead Type Doors

2.6 *ASHRAE Standard:*[8]
ANSI/ASHRAE 55-1992 Thermal Environmental Conditions for Human Occupancy and the ASHRAE 55a-1995 Addendum

2.7 *ASME Standard:*[9]
ASME/ANSI A112.19.2M Vitreous China Plumbing Fixtures

2.8 *ASSE Standard:*[10]
ASSE/ANSI 1037 Performance Requirements for Pressurized Flushing Devices for Plumbing Fixtures

2.9 *AWI Standard:*[11]
AWI Architectural Woodwork Quality Standards

2.10 *ICC Standards:*[12]
ICC/ANSI A117.1-98 Accessible and Usable Buildings and Facilities
International Building Code -2000
International Energy Conservation Code -2000
International Residential Code for One- and Two-Family Dwellings-2000

2.11 *NFRC Standards:*[13]
NFRC 100-97 Procedure for Determining Fenestration Product Thermal Properties (Currently Limited to U values)
Attachment A Interim Standard Test Method for Measuring the Steady State Thermal Transmittance of Fenestration Systems Using Hot Box Methods
Section B Procedure for Determining Door System Product Thermal Properties (Currently Limited to U values)
NFRC 200-97 Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence
NFRC 300-94 Procedures for Determining Solar Optical Properties of Simple Fenestration Products
NFRC 301-93 Standard Test Method for Emittance of Specular Surfaces Using Spectrometric Measurements
NFRC 400-95 Procedure for Determining Fenestration Product Air Leakage

2.12 *WDMA Standard:*[14]
NWWDA I.S.1 Industry Standard for Wood Flush Doors

2.13 *UL Standard:*[15]
UL 250 Household Refrigerators and Freezers (1993)

[4] Available from Association for the Advancement of Medical Instrumentation (AAMI), 4301 N. Fairfax Dr., Suite 301, Arlington, VA 22203-1633, http://www.aami.org.
[5] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.
[6] Available from Association of Home Appliance Manufacturers (AHAM), 1111 19th Street NW, Suite 402, Washington, DC 20036, http://www.aham.org.
[7] Door and Access Systems Manufacturer's Association International (DASMA), 1300 Summer Ave., Cleveland, Ohio 44115–2851, http://www.dasma.com.
[8] Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, http://www.ashrae.org.
[9] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, http://www.asme.org.
[10] Available from American Society of Safety Engineers (ASSE), 1800 E. Oakton St., Des Plaines, IL 60018, http://www.asse.org.
[11] Available from Architectural Woodwork Institute (AWI), 46179 Westlake Drive, Suite 120, Potomac Falls, VA 20156-5874, http://www.awinet.org.
[12] Available from International Code Council (ICC), 500 New Jersey Ave., NW, 6th Floor, Washington, DC 20001, http://www.iccsafe.org.
[13] Available from National Fenestration Rating Council (NFRC), 6305 Ivy Lane, Suite 140, Greenbelt, MD 20770, http://www.nfrc.org.
[14] Available from Window and Door Manufacturers Association (WDMA), 2025 M Street, NW, Suite 800, Washington, DC 20036-3309, https://www.wdma.com.
[15] Available from Underwriters Laboratories (UL), 2600 N.W. Lake Rd., Camas, WA 98607-8542, http://www.ul.com.

2.14 *Other References:*

Ramsey/Sleeper Architectural Graphic Standards—Latest Edition[16]

U.S. Department of Commerce Builder's Foundation Handbook

Humanscale 7/8/9 Diffrient, N., Tilley, Alvin R., and Harman, D.[17]

Fair Housing Accessibility Guidelines[18]

Peterson, Mary Jo, Universal Bathroom Planning, Design That Adapts To People[19]

Peterson, Mary Jo, Universal Kitchen Planning, Design That Adapts To People[19]

Time-Saver Standards For Architectural Design Data—Latest Edition[20]

Time-Saver Standards For Building Types—Latest Edition[20]

Time Saver Standards for Housing and Residential Development—Second Edition[20]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this guide refer to Terminologies E631 and E2151.

3.2 *Definitions:*

3.2.1 *air infiltration, n*—the amount of air leaking in and out.

3.2.2 *circulation, n*—as used in the performance statements, the passing of people, pets and objects from place to place, room to room, or space to space, unless otherwise noted.

3.2.3 *comfort, n*—contented well being; satisfying or enjoyable experience; physical, thermal, and visual contentment; not too cold or warm; not painful; and supportive.

3.2.4 *commentary, n*—the fourth part of a *performance statement*, consisting of an informative narrative explaining aspects of the *performance statement*.

3.2.4.1 *Discussion*—A *commentary* may include one or more of the following: an explanation of how the *objective* relates to *user needs* in fields such as physiology, psychology, and culture or tradition; an explanation of how the *criteria* are established including guides for setting different levels of performance to meet various *user needs*; a discussion of the reliability of the *evaluation* method; and example solutions that may be deemed, by the *specifier*, to comply with the *performance statement*.

3.2.5 *convenient, adj*—available to be utilized with the most effective, efficient, and accessible means.

3.2.6 *criteria, n*—the second part of a *performance statement*, consisting of quantitative statements defining the level or range of performance necessary to meet an *objective* or, where such a level or range cannot be established, the units of measurement of the performance.

3.2.7 *detached dwelling, n*—a *dwelling unit* standing by itself.

3.2.8 *evaluation, n*—the third part of a *performance statement*, consisting of the method(s) of assessing conformance of the element being addressed to the *criteria*.

3.2.8.1 *Discussion*—The *evaluation* states the standards, inspection methods, review procedures, historical documentation, test methods, in-use performance, engineering analyses, models, or other means to be used in assessing whether or not a criterion has been satisfied.

3.2.9 *functionality, n*—that part of *serviceability* that addresses issues such as activity support, shape and size, spatial relationships, visual privacy, circulation, and operability.

3.2.9.1 *Discussion*—See Guide "G"—Acoustics for audio issues, for discussions of visual privacy issues.

3.2.10 *habitable rooms, n*—a room that is used for sleeping, living, cooking or dining purposes, excluding such spaces as closets, pantries, bath or toilet (water closet) rooms, hallways laundries, storage spaces, utility rooms and similar spaces.

3.2.11 *means of egress, n*—a continuous and unobstructed path of travel from the dwelling unit directly to the exterior with no shared or common entry with another dwelling unit.

3.2.12 *not interfere w/ neighbor*—not to hinder the use, enjoyment, functionality, etc. of the adjacent dwellings, property, site, buildings, etc.

3.2.13 *service entrance, n*—in regard to electrical or other power or fuel network, the location where the electricity or fuel enters the building.

3.2.14 *serviceability, n*—the capability of a building, assembly, component, product, or construction to perform the function(s) for which it is designed and used.

3.2.15 *solar heat gain coefficient (SHGC), n*—the fraction of solar radiation admitted through a window or skylight, both directly transmitted, and absorbed and subsequently released inward.

3.2.15.1 *Discussion*—The solar heat gain coefficient has replaced the shading coefficient as the standard indicator of a window's shading ability. It is expressed as a number between 0 and 1. The lower a window's solar heat gain coefficient, the less solar heat it transmits, and the greater its shading ability. SHGC is expressed for the entire window assembly.

3.2.16 *specifier, n*—the individual or organization using the standard guides to create specifications for dwelling designs, materials, products, components, subsystems, or buildings to be provided by *providers*.

3.2.17 *user need, n*—a statement of the activities and behavior to be carried out in relation to the dwelling by its residents, or other users, defined in terms of motor, kinetic, physiological, psychological, emotional and other parameters of human behavior.

3.2.17.1 *water closet, n*—a compartment or room for defecation and excretion into a toilet bowl.

[16] Available from John Wiley and Sons, Inc., http://www.wiley.com.

[17] Available from Henry Dreyfuss Associates, 450 South Wagner Road, Ann Arbor, MI 48103, http://www.hda.net.

[18] Available from Office of the Assistant Secretary for Fair Housing and Equal Opportunity, U.S. Department of Housing and Urban Development, 451 7th Street, SW, Washington, DC 20410, http://portal.hud.gov.

[19] Available from National Kitchen and Bath Association (NKBA), 687 Willow Grove Street, Hackettstown, NJ 07840, http://www.nkba.org.

[20] Available from McGraw Hill Ryerson, Order Desk 300 Water Street, Whitby ON, L1N 9B6 Canda.

3.2.18 *water closet fixture, n*—a toilet bowl and its accessories.

3.2.19 *water infiltration, n*—water penetration that passes beyond the interior face of the unit and overflows into the room or into the wall area.

3.2.20 *U-factor, n*—a measure of the rate of non-solar heat loss or gain through a material or assembly. It is expressed in units of W/m^2-°C (Btu/h-ft^2-°F).

3.2.20.1 *Discussion*—Values are normally given for AAMA/ASHRAE/NFRC winter conditions of 18°C (0°F) outdoor temperature, 21°C (70°F) indoor temperature, 24 km/h (15 mph) wind, and no solar load. The U-factor is expressed for an entire window or windows, which includes the effect of the frame and the spacer materials. The lower the U-factor, the greater a window's resistance to heat flow and the better its insulating value.

4. Significance and Use

4.1 This guide and the use of consensus performance standards for housing can significantly contribute to the removal of barriers to the acceptance of housing innovation in the global marketplace. This guide in conjunction with the balance of the set of standard guides can also serve to improve communications between producers and consumers leading to enhanced quality and performance of housing.

4.2 This guide is not intended for use in specifying and evaluating residential construction other than single family attached and detached dwellings.

4.3 Although this guide addresses site planning as it affects functionality of single family attached and detached dwellings, the site-planning issues considered are not be construed as a comprehensive site specification.

4.4 This guide can be useful to managers of housing procurement projects, home builders, designers, product manufacturers, and evaluation services in addressing functionality issues related to single family attached and detached dwellings. Such applications can require that the examples of performance statements be written in mandatory language.

4.5 *Methodology/Special Conditions:*

4.5.1 In order to provide the specifier added flexibility in the choice of specific building elements, the specifier may choose to require that the providers submit information on certain building elements representing alternative levels of quality, beyond those which are defined by the attributes in the complete set of standard guides. For each of these the providers should be required to submit details, specifications, or other appropriate information as determined by the specifier.

4.5.2 Some elements that may need these alternatives are finishes, fixtures and hardware.

4.6 *Code Compliance*—This guide does not intend to take precedence over applicable standards, federally regulated standards local rules, codes and regulations.

4.7 *Data and Dimensions:*

4.7.1 *Anthropometric*—The specifier should provide the potential providers with important dimensions such as the height, width, reach, stretch, eye level of potential occupants standing and sitting, as well as other relevant anthropometric dimension so the occupants can conveniently use the dwelling unit. The Specifier should take into consideration occupants who do not fit into the population mean; the dimensions should be adjusted as required. See the standard Guide "I"—Accessibility for Dimensions Associated with Access for the Disabled.

4.7.1.1 *Discussion*—The 97.5 percentile (large male) dimensions may be used to determine space envelopes, the 2.5 percentile (small person) may be used to determine the maximum reach areas by hand or foot, and the 50 percentile (average person) may be used to establish control and display heights. Reference: "Humanscale 7/8/9" (see Section 2).

4.7.2 *Furniture Sizes*—The specifier may provide potential providers with typical furniture dimensions that will be used in conjunction with the performance statements that address furnishability to evaluate the appropriateness of room shapes and layouts. Providers wishing to suggest other furniture types for the purpose of evaluation should provide justification, dimensions, and documentation that a variety of each of these furniture types to be substituted is readily available. Reference: Residential chapter of "Time-Saver Standards For Building Types," Residential Furnishings section of "Architectural Graphic Standards" (see Section 2).

4.7.3 *Movement and Circulation Minima*—See the Ease of Movement Performance Statements, in Appendix X2 for minimum movement and circulation. Where such movement and circulation conditions exist, the guidelines are intended to be used with the furniture size information (see 4.7.2) and with the furnishability criteria in section X2.2.3 and the Performance Statements in Appendix X2. The specifier may choose to modify and add to these minimum guidelines based on project specific objectives. Providers wishing to use alternative minimum circulation dimensions should be required to provide documentation from a source acceptable to the specifier indicating that the intended dimensions are adequate. Also, where the specifier has included accessibility considerations see ASTM Designation: I-__ Pre-Standard Guide for Specifying and Evaluating Performance of Single Family Attached and Detached Dwellings—Accessibility.

4.8 *Provisions for a Functional Building Site*—See Section 6.

4.8.1 *Site Planning*—See Section 6.

4.9 *Automobile Parking*—See Section 6.

5. Parameters of Functionality

5.1 One of the first tasks of a specifier may be the development of a program of needs.

5.1.1 A program of needs may include eating, entertaining, living, relaxing, sleeping, etc.

5.1.2 The program of needs may differ depending on the characteristics of the family and family members.

5.2 The following parameters, affecting functionality, are examples of parameters that relate to the program of needs.

5.2.1 The parameters, affecting functionality, listed are examples only. This guide in no way suggests that the listed parameters are the only ones affecting functionality.

5.2.2 Fig. 1 is a matrix displaying the interaction of examples of Parameters affecting the Functionality of the building elements. Typical examples of parameters are indicated; the specifier should delete parameters that are not applicable (for example, "not interfere w/neighbor" if there are not close neighbors) or add others (for example, "natural elements" such as a stream) as warranted. In some cases, only general criteria in terms of Parameters are specified (designated by "q" in Fig. 1). These elements are covered in Section 4, Significance and Use, the general discussion at the beginning of Appendix X2, the whole building performance statements in Appendix X2, and the activity support performance statements for spaces in Appendix X2. Footnotes located in the same cell as the "q" indicates where there is further discussion of the issue. Also indicated in this matrix are letters "A" through "P" which represent the complete series of attribute guides. An issue that has a letter in its box is an issue that has a relationship to functionality but is more appropriately covered in the indicated attribute guide.

5.2.3 *Climate Effects*—The climate effects vary as a function of geographic location, and in some cases the micro-climate effects may lead to different building designs and configurations. For example, the location of a breakfast nook may depend on the entry of the morning sun into the room. For another example, whether the garage is connected to the dwelling unit may depend on the temperature extremes and the amount of precipitation in the area. If site-specific information is available for the project, the specifier should provide it to providers. Micro-climate can be affected by site design; see 6.1 for further discussion.

5.2.4 *Cultural Effects*—Culture effects may vary as a function of religious beliefs, ethnic background, and historic background. For example, the size, shape and equipment provided in a kitchen will differ depending on cultural needs. If such specific information is available for a specific dwelling project, the specifier should provide it to providers.

6. Site Considerations Affecting Functionality

6.1 *Site Design:*

6.1.1 There are many conditions specific to a building site that can have significant effects on the functionality of a dwelling. This section addresses information that should be considered in order to adequately provide for the functionality of the building.

6.1.2 The specifier should provide information in the form of site design and site-building interface of sufficient detail for providers to complete the design of the dwelling.

6.1.3 Alternatively the specifier may choose to make housing providers responsible for the design and layout of the site. If so, each provider should determine in the site design the layout and grading of the site, and how it interfaces with the building. In such cases, the specifier should provide site planning performance criteria.

6.1.4 Planning the siting of the dwelling should be performed to facilitate the efficient use of the land, to provide drainage away from the building, to provide privacy and other amenities for the occupants, to provide for views or other aesthetic considerations, to provide needed space in which to perform normal activities and to allow for the needs of the building for utilities and waste removal. Site planning should also include sensitivity to possible negative impacts on adjoining properties. The site design may include:

6.1.4.1 A layout that provides easy access throughout the site and into the building.

6.1.4.2 Control or to mitigate against nature's elements, for example, surface water, so as not to adversely affect the building or to adversely interfere with the use of the dwelling and the site.

Discussion—Grading to divert water away from buildings and pathways, and to provide protection from seasonal flooding, is an example of controlling rain water. Also, the location of the buildings and pathways usually should not be prone to flooding. Of course, if circulation through the site is by water transport (boat), then this would not apply.

6.1.4.3 Exterior circulation paths that do not accumulate rainwater.

6.1.4.4 Building orientation and landscaping that responds to seasonal sun angles and locations.

6.1.4.5 Building orientation and landscaping that responds to seasonal wind directions.

6.1.4.6 A layout that provides easy access from adjacent vehicle and pedestrian routes.

6.1.4.7 A layout that provides easy access to available utilities.

6.1.4.8 Building and path locations that are not prone to flooding.

6.2 *Solid Waste Management:*

6.2.1 Functionality criteria related to solid waste management may vary widely from site to site. Solid waste may be treated on site, or it may be stored on site or in the dwelling unit, awaiting transport to a treatment facility.

6.2.2 If solid waste is treated on site, then site or building area and possibly utilities; such as power, heat, and water; may be needed.

Discussion—On site solid waste treatment may include composting, incinerators, garbage disposals, etc.

6.2.3 If solid waste is stored on site, then it is a function of the method and frequency of solid waste removal from the site. The more frequent the removal schedule, the less area will be needed for storage. The specifier should provide providers with the information on trash collection method and frequencies at the site. (See performance statements in Appendix section X2.2.12.)

6.2.3.1 Alternatively, in any specific solicitation, the specifier may choose to make the housing providers responsible also for design of site solid waste removal. If so, each provider should be required to determine the method of solid waste removal and trash collection frequencies, based on the site design. In such cases, the specifier needs to provide criteria for site solid waste removal.

6.3 *Water Supply:*

6.3.1 Water supply may or may not be a site issue. Water may be provided at each dwelling unit, from a central location on the site with more than one dwelling unit, from a municipal water system, or any combination thereof.

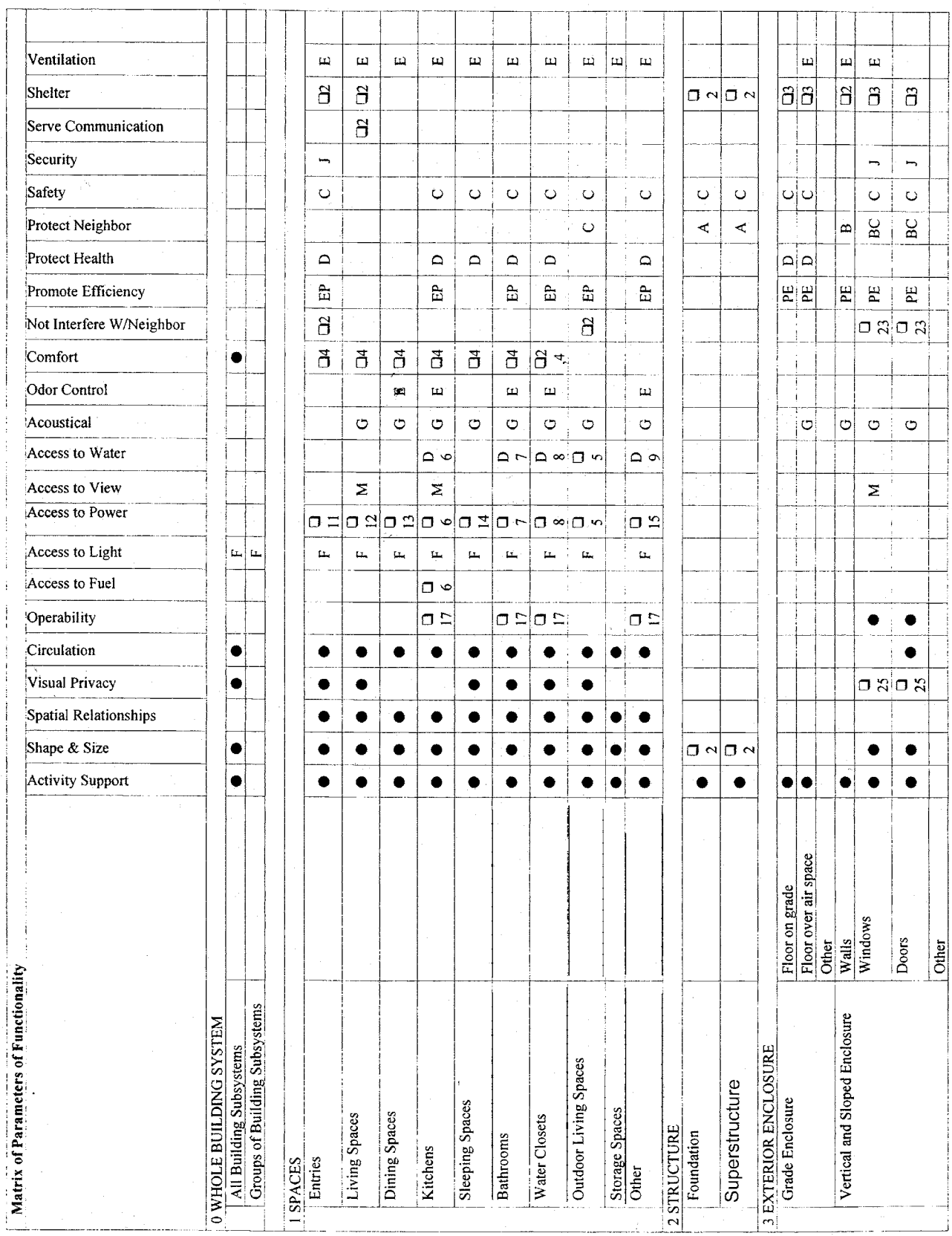

FIG. 1 Matrix of Parameters of Functionality

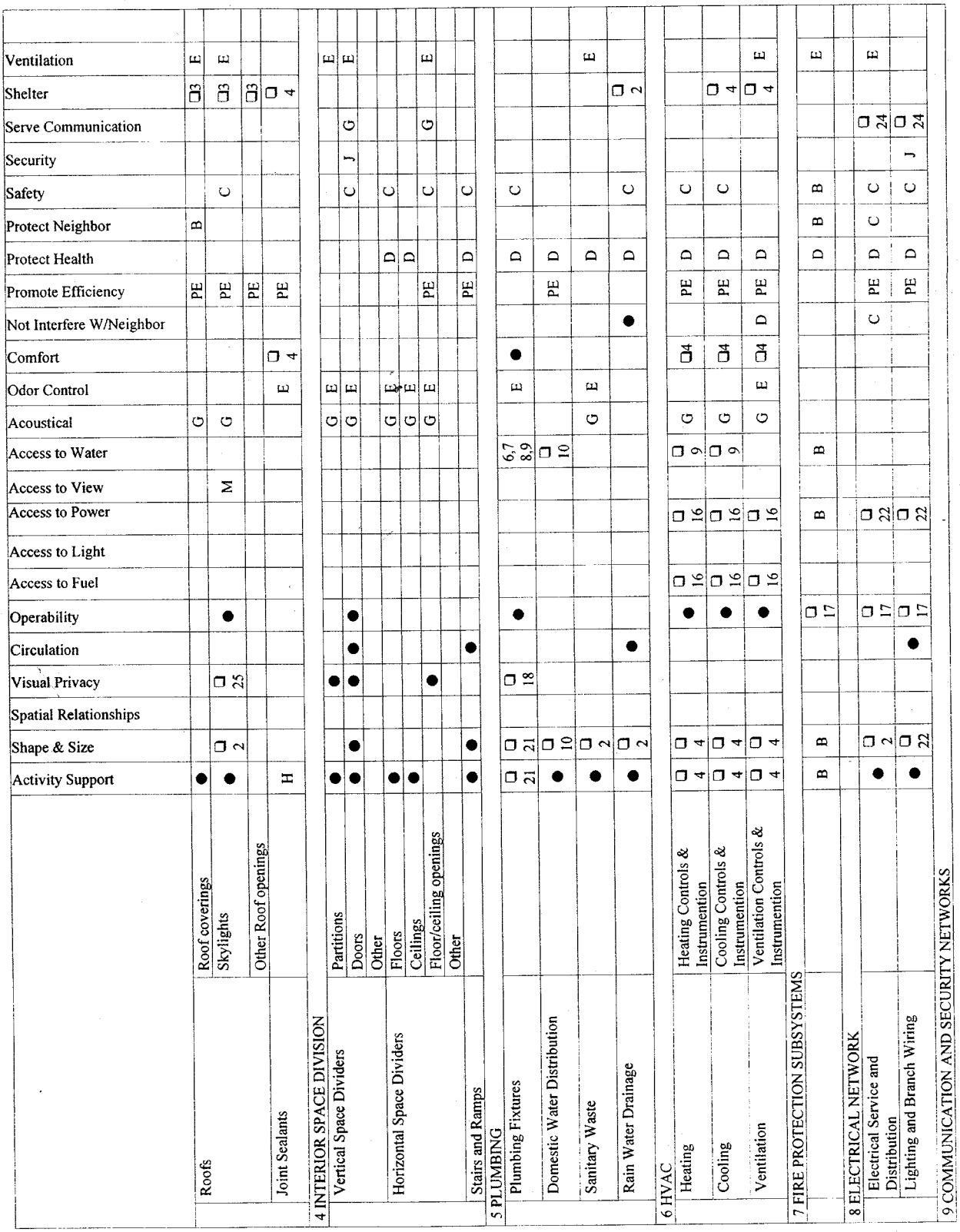

FIG. 1 Matrix of Parameters of Functionality *(continued)*

	Activity Support	Shape & Size	Spatial Relationships	Visual Privacy	Circulation	Operability	Access to Fuel	Access to Light	Access to Power	Access to View	Access to Water	Acoustical	Odor Control	Comfort	Not Interfere W/Neighbor	Promote Efficiency	Protect Health	Protect Neighbor	Safety	Security	Serve Communication	Shelter	Ventilation	
Telephone	●					☐ 17			☐ 2			G									☐ 2			
Intercom	●					☐ 17			☐ 2			G									☐ 2			
Television	●			●		☐ 17			☐ 2			G									☐ 2			
Security	J				J	☐ 17			J								D	C		J	J			
Other																								
10 FUEL NETWORKS	●	☐ 2				☐ 16							E			PE	D	C	C				E	
11 FITTINGS, FURNISHINGS, AND EQUIPMENT (Built-in)																								
Fittings, Furniture & Equipment	●	☐ 2		☐ 19	●	●			☐ 2						●		D						E	

● Represents conditions on which performance statements (O-C-E-C) are given within Appendix X2 of this guide.

☐ Indicates conditions that are discussed under Section 3.2.9, in this section, in section 7.1, in Appendix X1, in the whole building performance statements, in performance statements as indicated by footnotes, and in the general discussion in each division.

Boxes marked with the following indicate parameters that will not be covered in the guides for the following attributes:

A - Structural Safety and Serviceability

B - Fire Safety

C - Accident Safety

D - Health and Hygiene

E - Indoor Atmosphere

F - Light

G - Acoustics

H - Durability

I - Accessibility

J - Security

K - Economics

M - Aesthetics

N - Adaptability

O - Maintainability

P - Sustainability

X - Parameters that are unassigned to an attribute guide at this time; other attributes may be added in the future

FOOTNOTES

1 - Not used because it would not be discernable from the letter "I".

2 - This parameter is covered in the activity support performance statement for this building element.

3 - This parameter is covered in the activity support performance statement for whole buildings.

FIG. 1 Matrix of Parameters of Functionality *(continued)*

4 - This parameter is covered in the comfort performance statement for whole buildings.
5 - This parameter is covered in the activity support performance statement for outdoor living.
6 - This parameter is covered in the activity support performance statement for kitchen.
7 - This parameter is covered in the activity support performance statement for bathrooms.
8 - This parameter is covered in the activity support performance statement for water closets.
9 - This parameter is covered in the activity support performance statements for laundry, workroom & mechanical spaces.
10 - This parameter is covered in the activity support performance statement for water distribution.
11 - This parameter is covered in the activity support performance statement for entry.
12 - This parameter is covered in the activity support performance statement for living.
13 - This parameter is covered in the activity support performance statement for dining.
14 - This parameter is covered in the activity support performance statement for sleeping.
15 - This parameter is covered in the activity support performance statements for laundry, workroom, mechanical & garage spaces.
16 - This parameter is covered in the activity support performance statement for mechanical spaces.
17 - This parameter is covered in the operability support performance statement for fittings, furnishes, & equipment.
18 - This parameter is covered in the visual privacy performance statements for bathrooms & water closets.
19 - This parameter is covered in the visual privacy performance statements for sleeping & outdoor living.
20 - This parameter is covered in the shape & size performance statement for this building element.
21 - This parameter is covered in the comfort performance statement for this building element.
22 - This parameter is covered in the activity support performance statement for service and distribution.
23 - This parameter is covered in the visual privacy performance statement for this building element.
24 - This parameter is covered in the activity support performance statements for telephone and intercom.
25 - This parameter is covered in the visual privacy performance statement for whole buildings.

FIG. 1 Matrix of Parameters of Functionality *(continued)*

6.3.2 Functionality criteria related to the plumbing distribution network water supply system, and to minimum quantities and pressures of water required for operation of fixtures; may be a function of the design of the water supply network of the entire site or the individual dwelling unit. The specifier needs to provide providers with the information on water supply source characteristics, quantities, system design and pressures.

6.3.3 Alternatively, in any specific solicitation, the specifier may choose to make the provider responsible also for the design of the site water or dwelling unit distribution network. If so, the provider should be required to determine the characteristics of the water supply source at each building or site. In such cases the specifier needs to provide criteria for site water or individual dwelling unit distribution design, since such criteria will be beyond the scope of the housing performance specification.

6.3.4 See appendix section X2.6.2, Domestic Water Distribution, for examples of performance statements covering building related issues.

6.4 *Electrical Supply:*

6.4.1 Functionality criteria related to the electrical network may involve the service entrance in a building or the production of electricity within the building.

6.4.2 If a service entrance is needed, the location may depend on the design of the site electrical distribution network. The site distribution network may require connection to on site power production or to some central municipal power supply. It is anticipated that this design will not be the responsibility of providers. The specifier should provide providers with information on the required location of the building service entrance. Alternatively, the specifier may choose to make providers responsible also for the design of site electrical distributions. If so, each provider may locate the building's service entrance based on the site design. In such cases, the specifier needs to provide criteria for site electrical designs since such criteria will be beyond the scope of the housing performance specification.

6.4.3 If electrical power is being produced in the dwelling, then space needs to be provided for the equipment. If fuel is needed, then fuel storage or fuel connection is needed. If a renewable energy production is used, such as solar or wind, then space needs to be provided on the site or on the building for the energy gathering equipment.

6.4.4 Refer to examples of performance statements, in appendix section X2.9, that cover the functionality of electric use in dwelling units.

6.5 *Communication and Security Networks:*

6.5.1 Functionality criteria related to the communication and security networks refer to the design of telephone, television, intercom, security, and telecommunication networks. The specifier should provide providers with information and the design of the communication networks, including cabling, antennas, satellite dishes, etc.

6.5.2 Functionality criteria related to the communication and security networks may involve the service entrance in a building, for hardwire connections, or the space, on the site or on the building, for wireless reception equipment.

6.5.3 Refer to examples of performance statements, in appendix section X2.10, that cover the functionality of communication and security networks within dwelling units. See Standard Guide "J"—Security, for a more comprehensive coverage of security issues.

6.6 *Liquid and Gas Fuel Supply:*

6.6.1 Functionality criteria related to the liquid fuel distribution network and gaseous fuel distribution system may involve a "connection to central distribution network," on site storage of fuel, or on site production or gathering of fuel.

6.6.2 If such a central network is anticipated, the connection to it is a function of the design of such a site gas distribution network which may take a variety of forms, including distribution from on-site tank farms for the storage of gas, regional piping network, etc. It is anticipated that the design and construction of the site network will not be the responsibility of the provider. The specifier needs to provide the provider with the information on the characteristics of the connection to the central network. Alternatively, in any specific solicitation, the specifier may choose to make the providers responsible also for the design of site gas distribution. If so, each provider needs to determine the characteristics of the gas connection at each building. In such cases the specifier should provide criteria for site gas network design.

6.6.3 If on-site storage is anticipated, the provider should be expected to provide space or storage site for each dwelling unit for the storage of gas or other fuel containers in compliance with local codes.

6.6.4 If on-site fuel production or gathering is anticipated, then space needs to be provided for the equipment. If raw material is needed, then raw material storage is needed. If a renewable fuel production is used, such as fuel gas from plant material, then space needs to be provided on the site or on the building for the fuel production equipment.

6.6.5 Refer to examples of performance statements, in appendix section X2.11, that cover the functionality of fuel networks within dwelling units.

6.7 *Vehicle Parking on the Site:*

6.7.1 Where personal transportation vehicles are anticipated to be used, parking should be provided either at each dwelling unit or at a central location.

6.7.1.1 See the performance statements covering garage spaces.

6.7.1.2 If parking is provided at a central location or locations, a convenient pedestrian path should be provided, by the provider of the site amenities, to each dwelling unit.

6.7.1.3 Vehicle parking may be protected or unprotected from the outdoor environment and weather.

6.7.1.4 Types of vehicles and how they affect the aesthetics of the site are important considerations. For example, is it desirable for the vehicles to be seen from the street or the dwelling units, or should they be hidden from view?

6.7.1.5 The connection to a public road system may be desired, or traffic circulation may be internal only to the site.

6.8 *Site Investigation Report:*

6.8.1 A site investigation report may be deemed necessary. The site investigation report for the layout and grading of the site may be based on a site investigation to be carried out by the specifier or provider.

Discussion—The following information may typically be included in the report: *(1)* Exact dimensions and location of the site. *(2)* Enough spot elevations and/or contour elevations to understand the slope and drainage of the site. *(3)* Solar orientation of the site (may affect interior spatial relationships). *(4)* Seasonal prevailing winds (may affect interior spatial relationships). *(5)* Adjacent conditions that affect the site such as location and use of roads, sidewalks, utilities, structures. *(6)* Maximum flood levels with a specified year recurrence interval. *(7)* Seasonal temperature and humidity swings and/or degree days. (May affect exterior spatial relationships as to distance separations and treatment of pedestrian pathways). *(8)* Maximum precipitation with a specified year recurrence interval.

6.8.2 For functionality of the site and the building, the report may correlate and present the site information of section 6.8.1 in the following three areas of site and building design:

6.8.2.1 Site,

6.8.2.2 Site-building interface, and

6.8.2.3 Building systems.

6.8.3 The presentation of the information may be in both graphic and written form, and may be based on the proposed site design topography and elevations (provided by the specifier or the provider) and the proposed design locations, positions, configurations, and elevations of buildings and structures near, at and below ground.

6.8.4 The site investigation report may show the effect specific design considerations can have on the functionality of the building and the site. Along with this building performance standard guide, a detailed site plan or a site performance specification by which the site can be designed may be provided by the specifier. In the absence of either of these, the provider cannot be held responsible for those attributes relating the building to site elements.

6.9 *Mail Delivery:*

6.9.1 Provisions for mail delivery may or may not be needed for a site.

6.9.2 If mail is delivered to each dwelling unit or group of dwelling units, then access to the site and buildings need to be provided for.

Discussion—In a situation where the dwelling unit occupants pick up their mail at a central location, such as a post office box, then access to the site and buildings, for mail delivery would not be needed.

7. Evaluation Methods and Documentation of Conformance for Functionality

7.1 Conformance of building materials, spaces, products, components, assemblies, and subsystems to many of the examples of functionality criteria may be determined by the common evaluation methods described in Appendix X1. These evaluation methods are based on considerations of the most common types of user and environmental functions. The evaluation methods, described in Appendix X1, are designated EM-1 through EM-11. These evaluation methods are cited in the example performance statements given in Appendix X2. The specifier is cautioned to check the appropriateness of the evaluation methods before adding them to the specifications.

8. Performance Statements (O-C-E-C)

8.1 Examples of performance statements for building elements are given in Objective, Criteria, Evaluation Method, and Commentary (O-C-E-C) format. The objectives are based on considerations of normally encountered uses of the particular space or item. Examples of performance statements are found in Appendix X2.

8.1.1 The example performance statements are presented against the Hierarchy of Building Elements tabulated in Table 2. The order of presentation begins with “0. Whole Building system” followed in order by each of the 11 subsystems. Within each subsystem, the example performance statements follow in order down to the lowest levels of the hierarchy as needed.

8.1.2 The performance statements in Appendix X2 are for illustration purposes only. These examples are not intended to illustrate the only accepted method of providing functionality in dwelling units.

8.1.3 Many of the examples of performance statements in Appendix X2 are based on conditions existing in northern North America. The performance statements, in Appendix X2, are examples of how the Parameters affecting the Functionality can respond to specific site conditions and location. A specifier, for dwelling units in a different climate or locale, may use the performance statements as a guide, but revision will be needed to respond to the different climate or locale.

APPENDIXES

(Nonmandatory Information)

X1. EXAMPLES OF SPECIAL EVALUATION METHODS THAT MAY BE USED IN THE EVALUATION OF THE FUNCTIONALITY PERFORMANCE STATEMENTS CRITERIA

X1.1 *Observation and Review Drawings*—Compare the dwelling unit with the criteria of this performance statement.

X1.1.1 *Observation*—Observe a typical unit after construction and compare with the parameters of this guide. Walk through the unit while comparing it to the specific performance statement.

X1.1.2 Review Drawings consists of analyzing the documents provided by the specifier and compare the drawings with the parameters of this guide. Compare the drawings with the specific performance statement. Dimensions given are to be measured in accordance with ANSI Z765-1996.

X1.2 *EM-2*—Simulate the thermal comfort conditions, as defined by ANSI/ASHRAE 55-1992 Thermal Environmental Conditions for Human Occupancy and the ASHRAE 55a-1995 Addendum, in a typical unit before construction and/or measure the thermal comfort conditions in a typical unit after construction.

X1.2.1 Thermal comfort can be simulated, in a typical unit before construction, by using energy simulation software such as IDA Indoor Climate and Energy from EQUA, www.equa.se.

X1.2.2 Temperature can be simulated, in a typical unit before construction, by using energy simulation software such as Energy 10 from the Sustainable Buildings Industry Council (202-628-7400), DOE-2 from the Lawrence Berkeley National Laboratory (510-486-5711), REM-Rate from the Architectural Energy Corporation (303-444-4149), BLAST from Building Systems Laboratory (217-333-3977), Builder Guide from the National Renewable Energy Laboratory (303-384-7507), Energy Gauge USA from the Florida Solar Energy Center (407-638-1492), or Home Energy Saver from the Center For Building Science Environmental Energy (510-525-7655).

X1.2.3 Humidity can be simulated, in a typical unit before construction, by using humidity simulation software such as DOE-2 from the Lawrence Berkeley National Laboratory (510-486-5711) or Moist from the National Institute of Standards and Technology (301-975-6433).

X1.2.4 The thermal comfort conditions can be measured, in a typical unit after construction, with the equipment recommended by ANSI/ASHRAE 55-1992 Thermal Environmental Conditions for Human Occupancy and the ASHRAE 55a-1995 Addendum.

X1.3 *EM-3*—Typical unit waste water removal volume and velocity test.

X1.3.1 Test a typical dwelling unit, after construction, by turning on a water appliance such as a washing machine or flushing a toilet, and simultaneously turning on the shower on full. Verify that the waste water removal system has the volume capacity and maintains the proper velocity for the simultaneous operation of both. The number of water appliances simultaneously turned can be adjusted at the request of the specifier.

X1.4 *EM-4*—Verify with authority having jurisdiction (AHJ) what are the applicable standards.

X1.4.1 Review AHJ's laws, codes and ordinances for specific applicable referenced standards.

X1.4.2 Contact AHJ to obtain specific applicable referenced standards.

X1.4.3 Verify with AHJ that the applicable standards are in keeping with the protocol of the municipality to which the AHJ represents.

X1.5 *EM-5*—Observation of typical product and review manufacturer's documentation.

X1.5.1 Observe a full size sample of the product for appropriateness for the specific use envisioned for the dwelling unit and the occupants.

X1.5.2 Review the manufacturer's cut sheets and descriptive documentation for appropriateness for the specific use envisioned for the dwelling unit and the occupants.

X1.6 *EM-6*—Typical unit water supply and pressure test.

X1.6.1 Test a typical dwelling unit, after construction, by turning on a water appliance such as a washing machine or flushing a toilet, and simultaneously turning on the shower. Verify that there is enough pressure and supply for the simultaneous operation of both. The number of water appliances simultaneously turned can be adjusted at the request of the specifier.

X1.6.2 Test a typical unit daily, at three different times, for one year for water supply and pressure.

X1.6.3 Test a typical unit once daily, for a full year, and record what days the water supply and pressure was not at full quality as specified.

X1.7 *EM-7*—Typical unit electrical system test.

X1.7.1 Test a typical dwelling unit, after construction, for voltage, amperage, and frequency, with the required electrical m.

X1.7.2 Test a typical unit daily, at three different times, for one year, for electrical quality.

X1.7.3 Test a typical unit, once daily, for a full year, and record what days the electrical supply was not at full quality as specified.

X1.8 *EM-8*—Bubble Diagram Study.

X1.8.1 Draw circles relative to the size of the spaces in the dwelling. Name the circles the different spaces in the dwelling.

Draw the circles, representing dwelling spaces, adjacent to other circles, representing dwelling spaces, to represent dwelling spaces that need to be adjacent to each other.

X1.8.2 Draw arrows from circles to other circles to show dwelling spaces that need direct assess to each other. Draw darker arrows for more important relationships and lighter arrows for less important relationships.

X1.8.3 Change the locations of the circles and the arrows until the best relationship is found.

X1.9 *EM-9*—Visual privacy analysis.

X1.9.1 Place a camera, with a lens that is equivalent to 20/20 vision of a person, on a tripod at a set distance above the finish grade, at the exterior of the dwelling, at a set distance perpendicular to the window being analyzed.

X1.9.2 Place a colored ball on the top of a stick whose length will cause the ball to be 300 mm (1 ft) above the height of the window sill.

X1.9.3 Move the ball into the room perpendicular to the window being analyzed. Measure the perpendicular distance from window to the ball at the point when the ball first can not be clearly seen from the camera set outside.

X1.10 *EM-10*—ASTM E783-93 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

X1.11 *EM-11*—ASTM E1105-96 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference; or E547-96 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential; or E331-96 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

X1.12 *EM-12*—Typical unit fuel supply and pressure test.

X1.12.1 Test a typical dwelling unit, after construction, by turning on all the fuel appliances such as a gas boiler and gas cooking range. Verify that there is enough pressure and supply for the simultaneous operation of both. The fuel appliances simultaneously tested must use the same fuel source.

X1.12.2 Test a typical unit daily at three different times for one year for fuel supply and pressure.

X1.12.3 Test a typical unit once daily for a full year and record what days the fuel supply and pressure was not at full quality as specified.

X1.13 *EM-13*—E1486M-98 Standard Test Method for Determining Floor Tolerances Using Waviness, Wheel Path and Levelness Criteria. (Metric)

X1.13.1 E1486-98 Standard Test Method for Determining Floor Tolerances Using Waviness, Wheel Path and Levelness Criteria. (English Units)

X2. EXAMPLES OF FUNCTIONALITY PERFORMANCE STATEMENTS

X2.1 *Whole Building*:

X2.2 *Spaces*: This section contains a variety of typical functional areas or spaces. This list is not a comprehensive or complete categorization of all spaces that may be required by the specifier. Also, some of the spaces suggested herein may not be applicable, and some spaces may be required in combination with others. The specifier should determine which functional areas or spaces are required to meet the user needs. All areas and dimensions given are to be measured in accordance with ANSI Z765-1996.

X2.2.1 *Providing for the Disabled and Others*—The minimum performance statements assume use by able bodied adults. Construction for those using wheelchairs and people with other disabilities should comply with ICC/ANSI A117.1-98, the Fair Housing Act, and the Americans with Disabilities Act. See Standard Guide "I"—Accessibility.

X2.2.2 *Spatial Interrelationships*—See the following performance statements for private spaces. Necessary circulation and desired privacy should be defined by the specifier in the form of graphics (affinity diagrams), text, or other forms of representation. Such representations should serve as the criteria for evaluation of these performance statements.

X2.2.3 *Reference*—For examples of furniture, fixtures and equipment sizes and clearances refer to "Time-Saver Standards

L—FUNCTIONALITY		
0.1. WHOLE BUILDINGS—ALL BUILDING SUBSYSTEMS		
A. Functionality of the Dwelling in Regard to Activity Support		
Objective		The dwelling should serve all the activities listed in the specific space performance statements as needed.
Criteria	C-1:	The dwelling should serve all the various activities of each space while not allowing these activities to interfere with each other.
	C-2:	The dwelling should provide shelter from the elements.
Evaluation Methods	E-1:	EM-8: Bubble Diagram Study.
	E-2:	EM-1: Observation and Review drawings.
Commentary	•	See the spatial relationship performance statements for the dwelling unit spaces to see how activities of each space are supported without interfering with each other.
	•	For maintenance issues, see Attribute O—Maintainability.

FIG. X2.1 Functionality of All Building Subsystems in Regard to Activity Support

L—FUNCTIONALITY		
WHOLE BUILDINGS—ALL BUILDING SUBSYSTEMS		
B. General Functionality of The Dwelling in Regard to Shape and Size		
Objective		The dwelling and each room within it should be of a size and shape to facilitate the intended activities of the occupants.
Criteria	C-1:	All dimensions relating to size and location of objects and spaces within the dwelling should be consistent with anthropometric and use requirements of the occupant, such that most expected users or occupants can be accommodated with comfort.
	C-2:	All spaces, fixtures, and accessories (for example, hallways, counters, shelves, rods, faucets, basins, switches, etc.) to be provided in private space and not specifically dimensioned elsewhere should have sizes and locations as determined using specific anthropometric data (such as the examples in section 4.7 of this guide).
	C-3:	Habitable rooms, hallways, corridors, bathrooms, toilet rooms, laundry rooms and basements should have a ceiling height of an adequate height above an occupants head for the activities that are intended to occur in the space, and an adequate height for doors to be able to operate.
	C-4:	Beams, girders, and other obstructions should not project below the ceiling height to the extent that the activities of the space are affected.
	C-5:	Dwelling unit spaces should comply with all applicable standards.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings and EM-5: Observation of typical product and review manufacturer's documentation.
	E-3 thru E-4:	EM-1: Observation and Review drawings.
	E-5:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	The specifier must provide some basis for evaluation. Within section 4.7, it is indicated that the data included therein can be substituted with alternative information from the provider if deemed appropriate by the specifier. If the sizes of the occupants are known than the dwelling unit should be designed to the known occupant sizes.
	•	The specifier may wish to specify minimum total dwelling areas that exceed the aggregation of specified minimum room and space areas, to provide for added circulation, wall thicknesses, equipment, and additional comfort, esthetics and flexibility.
	•	See "Humanscale 7/8/9" selector 7 for anthropomorphic dimensions and chapter 8 for space planning.
	•	For examples of furniture, fixtures and equipment sizes and clearances refer to "Time-Saver Standards For Building Types" residential chapter and "Graphic Standards" chapters on human dimensions, lamps, general use furniture and residential furniture.
	•	See the schedule of furniture requirements in section 4.7.2.
	•	A common ceiling height in the continental United States for Habitable rooms, hallways, corridors, bathrooms, toilet rooms, laundry rooms and basements is 2.1 m (7 ft).
	•	Ceiling heights in basements without habitable spaces typically are not less than 2.0 m (6 ft 8 in.) clear except for under beams, girders, ducts or other obstructions where the clear height should be 1.9 m (6 ft 4 in.).
	•	Typically Beams and girders spaced not less than 1.2 m (4 ft) on center should not project more than 152 mm (6 in.) below the 2.1 m (7 ft) ceiling height.Typical.
	•	Not more than fifty percent of the floor area of a room or space should have a sloped ceiling less than 2.1 m (7 ft) in height with no portion of the floor area having a ceiling less than 1.5 m (5 ft) in height.
	•	An applicable standard may be Chapter 3, Building Planning, of the International Residential Code™.

FIG. X2.2 Functionality of All Building Subsystems in Regard to Shape and Size

L—FUNCTIONALITY		
0.1. WHOLE BUILDINGS—ALL BUILDING SUBSYSTEMS		
C. General Functionality of The Dwelling in Regard to Visual Privacy		
Objective		To the extent practical, spatial relationships, doors, walls, horizontal separations, vertical separations, skylights and window locations should not impair the privacy of dwelling occupants.
Criteria	C-1:	Buildings and spaces should be related to each other, and all windows, doors, and skylights should be located and/or protected (drapes, screens, etc. under the control of the occupant) such that pedestrians or neighbors in public spaces and in private spaces of a different dwelling cannot see clearly from a set distance outside into a set distance inside.
Evaluation Methods	E-1:	EM-9: Visual privacy analysis.
Commentary	•	Situations where this privacy criteria can be violated only through awkward or contorted positions by the viewer should not be considered violations of the criteria.
	•	For example, the specifier may state that pedestrians or neighbors in public spaces and in private spaces of a different dwelling cannot see clearly more than 2.4 m (8 ft) into dwelling through a window from a horizontal distance of 10 m (32.8 ft) or less and at 1.5 m (5 ft) above grade. While this criteria would not specifically disallow conditions in which visual surveillance is possible based on distance alone, the provider should be encouraged to take sight lines into consideration even in cases where distances are large.
	•	See standard Guide "G"—Acoustics for discussions of audio privacy.

FIG. X2.3 Functionality of All Building Subsystems in Regard to Visual Privacy

For Building Types" residential chapter and "Graphic Standards" chapters on human dimensions, lamps, general use furniture and residential furniture, as listed in Section 2 Reference Documents. Dimensions given are to be measured in accordance with ANSI Z765-1996.

X2.2.4 *Entry:*

X2.2.5 *Living Spaces:*

X2.2.6 *Dining Spaces:*

X2.2.7 *Kitchen Spaces:*

X2.2.7.1 Refer to Standard Guide C—Accident Safety for safety issues.

X2.2.8 *Sleeping Spaces:*

X2.2.9 *Bathroom Spaces:*

X2.2.10 *Water Closet:*

X2.2.11 *Outdoor Living:*

L—FUNCTIONALITY		
0.1. WHOLE BUILDINGS—ALL BUILDING SUBSYSTEMS		
D. General Functionality of The Dwelling in Regard to Circulation		
Objective		The size, shape and location of the spaces of a dwelling unit should provide convenient access to and from the interior and exterior spaces.
Criteria	C-1:	All buildings should be designed such that at least one path including all doors, corridors, and stairways from the ground floor to each space is large enough for moving all of the furniture and equipment types normally used in that space in and out.
	C-2:	All buildings should be designed such that at least one path including all doors, corridors, and stairways from the ground floor to each space is large enough for unhindered circulation without interfering with the use of the space and without the use of the space interfering with the circulation.
	C-3:	The size, shape and location of all spaces should provide convenient access for the occupants to move about and to have access for full operation of all windows and doors.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings
Commentary	•	For examples of furniture, fixtures and equipment sizes and clearances refer to “Time-Saver Standards For Building Types” residential chapter and “Graphic Standards” chapters on human dimensions, lamps, general use furniture and residential furniture, as listed in Section 2 Reference Documents.

FIG. X2.4 Functionality of All Building Subsystems in Regard to Circulation

L—FUNCTIONALITY		
0.1. WHOLE BUILDINGS—ALL BUILDING SUBSYSTEMS		
E. General Functionality of The Dwelling in Regard to Comfort		
Objective		The dwelling unit should provide thermal comfort levels year round.
Criteria	C-1:	The conditioned spaces within the dwelling should be thermally comfortable to the occupants of these spaces as defined as recommended levels for thermal comfort by ANSI/ASHRAE 55-1992 Thermal Environmental Conditions for Human Occupancy and the ASHRAE 55a-1995 Addendum, appropriate for the region and specific use.
	C-2:	Thermal comfort should comply with all applicable standards.
Evaluation Methods	E-1:	EM-2: Simulate the thermal conditions in a typical unit before construction and/or measure the thermal conditions in a typical unit after construction.
	E-2:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	It is beyond the scope of this guide to cover the many issues involved in thermal comfort. ANSI/ASHRAE 55-1992 Thermal Environmental Conditions for Human Occupancy and the ASHRAE 55a-1995 Addendum has as be referenced as a standard that covers these issues.
	•	An example of a typical temperature range in the summer would be 22.5°C to 26°C (73°F to 79°F) (dry bulb).
	•	An example of a typical temperature range in the winter would be 20°C to 23.5°C (68°F to 74°F) (dry bulb).
	•	An example of a typical humidity range in the summer would be 50 % RH to 60 % RH.
	•	An example of a typical humidity range in the winter would be 25 % RH to 50 % RH.
	•	Refer to ANSI/ASHRAE 55-1992 for a more complete explanation of how temperature and humidity affect thermal comfort.
	•	The temperature and humidity ranges will be affected by climate cultural effects.
	•	Another applicable standard may be Section M1401 of the International Residential Code™, which covers the appropriate sizing of heating and cooling equipment and all of Chapter 14, Heating and Cooling Equipment.
	•	See the Whole Building Performance Statements in the Attribute Guide “E”—Indoor Air Quality for further discussion of thermal comfort and its reference to ANSI/ASHRAE 55-1992.

FIG. X2.5 Functionality of All Building Subsystems in Regard to Comfort

X2.2.12 *Storage Spaces:*

X2.2.13 *Other Spaces:*

X2.2.13.1 *Laundry*—Provision should be made for an automatic washer and an automatic dryer. For grouped housing, a central location with automatic washers and dryers could be substituted.

X2.2.13.2 *Garage:*

X2.2.13.3 *Work Space:*

X2.2.13.4 *Mechanical Space:*

X2.3 *Structure*:

X2.3.1 *Foundation:*

X2.3.2 *Superstructure:*

X2.4 *Exterior Enclosure*:

X2.4.1 *Grade Enclosure:*

X2.4.2 *Vertical and Sloped Enclosure:*

X2.4.2.1 *Walls:*

X2.4.2.2 *Windows:*

X2.4.2.3 *Doors:*

X2.4.2.4 *Other*—(No figures indicated).

X2.4.3 *Roofs:*

X2.4.3.1 *Roof Coverings:*

X2.4.3.2 *Skylights:*

X2.4.3.3 *Other Roof Openings*—(No figures indicated).

X2.4.4 *Joint Sealants*—(No figures indicated).

X2.5 *Interior Space Division*:

X2.5.1 *Vertical Space Dividers:*

X2.5.1.1 *Partitions:*

X2.5.1.2 *Doors:*

X2.5.1.3 *Other*—(No figures indicated).

X2.5.2 *Horizontal Space Dividers:*

X2.5.2.1 *Floors:*

X2.5.2.2 *Ceilings:*

X2.5.2.3 *Floor/Ceiling Openings:*

L—FUNCTIONALITY		
1.1. PRIVATE SPACES—ENTRY		
A. Functionality of Entry Space in Regard to Activity Support		
Objective		The Entry Space should serve as transfer space from outside to inside and inside to outside.
Criteria	C-1:	The point of entry/exit (the door) should be weather tight.
	C-2:	There should be enough space perpendicular to the exterior of the door so the door will not encroach on a neighbor's property or a public way.
	C-3:	Each dwelling should provide for the storage of outer clothing.
	C-4:	Provisions should be made for the storage of deposited mail for each dwelling unit, if mail is delivered to each dwelling unit.
	C-5:	Provision for power, for cleaning equipment, or other method of cleaning should be provided if appropriate for the region and location of Entry Space in regard to the exterior.
Evaluation Methods	E-1 thru E-5:	EM-1: Observation and Review drawings.
Commentary		• The Specifier may state that there be at least 1.2 m (4 ft) clear perpendicular to the exterior of the door so as not to encroach on a neighbor's property or a public way. • Storage for outer clothing may be located adjacent to the principal point of entry/exit. • A covered exterior landing entering into a interior foyer with a coat closet is common. • If mail is delivered to each dwelling unit or group of dwelling units, then temporary mail storage may be provided, within close proximity to, adjacent to, or within the building. A mailbox at the beginning of the entrance walk, a mail box adjacent to the entrance door, a mail slot in the entrance door or a central mail facility are all common ways to provide for mail delivery. • Mailboxes and access for depositing mail should comply with all applicable requirements of the U.S. Postal Service, if located within U.S. jurisdiction. • See the performance statements on exterior doors. • See the performance statement on size and shape below.

FIG. X2.6 Functionality of Entry Space in Regard to Activity Support

L—FUNCTIONALITY		
1.1. PRIVATE SPACES—ENTRY		
B. Functionality of Entry Space in Regard to Proper Shape and Size		
Objective		The Entry Space should be of a shape and size which will facilitate the anticipated activities of the dwelling occupants.
Criteria	C-1:	When entry/exit is from/to the exterior, an exterior covered space may be provided that is large enough for a specified number of occupants to be standing within reach of the door hardware.
	C-2:	The interior entry space should be large enough for a specified number of occupants to open and close the door, enter, and remove or put on garments.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary		• The Specifier may state that there be at least a 900 mm by 900 mm (3ft x 3ft) exterior covered space outside the front door. • The Specifier may state that there be at least an exterior covered space outside the front door that has the sides of a square at least as long as the door width. • The minimum number of adults to be accommodated at one time at the point of exterior entry/exit may depend on the anticipated number of occupants, size of dwelling, and economic considerations. The dimensions indicated above assume two people with allowance for some transitional movement. • The Size and Shape of an Entry Space, complying with all the appropriate Performance Statements may vary widely. It may be a very small space such as 900 by 900 mm (3 by 3 ft) in a manufactured home, or it may be a large grand entrance in a large home. • The minimum number of adults to be accommodated at one time at the point of interior entry/exit may depend on the anticipated number of occupants, size of dwelling, and economic considerations. The dimensions indicated above assume two people with allowance for some transitional movement. • See also the Performance Statement covering Circulation below. • The Entry Space may share space with areas such as hallways and living rooms. • See standard Guide "I"—Accessibility for shape and size requirements for persons with disabilities.

FIG. X2.7 Functionality of Entry Space in Regard to Proper Shape and Size

X2.5.2.4 *Other.*

X2.5.3 *Stairs and Ramps:*

X2.6 *Plumbing* :

X2.6.1 *Plumbing Fixtures:*

X2.6.2 *Domestic Water Distribution:*

X2.6.3 *Sanitary Waste:*

X2.6.4 *Rain Water Drainage:*

X2.7 *HVAC*:

X2.7.1 *Heating:*

X2.7.1.1 *Heat Generating*—(No figures indicated).

X2.7.1.2 *Heat Distribution*—(No figures indicated).

X2.7.1.3 *Heating Terminal and Package Units*—(No figures indicated).

X2.7.1.4 *Heating Controls and Instrumentation:*

X2.7.2 *Cooling:*

X2.7.2.1 *Cooling Generating*—(No figures indicated).

X2.7.2.2 *Cooling Distribution*—(No figures indicated).

X2.7.2.3 *Cooling Terminal and Package Units*—(No figures indicated).

X2.7.2.4 *Cooling Controls and Instrumentation:*

L—FUNCTIONALITY		
1.1. PRIVATE SPACES—ENTRY		
C. Functionality of Entry Space in Regard to Spatial Relationships		
Objective		The location of the Entry Space should provide convenient access and support the other spaces in the dwelling unit.
Criteria	C-1:	The location of the Entry Space should provide convenient access to the living space.
	C-2:	The location of the Entry Space should not be near spaces that would be interfered with by the public nature of the space.
	C-3:	The Entry Space should be directly connected to a hall/circulation space that serves the other dwelling spaces.
	C-4:	If a secondary entrance is provided, it should provide convenient access to the Kitchen Space.
	C-5:	The location of the Entry Space should not interfere with neighboring properties.
Evaluation Methods	E-1 thru E-5:	EM-1: Observation and Review drawings and EM-8: Bubble Diagram Study.
Commentary	•	There may be a desire to have easy access from a front entrance to a living room or a drawing room for preliminary entertainment of guests.
	•	Bedrooms located near an Entry Space could be disturbed by the noise and activity.
	•	There may be desire for easy access from a kitchen or pantry space to a rear or carport entry for dropping off groceries, and etc.

FIG. X2.8 Functionality of the Entry Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.1. PRIVATE SPACES—ENTRY		
D. Functionality of Entry Space in Regard to Visual Privacy		
Objective		Unless otherwise specified, the entrance/exit to/from the dwelling should be configured in such a manner as to provide interior visual privacy from public spaces.
Criteria	C-1:	A person standing outside an open entrance door should not be able to see more than ten percent of the floor area of any livingroom spaces.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
Commentary	•	Full height walls, partial height walls and space configuration are all design approaches to provide visual privacy.

FIG. X2.9 Functionality of Entry Space in Regard to Visual Privacy

L—FUNCTIONALITY		
1.1. PRIVATE SPACES—ENTRY		
E. Functionality of Entry Space in Regard to Circulation		
Objective		The size, shape and location of the Entry Space should provide convenient access from the exterior to the interior and to specific spaces as needed.
Criteria	C-1:	The minimum clear passage width should be large enough so a specified number of occupants can pass each other.
	C-2:	There should be at least one main entrance from exterior.
	C-3:	There should be enough room near the entrance door and/or the position of the entrance door should be such that the operation of the door does not prevent circulation through the Entry Space.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings.
Commentary	•	An example of a minimum clear passage width could be not less than 900 mm (3 ft).
	•	An example of a minimum space just inside the entrance door may be at least 200 mm (8 in.) wider than the door and at least a dimension equal to the width of the door in the direction perpendicular to the entrance door.
	•	The specifier may state that the minimum clear passage width should be large enough so two people can pass each other.
	•	See standard Guide “F”—Light, for the affect of light on circulation.
	•	See standard Guide “I”—Accessibility for shape and size requirements for persons with disabilities.

FIG. X2.10 Functionality of Entry Space in Regard to Circulation

X2.7.3 *Ventilation:*

X2.7.3.1 *Ventilation Distribution*—(No figures indicated).

X2.7.3.2 *Ventilation g Terminal and Package Units*—(No figures indicated).

X2.7.3.3 *Ventilation Controls and Instrumentation:*

X2.8 *Fire Protection Subsystems*—(No figures indicated).

X2.9 *Electrical* :

X2.9.1 *Electrical Service and Distribution:*

X2.9.2 *Lighting and Branch Wiring:*

X2.10 *Communication and Security Networks*:

X2.10.1 *Telephone:*

X2.10.2 *Intercom:*

X2.10.3 *Television:*

X2.10.4 *Security*—(No figures indicated).

X2.10.5 *Other*—(No figures indicated).

X2.11 *Fuel Networks*:

X2.12 *Fittings, Furnishings, and Equipment (Built-in)*:

L—FUNCTIONALITY		
1.2. PRIVATE SPACES—LIVING		
A. Functionality of Living Room Space in Regard to Activity Support		
Objective		A space should be provided for the purpose of social activity.
Criteria	C-1:	This space should be further defined by the specifier as a function of the specifier's definition of entertainment and/or social activity requirements.
	C-2:	If children will occupy the dwelling, space should be provided in each dwelling appropriate for play areas for small children.
	C-3:	The space should support family meeting and communication.
	C-4:	The space should provide power for entertainment equipment.
Evaluation Methods	E-1 thru E-4:	EM-1: Observation and Review drawings.
Commentary	•	The entertaining and/or social activity space might be a combination of interior space and covered outdoor area. It may be desired that this be a combination of spaces, visually linked and physically connected.
	•	Criteria for children play areas should be defined by the specifier based on considerations such as the extent of visual and acoustical relationship with other spaces (for example, the kitchen, office, and family area) and the requirements for other spaces (for example, halls, yards, or terraces).
	•	The types of entertainment and/or social activities will vary depending on ethnic cultural, religious and personal preferences.

FIG. X2.11 Functionality of Living Space in Regard to Activity Support

L—FUNCTIONALITY		
1.2. PRIVATE SPACES—LIVING		
B. Functionality of Living Space in Regard to Shape and Size		
Objective		The dwelling should have one or more rooms of a shape and size which will facilitate the anticipated social activities of the occupants.
Criteria	C-1:	One or more living room/great room/family room/recreation room/other room should be provided with minimum acceptable area and configuration determined by the specifier.
	C-2:	In addition, such rooms should be furnishable with specific items of a size and shape determined by the specifier.
	C-3:	These items should be arrangeable in a functional manner, as determined by the specifier.
	C-4:	At least one Living Space should be provided with room for at least a chair, a couch, an entertainment center and a low table.
	C-5:	The size of the furniture should comply with at least the minimum dimensions indicated in the reference documents specified in section X2.2.3.
Evaluation Methods	E-1, E-3, E-4:	EM-1: Observation and Review drawings.
	E-2, E-5:	EM-5: Observation of typical product and review manufacturer's documentation.
Commentary	•	None

FIG. X2.12 Functionality of Living Space in Regard to Shape and Size

L—FUNCTIONALITY		
1.2. PRIVATE SPACES—LIVING		
C. Functionality of Living Space in Regard to Spatial Relationships		
Objective		The Living Space should be in a location consistent with the spatial interrelationships established by the specifier in section X2.2.2.
Criteria	C-1:	The Living Space should be very convenient to the Entry Space.
	C-2:	The Living Space should be convenient to the Dining Space.
	C-2:	The Living Space should be convenient to the Kitchen Space.
	C-2:	The Living Space should be convenient to a Toilet Room.
	C-2:	The Living Space should be convenient to exterior entertainment space, if provided.
Evaluation Methods	E-1 thru E-5:	EM-1: Observation and Review drawings and EM-8: Bubble Diagram Study.
Commentary	•	There may be a desire to have easy access from a front entrance to a living room or drawing room for preliminary entertainment of guests.

FIG. X2.13 Functionality of Living Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.2. PRIVATE SPACES—LIVING		
D. Functionality of Living Room Space in Regard to Visual Privacy		
Objective		Unless otherwise specified, the Living Room Space should be configured in such a manner as to provide interior visual privacy from private spaces.
Criteria	C-1:	Vision from the Living Room Space should be blocked to the Kitchen food and serviceware preparation and cleaning.
	C-2:	Vision from the Living Room Space should be blocked into any Toilet or Bathroom space.
Evaluation Methods	E-1 and E-2:	EM-1: Observation and Review drawings.
Commentary	•	Full height walls, partial height walls and space configuration are all successful ways of providing visual privacy.

FIG. X2.14 Functionality of Living Room Space in Regard to Visual Privacy

L—FUNCTIONALITY		
1.2. PRIVATE SPACES—LIVING		
E. Functionality of Living Space in Regard to Circulation		
Objective		The size, shape and location of the Living Space should provide convenient access to and from the interior spaces and exterior.
Criteria	C-1:	The size, shape and location of the Living Space should provide convenient access to place and move furniture and equipment.
	C-2:	The size and shape of the Living space should provide room for circulation along with areas for relaxation.
	C-3:	The minimum clear passage width should be large enough so two people can pass each other.
Evaluation Methods	E-1 thru E-4:	EM-1: Observation and Review drawings.
Commentary	•	There may be a desire to have easy access from a front entrance to a living room or drawing room for preliminary entertainment of guests.
	•	An example of the minimum width of main circulation paths could be 900 mm (3 ft).

FIG. X2.15 Functionality of Living Space in Regard to Ease of Circulation

L—FUNCTIONALITY		
1.3. PRIVATE SPACES—DINING		
A. Functionality of Dining Space in Regard to Activity Support		
Objective		The Dining Space should promote the activities of eating and entertaining as appropriate.
Criteria	C-1:	The space should conform with all the performance statements discussed in this section. The space should support the activity of eating at the appropriate time.
	C-2:	The space should support the activity of entertaining at the appropriate time.
	C-3:	Power, or other means, for food warming and cleaning space should be provided.
Evaluation Methods	E-1 thru E-4:	EM-1: Observation and Review drawings.
Commentary	•	Refer to all the performance statements in this section.
	•	The Dining Space may share the space with other activities such as cooking, entertaining, living, etc. The space may only used as a Dining Space at certain times of the day.

FIG. X2.16 Functionality of Dining Space in Regard to Support Activity

L—FUNCTIONALITY		
1.3. PRIVATE SPACES—DINING		
B. Functionality of Dining Space in Regard to Proper Shape and Size		
Objective		The Dining Space should be of a shape and size which will facilitate the intended activities of the dwelling occupants.
Criteria	C-1:	Such rooms or areas should be furnishable with specific items of a size and shape, appropriate for dining and entertaining, as determined by the specifier. These items should be arrangeable in a functional manner, as determined by the specifier, allowing for adequate movement and circulation and for full operation of all windows and doors.
	C-2:	Any required movement and circulation spaces when defined in accordance with section 4.7.3 must be met or exceeded.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary	•	The minimum number of adults to be accommodated at one time in the dining space may depending on anticipated number of occupants, size of dwelling, and economic considerations. One example, a minimum set at two people will allow for some transitional movement.
	•	The need for a space or multiple spaces for eating may be met in a variety of manners depending on the size of the dwelling and the lifestyle anticipated.

FIG. X2.17 Functionality of Dining Space in Regard to Proper Shape and Size

L—FUNCTIONALITY		
1.3. PRIVATE SPACES—DINING		
C. Functionality of Dining Space in Regard to Spacial Relationships		
Objective		The location of the space should provide convenient access to supporting and accessory spaces.
Criteria	C-1:	The location of the space should provide convenient access to the Entry Space.
Criteria	C-2:	The location of the space should provide access through an intervening circulation space to the Toilet Room.
Criteria	C-3:	The location of the space should provide very convenient access to the Kitchen Space.
Criteria	C-4:	The location of the space should provide convenient access to the Living Space.
Criteria	C-5:	The location of the space should not be near spaces that interfere with use of the space.
Evaluation Methods	E-1 thru E-5:	EM-1: Observation and Review drawings and EM-8: Bubble Diagram Study.
Commentary	•	There may be a desire to have easy access from a front entrance, living room or drawing room for preliminary entertainment of guests.
	•	A dining room located near a garage could be disrupted by the noise and fumes from an automobile.
	•	A child's bedroom located near a dining space could be affected by noise and aroma from the Dining Space.

FIG. X2.18 Functionality of Dining Space in Regard to Spacial Relationships

L—FUNCTIONALITY		
1.3. PRIVATE SPACES—DINING		
D. Functionality of Dining Space in Regard to Circulation		
Objective		The size, shape and location of the space should provide convenient access around the furniture and from adjacent interior spaces.
Criteria	C-1:	The size, shape and location of the space should provide convenient access to place and move furniture and equipment.
	C-2:	The size, shape and location of the space should provide convenient access for the occupants to move about.
	C-3:	The size and shape of the space should provide room for circulation along with areas for dining.
	C-4:	It should be possible for a person to get to and sit (or other static position) at any seating location at the table without any seated person at the table having to move.
Evaluation Methods	E-1 thru E-4:	EM-1: Observation and Review drawings.
Commentary	•	Typically a minimum of 900 mm (3 ft) clear from the edge of the dining table to a wall or other obstruction is provided around the perimeter of the table.
	•	An example of a size for a dining room table is 900 mm (3 ft) by 1500 mm (5 ft).

FIG. X2.19 Functionality of Dining Space in Regard to Circulation

L—FUNCTIONALITY		
1.4. PRIVATE SPACES—KITCHEN		
A. Functionality of the Kitchen Space in Regard to Activity Support		
Objective		Each kitchen should be equipped with work centers, including fixtures, and designed to be furnished with appliances to facilitate food storage and preparation.
Criteria	C-1:	Space and service (stove) should be provided to cook food.
	C-2:	Space and service (refrigerator) should be provided to keep food from spoiling.
	C-3:	Space and service (freezer) should be provided to keep food frozen.
	C-4:	Space or service (sink) should be provided to wash food, dishes, pots pans, etc.
	C-5:	There should be counter space available for drying of dishes, pots, pans, etc.
	C-6:	There should be counter space available for food preparation.
	C-7:	There should be a minimum of one dry goods storage (pantry) space with door.
	C-8:	There should be a minimum of one storage space (cabinet) with door for dishes, pots, pans and etc.
	C-9:	There should be a minimum of one utensil storage drawer.
	C-10:	There should be fuel or power as needed for cooking, cleaning, etc.
	C-11:	There should be access to water for cooking, cleaning, etc.
	C-12:	Space and/or service should be provided for garbage disposal.
	C-13:	Appliances should comply with all applicable standards.
Evaluation Methods	E-1 thru E-11:	EM-1: Observation and Review drawings.
	E-12:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	Typically, there should be a minimum of 900 mm (3 ft) of food preparation (counter) space.
	•	If cabinets are acceptable to the specifier, minimum frontages of cabinets should be specified or based on a set standard. Cabinets space used by dishwashers, hot water heaters, or other equipment and appliance should not be counted toward satisfying the minimum frontages for storage.
	•	The specifier may wish to set minimum criteria for countertop configurations.
	•	The specifier may wish to set a limit on the height of any shelving.
	•	The specifier may wish to set a minimum clearance between base and wall cabinets and such clearance should consider conditions such as lighting fixtures projecting below wall cabinets.
	•	The specifier may wish to note a minimum number of sinks with hot and cold running water.
	•	The specifier may determine a specific method(s) of cooking (for example, separate or combined range and oven and/or microwave) and fuel (for example, electric, gas, wood).
	•	The provision for garbage disposal may include a garbage can, a composting bin, and/or an automatic sink mounted garbage disposal unit. The composting bin system may include a small covered container, in the kitchen, and a larger composting bin at an exterior location or a location and/or construction that shelters the interior of the dwelling unit from its associated smells, pests, moisture.
	•	If a specific appliance is not provided by the provider, the space and the required services such as power, water, and waste should be provided.
	•	An applicable reference may be “Universal Kitchen Planning, Design That Adapts To People”
	•	Some applicable standards may include ANSI/AHAM HRF-1-1988, Household Refrigerators, Combination Refrigerator-Freezers and Household Freezers, and UL 250, Household Refrigerators and Freezers (1993).
	•	See standard Guide “B”—Fire Safety for discussions on fire prevention in the kitchen.
	•	See standard Guide “C”—Accident Safety for discussions on accident prevention in the kitchen.

FIG. X2.20 Functionality of Kitchen Space in Regard to Support Activity

L—FUNCTIONALITY		
1.4. PRIVATE SPACES—KITCHEN		
B. Functionality of the Kitchen Space in Regard to Shape and Size		
Objective		Each dwelling should have a kitchen of a shape and size which will facilitate the anticipated activities of the occupants.
Criteria	C-1:	It should be convenient to transfer food from one appliance or counter to another.
	C-2:	Kitchen should be provided with minimum area and dimensions as required for occupant needs.
	C-3:	It should be the minimum size needed to provide the criteria stated in the Ease of Movement and Serving Activity Performance Statements.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary	•	Generally, the minimum kitchen area should increase in size with an increase in the number of bedrooms to allow for more and larger fixtures and appliances, storage, accessories, and utensils.
	•	Different ethnicities, cultures, religions and specific needs will affect the size and shape of the Kitchen Space.
	•	See standard Guide “I”—Accessibility” for issues involving access for the disabled.

FIG. X2.21 Functionality of Kitchen Space in Regard to Shape and Size

L—FUNCTIONALITY		
1.4. PRIVATE SPACES—KITCHEN		
C. Functionality of the Kitchen Space in Regard to Spatial Relationships		
Objective		The location of the space should provide convenient access to supporting and accessory spaces.
Criteria	C-1:	The kitchen should be directly accessible to the dining area, unless otherwise specified.
	C-2:	The kitchen should be directly accessible to a nearby secondary entry, if provided.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary	•	A rear or carport entry may have easy access to a kitchen or pantry space to drop off groceries, etc.

FIG. X2.22 Functionality of Kitchen Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.4. PRIVATE SPACES—KITCHEN		
D. Functionality of the Kitchen Space in Regard to Circulation		
Objective		The internal circulation in the kitchen area should be sequentially related to work centers as specified by the specifier.
Criteria	C-1:	It should be convenient to transfer food from one appliance or counter to another.
	C-2:	The minimum clear passage width should be large enough so two people can pass each other.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary	•	A internal circulation pattern in the shape of a triangle is common for a kitchen.
	•	An example of a minimum width of the circulation path could be 900 mm (3 ft).
	•	The minimum width of the circulation space may be required by the specifier or codes.

FIG. X2.23 Functionality of Kitchen Space in Regard to Circulation

L—FUNCTIONALITY		
1.5. PRIVATE SPACES—SLEEPING (and personal preparation)		
A. Functionality of Sleeping Space in Regard to Activity Support		
Objective		Each dwelling should have an area suitable for sleeping, personal preparation, and related activities.
Criteria	C-1:	There should be room for one bed, or its equivalent sleeping accommodation, for each person staying in the dwelling unit.
	C-2:	If only one bedroom is provided, the specifier may require that it be considered to fulfill the requirements of a “master” bedroom.
	C-3:	There should be space and/or facilities for personal preparation.
	C-4:	There should be room for adequate clothes storage per person.
	C-5:	There should be access to power for clock, lights, entertainment appliances, vacuum, etc.
Evaluation Methods	E-1 thru E-5:	EM-1: Observation and Review drawings.
Commentary	•	The specifier may require that sleeping area(s) be sized, configured, and furnished for purposes in addition to sleeping.
	•	The specifier may allow that single occupancy or double occupancy bedrooms be provided.
	•	Sleeping accommodations may include items such as beds, hammocks, mats, etc.
	•	Closets could be provided in each bedroom and typically will have certain minimum attributes as determined by the specifier. The specifier could set minimum dimensions and area requirements for closets. There may be areas determined by the specifier where access for storage is acceptable at a height less than minimum.
	•	An example of a minimum closet size could be at least 900 linear mm (3 ft) of closet width for hanging clothes per person.
	•	Generally, closets should be provided with doors; however, there may be areas where doors are not required if acceptable to the specifier.
	•	Clothes can be stored folded , on hangers, or on hooks. This could be accommodated by built-in shelves, rods, or hooks. Another possibility is that space is provided for occupant supplied furniture for clothes storage. Typically, in North America, closets and space for occupant supplied furniture is provided.
	•	The size of the beds, or other sleeping accommodation, will be determined by the size of the occupants and the relationship of the occupants to each other.

FIG. X2.24 Functionality of Sleeping Space in Regard to Activity Support

L—FUNCTIONALITY		
1.5. PRIVATE SPACES—SLEEPING (and personal preparation)		
B. Functionality of the Sleeping Space in Regard to Shape and Size		
Objective		Bedroom(s) or bedroom area(s) should be provided of a shape and size which will facilitate the intended activities.
Criteria	C-1:	The size and shape of the Sleeping Space should provide room for circulation along with areas for sleeping.
	C-2:	Sleeping area(s) should be able to be furnished with specific items of a size and shape as determined by the specifier.
	C-3:	The Sleeping Space should be large enough for the operation, use, and maintenance of furnishings and equipment planed for the space.
Evaluation Methods	E-1 thru E-2: E-23:	EM- 1: Observation and Review drawings. EM-5: Observation of typical product and review manufacturer's documentation.
Commentary	•	Local codes and the authority having jurisdiction may have minimum size requirements.Examples of furniture sizes can be found in the reference documents specified in section X2.2.3.
	•	If a bed is planned to be used and one or more of the sides of the bed will be adjacent to a wall, then a (1 ft) distance, from the bed to the wall, is typically desired. This separation allows for bed linen maintenance.

FIG. X2.25 Functionality of Sleeping Space in Regard to Shape and Size

L—FUNCTIONALITY		
1.5. PRIVATE SPACES—SLEEPING (and personal preparation)		
C. Functionality of the Sleeping Space in Regard to Spatial Relationships		
Objective		The location of the space should provide convenient access to supporting and accessory spaces.
Criteria	C-1:	The location of the Sleeping Space should provide convenient access to the Toilet Room.
	C-2:	Sleeping spaces should not be directly connected to spaces with incompatible uses.
	C-3:	Sleeping spaces should not be directly connected to spaces 'that would have a negative health affect on the occupants.
	C-4:	Sleeping spaces should be directly connected to a hall/circulation space that serves the other dwelling unit spaces.
Evaluation Methods	E-1 thru E-4:	EM- 1: Observation and Review drawings.
Commentary	•	It may not be desirable to have a Sleeping Space directly connected to a Living Space or a Kitchen Space. A separation may not be possible if a space has more than one or has shared uses, such as a fold-out couch used for sleeping that is located in a Living Space or a large country kitchen type space.
	•	Sleeping spaces should not be directly connected to service spaces such as Garage Spaces or Mechanical Spaces.

FIG. X2.26 Functionality of Sleeping Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.5. PRIVATE SPACES—SLEEPING (and personal preparation)		
D. Functionality of Sleeping Space in Regard to Visual Privacy		
Objective		Unless otherwise specified, the Sleeping Space should be provided with a way to prevent vision through windows and doors when and where needed.
Criteria	C-1:	A person standing on one side of a door or window should not be able to make out specific shapes in the other space when a device to provide visual privacy is in operation.
	C-2:	The occupants should have full control of the vision control device.
Evaluation Methods	E-1:	EM- 1: Observation and Review drawings.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
Commentary	•	Translucent glass can be used for permanent visual privacy.
	•	Shades or blinds can be used for temporary visual privacy.
	•	Doors can be closed for temporary visual privacy.
	•	The shape of the room can also limit the view to the bed.

FIG. X2.27 Functionality of Sleeping Space in Regard to Visual Privacy

L—FUNCTIONALITY		
1.5. PRIVATE SPACES—SLEEPING (and personal preparation)		
E. Functionality of Sleeping Space in Regard to Circulation		
Objective		The size, shape and location of the Sleeping Space should provide ease of movement within the space.
Criteria	C-1:	The size, shape and location of the Sleeping Space should provide convenient access to place and move furniture.
	C-2:	The size, shape and location of the Sleeping Space should provide convenient access for the occupants to move about and for full operation of all windows and doors.
	C-3:	The minimum clear passage width should be large enough so a specified number of occupants can pass each other. This includes at least one long side of each bed or equivalent sleeping space/element.
Evaluation Methods	E-1 thru E-3:	EM- 1: Observation and Review drawings.
Commentary	•	An example of the minimum circulation path width could be 900 mm (3 ft). This could include at least one side of each bed, not adjacent to a wall, and at the foot of each bed.
	•	Another way to indicate the minimum clear passage width is for it to be specified that it needs to be wide enough for two people to pass each other.

FIG. X2.28 Functionality of Sleeping Space in Regard to Circulation

L—FUNCTIONALITY		
1.6. PRIVATE SPACES—BATHROOM		
A. Functionality of the Bathroom Space in Regard to Activity Support		
Objective		Each Bathroom Space should be equipped with personal hygiene centers, including fixtures, and designed to be furnished with accessories to personal hygiene.
Criteria	C-1:	The Bathroom Space should be designed to contain any water splashes or leakage.
	C-2:	All bathrooms should be provided with storage space adequate for the storage of the items commonly associated with that room.
	C-3:	Bathrooms should have an element and/or a location, for the storage of medicines, first aid type medical supplies and dangerous items, such as razors and scissors, that provides for the appropriate level of security.
	C-4:	Each Bathroom Space should be provided with: at least one water closet fixture. at least one hand washing fixture. at least one accommodation for bathing. the appropriate accessories for each fixture. towel storage or other means for drying off water. an element to provide one's clear and stable reflection. wet soap storage. at least one toilet paper holder or other way of providing personal toilet hygiene. a way of keeping splashing water in the bathing fixture. access to power, or other means, for providing for hygiene and cosmetic procedures. access to water for hygiene and plumbing fixtures.
	C-5:	Plumbing fixtures and accessories should comply with all applicable standards.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2 thru E-5:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	A medicine cabinet can be used for the storage of medical supplies and dangerous items, such as razors and scissors. The bottom of the medicine cabinet can be located at a height suitable for the use of adult occupants and out of the reach of small children.
	•	A Bathroom can be provided with tub or shower, or both as appropriate.
	•	If cabinets are to be specified, then minimum frontages of cabinets should be indicated or based on a set standard.
	•	Hygiene and cosmetic appliances may require access to electrical power.
	•	The specifier may wish to set minimum criteria for countertop configurations.
	•	The specifier may wish to set a limit on the height of any shelving.
	•	The specifier may wish to set a minimum clearances between base and wall cabinets and such clearances should consider conditions such as lighting fixtures projecting below wall cabinets.
	•	The specifier may wish to note a minimum number of sinks with hot and cold running water.
	•	A typical minimum length for a towel bar is 600 mm (2 ft) long.
	•	All shower stalls should be watertight. A possible reference is ANSI Z124.2 Plastic Shower Receptors and Shower Stalls.
	•	Other appropriate accessories are tooth brush holders and robe hooks.
	•	An alternative type of Bathroom is the half-bath which has a shower instead of a tub.
	•	An applicable reference may be "Universal Bathroom Planning, Design That Adapts To People".
	•	See Standard Guide "D"—Health and Hygiene.

FIG. X2.29 Functionality of Bathroom Space in Regard to Support Activity

L—FUNCTIONALITY		
1.6. PRIVATE SPACES—BATHROOM		
B. Functionality of the Bathroom Space in Regard to Shape and Size		
Objective		All dwellings should have bathroom facility(ies) of shape(s) and size(s) which facilitate the intended activities.
Criteria	C-1:	Minimum clearance distances in spaces containing personal sanitation facilities should be as defined by the specifier.
	C-2:	Bathroom should be provided with minimum area and dimensions as required for occupant needs.
	C-3:	It should be the minimum size needed to provide for the criteria stated in the Ease of Movement and Serving Activity performance statements.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings.
Commentary	•	Generally, the minimum bathroom area or the number of bathrooms should increase with an increase in the number of bedrooms to allow for more fixtures and utensils.
	•	Special needs may affect the size and shape of the Bathroom Space(s).
	•	See standard Guide “I”—Accessibility” for issues involving access for the disabled.

FIG. X2.30 Functionality of Bathroom Space in Regard to Shape and Size

L—FUNCTIONALITY		
1.6. PRIVATE SPACES—BATHROOM		
C. Functionality of the Bathroom Space in Regard to Spatial Relationships		
Objective		The Bathroom Space(s) should be conveniently located.
Criteria	C-1:	Bathroom Space(s) should be convenient to Sleeping Spaces.
	C-2:	Bathroom Space(s) should be directly connected to a hall/circulation space that serves the other rooms.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary	•	A master bedroom may have its own dedicated Bathroom Space.

FIG. X2.31 Functionality of Bathroom Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.6. PRIVATE SPACES—BATHROOM		
D. Functionality of Bathroom Space in Regard to Visual Privacy		
Objective		Unless otherwise specified, the Bathroom Space(s) should be provided with a way to prevent vision through windows and doors when and where needed.
Criteria	C-1:	A person standing outside the door or window should not be able to make out specific shapes in the Bathroom Space when a vision prevention device is in operation.
	C-2:	The occupants should have full control of the vision control device(s).
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-5: Observation of typical product and review manufacturer’s documentation.
Commentary	•	Translucent glass can be used for permanent visual privacy.
	•	Shades or blinds can be used for temporary visual privacy.
	•	Doors can be closed for temporary visual privacy.
	•	The shape of the room can also limit the view if desired.

FIG. X2.32 Functionality of Bathroom Space in Regard to Visual Privacy

L—FUNCTIONALITY		
1.6. PRIVATE SPACES—BATHROOM		
E. Functionality of the Bathroom Space in Regard to Circulation		
Objective		The internal circulation in the Bathroom Space(s) should be sequentially related to fixtures as specified by the specifier.
Criteria	C-1:	Bathroom(s) should allow for full operation of all fixtures, doors and windows.
	C-2:	The fixture and circulation clearances should be as specified in selector 8, Space Planning, of the referenced document “Human-scale 7/8/9” as listed in Section 2, Reference Documents.
Evaluation Methods	E-1:	EM- 1: Observation and Review drawings.
	E-2:	EM- 1: Observation and Review drawings.
Commentary	•	An internal circulation pattern in the shape of a triangle is common for a bathroom.
	•	The minimum width of circulation space may be required by the specifier or codes.

FIG. X2.33 Functionality of Bathroom Space in Regard to Circulation

L—FUNCTIONALITY		
1.7. PRIVATE SPACES—WATER CLOSET		
A. Functionality of the Water Closet in Regard to Activity Support		
Objective		Each Water Closet, if provided, should be equipped with personal hygiene centers, including fixtures, and designed to be furnished with accessories for personal hygiene.
Criteria	C-1:	The Water Closet should be designed to contain any water splashes or leakage.
	C-2:	The Water Closet should be provided with storage space adequate for the safe storage of the items commonly associated with that room.
	C-3:	A Water Closet should have a closable cabinet for the storage of medicines, sickness supplies and dangerous items such as razors and scissors. The bottom of the medicine cabinet should be located at a height suitable for the use of adult occupants and out of the reach of small children.
	C-4:	Each Water Closet should be provided with: at least one water closet fixture, at least one hand washing lavatory, the appropriate accessories for each fixture, at least one towel bar, at least one mirror, at least one built in soap dish, at least one toilet paper holder, access to power for night light and shaver, access to water for hygiene and plumbing fixtures.
	C-5:	Plumbing fixtures and accessories should comply with all applicable standards.
Evaluation Methods	E-1 thru E-4:	EM-1: Observation and Review drawings.
	E-5:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	If cabinets are acceptable to the specifier, minimum frontages of cabinets should be specified or based on a set standard.
	•	The specifier may wish to set minimum criteria for countertop configurations.
	•	The specifier may wish to set a limit on the height of any shelving.
	•	The specifier may wish to set a minimum clearance between base and wall cabinets and such clearance should consider conditions such as lighting fixtures projecting below wall cabinets.
	•	The specifier may wish to note a minimum number of sinks with hot and cold running water.
	•	An example of a minimum towel bar length is 300 mm (1ft) long.
	•	Other appropriate accessories are tooth brush holders and robe hooks.
	•	An applicable standard may be Section R307, Toilet, Bath and Shower Spaces of the International Residential Code™.
	•	See Standard Guide D—Health and Hygiene.

FIG. X2.34 Functionality of Water Closet in Regard to Support Activity

L—FUNCTIONALITY		
1.7. PRIVATE SPACES—WATER CLOSET		
B. Functionality of the Water Closet in Regard to Shape and Size		
Objective		All dwellings should have a Water Closet Space(s) of shape(s) and size(s) which facilitate the intended activities.
Criteria	C-1:	Minimum clearance distances in spaces containing personal sanitation facilities should be as defined by the specifier.
	C-2:	Water Closet should be provided with minimum area and dimensions as required for occupant needs.
	C-3:	It should be the minimum size needed to provide for the criteria stated in the Ease of Movement and Serving Activity Performance Statements.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings.
Commentary	•	Generally, the minimum Water Closet area and the number of Water Closets should increase with an increase in the number of bedrooms to allow for more fixtures and utensils.
	•	Special needs may affect the size and shape of the Water Closet(s).
	•	See the plumbing fixtures in the mechanical chapter of Architectural Graphic Standards.
	•	See standard Guide “I”—Accessibility for issues involving access for the disabled.

FIG. X2.35 Functionality of Water Closet in Regard to Shape and Size

L—FUNCTIONALITY		
1.7. PRIVATE SPACES—WATER CLOSET		
C. Functionality of the Water Closet in Regard to Spacial Relationships		
Objective		Water Closet(s) should be conveniently located.
Criteria	C-1:	The location of the Water Closet(s) should provide convenient access to the Living Space(s).
	C-2:	Water Closet(s) should be directly connected to a hall/circulation space that serves other rooms.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
Commentary	•	A bathroom may fulfill the function of a Water Closet.

FIG. X2.36 Functionality of Water Closet in Regard to Spacial Relationships

L—FUNCTIONALITY		
1.7. PRIVATE SPACES—WATER CLOSET		
D. Functionality of Water Closet in Regard to Visual Privacy		
Objective		Unless otherwise specified, the Water Closet(s) should be provided with a way to prevent vision through Windows / Doors when and where needed.
Criteria	C-1:	A person standing outside a door or window should not be able to make out specific shapes in the Water Closet when a vision prevention device is in operation.
	C-2:	The occupants should have full control of the vision control devices.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
Commentary	•	Translucent glass can be used for permanent visual privacy.
	•	Shades or blinds can be used for temporary visual privacy.
	•	Doors can be closed for temporary visual privacy.
	•	The shape of the room can also limit the view if desired.

FIG. X2.37 Functionality of Water Closet in Regard to Visual Privacy

L—FUNCTIONALITY		
1.7. PRIVATE SPACES—WATER CLOSET		
E. Functionality of the Water Closet in Regard to Circulation		
Objective		The internal circulation in the Water Closet should be sequentially related to fixtures as specified by the specifier.
Criteria	C-1:	Water Closet(s) should allow for full operation of all fixtures, doors and windows.
	C-2:	The fixture and circulation clearances should be as specified in selector 8, Space Planning, of the referenced document "Human-scale 7/8/9" as listed in Section 2 Reference Documents.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
Commentary	•	An internal circulation pattern in the shape of a straight line is common for a Water Closet.
	•	The minimum width of circulation space may be required by the specifier or codes.

FIG. X2.38 Functionality of Water Closet in Regard to Circulation

L—FUNCTIONALITY		
1.8. PRIVATE SPACES—OUTDOOR LIVING		
A. Functionality of Outdoor Living Space in Regard to Activity Support		
Objective		The Outdoor Living Space should promote the activities of play, relaxation and entertaining as appropriate.
Criteria	C-1:	The space should conform with all the Performance Statements discussed in this section.
	C-2:	The cumulative effect of all the Performance Statements in this section should be that the space supports play, relaxation and entertaining.
	C-3:	The space should provide access to power for maintenance, cooking and entertainment equipment.
	C-4:	The space should provide access to water for irrigation, cleaning, cooking and entertainment.
	C-5:	The space should help prevent the unit outdoor activities from interfering with the neighbor's activities.
Evaluation Methods	E-1 thru E-5:	EM-1: Observation and Review drawings.
Commentary	•	Terraces and yards are frequently used spaces in certain climates. They may be used for entertaining, dining, studying, children playing, clothes drying and other such activities.
	•	Hedges, fences, and distance separations can help isolate the unit's outdoor activities from interfering with the neighbor.

FIG. X2.39 Functionality of Outdoor Living Space in Regard to Activity Support

L—FUNCTIONALITY		
1.8. PRIVATE SPACES—OUTDOOR LIVING		
B. Functionality of Outdoor Living Space in Regard to Shape and Size		
Objective		Each dwelling should have yard(s) or terrace(s) of a shape and size that will facilitate the intended activities where climate or site conditions permit.
Criteria	C-1:	The provider should provide space(s) open to the outdoors with minimum area(s) determined by the specifier and in location(s) consistent with the circulation patterns of the dwelling.
	C-2:	In addition, such spaces should be furnishable with specific items of a size and shape determined by the specifier.
	C-3:	These items should be able to be arranged in a functional manner, as determined by the specifier.
	C-4:	The size of the furniture should comply with at least the minimum dimensions indicated in the reference documents specified in section X2.2.3.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings.
	E-4:	EM-5: Observation of typical product and review manufacturer's documentation.
Commentary	•	An Outdoor Space may be provided with room for a chair, a barbeque, and a tree with at least a 1.2 m (4 ft) branch radius.

FIG. X2.40 Functionality of Outdoor Living Space in Regard to Shape and Size

L—FUNCTIONALITY		
1.8. PRIVATE SPACES—OUTDOOR LIVING		
C. Functionality of Outdoor Living Space in Regard to Spatial Relationships		
Objective		The Outdoor Living Space should be in a location consistent with the spatial interrelationships established by the specifier in section X2.2.2.
Criteria	C-1:	The Outdoor Living Space should be directly convenient to the interior Living Space.
	C-2:	The Outdoor Living Space should be convenient to the Kitchen Space.
	C-3:	The Outdoor Living Space should not interfere with neighboring properties.
Evaluation Methods	E-1 thru E-5:	EM-1: Observation and Review drawings.
Commentary	•	It may be useful to provide sufficient clearance so that large equipment (for example, backhoes, rollers) can be moved into the Outdoor Living Space.

FIG. X2.41 Functionality of Outdoor Living Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.8. PRIVATE SPACES—OUTDOOR LIVING		
D. Functionality of Outdoor Living Space in Regard to Visual Privacy		
Objective		Unless otherwise specified, the Outdoor Living Space should be protected from view.
Criteria	C-1:	Terraces and yards which can be viewed from adjacent public or private (other than by awkward positioning of the viewer) should be provided with screens, fences or other devices to block the view.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
Commentary	•	The distance from public or private spaces not controlled by the dwelling may be set by the specifier (for example, at a distance of __ m [ft] or less). In addition, the specifier may require that the screening should obliterate the view into terraces and/or yards from the ground to a height of __ m (ft) above the ground over not less than __ (for example, 60 %) of the perimeter.

FIG. X2.42 Functionality of Outdoor Living Space in Regard to Visual Privacy

L—FUNCTIONALITY		
1.8. PRIVATE SPACES—OUTDOOR LIVING		
E. Functionality of Outdoor Living Space in Regard to Circulation		
Objective		The size, shape and location of the Outdoor Living Space should provide convenient access to and from the dwelling and its surroundings.
Criteria	C-1:	The size, shape and location of the Outdoor Living Space should be adequate for placement of furniture and equipment.
	C-2:	The size, shape and location of the Outdoor Living Space should allow free circulation of people and pets.
	C-3:	The location of the Outdoor Living Space should provide convenient access to the Living spaces.
	C-4:	The size and shape of the Outdoor Living space should provide room for circulation, physical activities, and relaxation.
	C-5:	The minimum clear passage width should be large enough so two people can pass each other.
Evaluation Methods	E-1 thru E-5:	EM-1: Observation and Review drawings.
Commentary	•	The specifier may set minimum requirements such as opening not less than __ (for example, one-half of the area of the space) with a minimum dimension of not less than __ (for example, 2 m; 6 ft, 6 in.) and a minimum aggregate area of __ m^2 (ft^2).
	•	Refer to Standard Guide "G"—Acoustics, when ambient noise is an issue.
	•	An example of the minimum width of main circulation paths could be 900 mm (3 ft).

FIG. X2.43 Functionality of Outdoor Living Space in Regard to Circulation

L—FUNCTIONALITY		
1.9. PRIVATE SPACES—STORAGE		
A. Functionality of Storage Space in Regard to Activity Support		
Objective		Provision should be made for the storage of occupant possessions and equipment.
Criteria	C-1:	Provision should be made for bulk storage.
	C-2:	Storage Space should protect the materials from the weather.
	C-3:	Power should be provided for light and room maintenance.
	C-4:	Interior Storage Space should be provided for occupant clothes, seasonal goods, and maintenance equipment.
	C-5:	Exterior Storage Space should be provided for landscaping maintenance equipment, if applicable.
	C-6:	Each dwelling should have convenient access to a private or semi-public area in which to store trash for municipal or private collection. The size of trash containers should be a function of the number of inhabitants and the frequency of collection.
	C-7:	Adequate storage facilities should be built into or allowed for in each dwelling, in addition to the storage requirements for each room type.
Evaluation Methods	E-1 thru E-7:	EM-1: Observation and Review drawings.
Commentary	•	Interior Storage Space may consist of closets.
	•	Bulk storage may be within the dwelling or in a central location on a multiple dwelling site.
	•	Exterior Storage Space may consist of a storage shed or additional space in a garage.
	•	If exterior landscaping is maintained by other than the dwelling occupants (a co-op for example), then exterior storage may not be needed.
	•	Trash storage may be done by either providing a container for each dwelling or providing a central collection area designed to contain the trash of several dwellings. The specifier should set the maximum length of travel from the entry to the trash container. The allowable use and location of common trash collection may be subject to specific ordinances, covenants, zoning or land use regulations that must be considered in addition to the requirements of the specifier.
	•	Part of the general storage may be required to be provided with an outdoor access or service entry or as an ancillary building, and may be included within an area used for ancillary purposes (for example, garage).
	•	The use of accessory buildings may be limited by land-use and zoning constraints.
	•	An example of adequate storage facilities built into or allowed for in each dwelling, in addition to the storage requirements for each room type, could be a minimum of 9.3 m^2 (100 ft^2). The items to be stored may include maintenance supplies (light bulbs, etc.), seasonal clothing, furniture awaiting specific use (infant crib), etc.
	•	See the performance statement, covering the Functionality of the Kitchen Space in Regard to Activity Support, for a discussion of the storage implications of composting.
	•	See Standard Guide "D"—Health and Hygiene for discussion of issues of pest, odor, and moisture control pertaining to garbage and compost storage.

FIG. X2.44 Functionality of Storage Space in Regard to Activity Support

L—FUNCTIONALITY		
1.9. PRIVATE SPACES—STORAGE		
B. Functionality of the Storage Space in Regard to Shape and Size		
Objective		The Storage Space(s) should be of a shape(s) and size(s) that meet the requirements of the occupants.
Criteria	C-1:	Storage should be provided with minimum area and dimensions as required for occupant needs.
	C-2:	The minimum size storage is that which is needed to meet the criteria stated in the Circulation and Serving Activity performance statements, and the performance statements for each interior space.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
Commentary	•	Generally, the minimum Storage area should increase in size with an increase in the number of bedrooms to allow for more storage volume.
	•	Sometimes the Garage Space is also used for accessory storage. See the Garage Space performance statements.
	•	The interior spaces that have Activity Support performance statements that also deal with storage are Entry, Kitchen, Sleeping, Bathroom, Toilet and Garage.

FIG. X2.45 Functionality of Storage Space in Regard to Shape and Size

L—FUNCTIONALITY		
1.9. PRIVATE SPACES—STORAGE		
C. Functionality of the Storage Space in Regard to Spatial Relationships		
Objective		The Storage Space(s) should accessible from the dwelling without disrupting the activities in the dwelling.
Criteria	C-1:	There should be convenient access to a circulation type (hallway) space.
	C-2:	There should be convenient access to the service or main entrance.
	C-3:	There should be convenient access to the Entry, Kitchen, Sleeping, Bathroom, Toilet and Garage Spaces.
	C-4:	There should be convenient access to the Outdoor Living Space(s).
Evaluation Methods	E-1 thru E-4:	EM-1: Observation and Review drawings.
Commentary	•	Indirect access to the entry, kitchen, sleeping, bathroom, toilet and garage spaces is often the case. Normally, there will be more than one Storage Space to accommodate different needs.

FIG. X2.46 Functionality of Storage Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.9. PRIVATE SPACES—STORAGE		
D. Functionality of the Garage Space in Regard to Circulation		
Objective		The Storage Space should not hinder circulation inside and outside the dwelling.
Criteria	C-1:	The Storage Space should not block interior and exterior circulation paths.
	C-2:	The door swings of large Storage Spaces should not block interior and exterior circulation paths.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
Commentary	•	None

FIG. X2.47 Functionality of Storage Space in Regard to Circulation

L—FUNCTIONALITY		
1.10.1. PRIVATE SPACES—OTHER-LAUNDRY		
A. Functionality of Laundry Space in Regard to Activity Support		
Objective		A means should be provided for washing and drying of laundry for each dwelling.
Criteria	C-1:	Services such as an appliance power outlet; hot, cold and waste water connections; and an exterior dryer vent, all properly sized for the capacity of the proposed equipment should be provided. A central location with automatic washers and dryers could be substituted.
	C-2:	If a washer and a dryer are provided in the dwelling unit, a service type sink should be provided along with hot and cold water and a waste drain.
	C-3:	When an automatic washer and dryer are provided, a minimum space should be provided as indicated in the Residential Equipment section of “Graphic Standards” and in the Residential Laundry Room section of “Time-Saver Standards for Building Types”.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings.
Commentary	•	If desired by the occupants, an alternative non-mechanical means for drying of laundry should be provided for each unit. An outdoor clothesline is one example. Outdoor clothes drying may be regulated by covenant or zoning ordinance.

FIG. X2.48 Functionality of Laundry Space in Regard to Activity Support

L—FUNCTIONALITY		
1.10.1. PRIVATE SPACES—OTHER-LAUNDRY		
B. Functionality of the Laundry Space in Regard to Shape and Size		
Objective		The Laundry Space should be of a shape and size which will facilitate the intended activities.
Criteria	C-1:	It should be convenient to transfer laundry from one appliance or counter to another.
	C-2:	Laundry should be provided with minimum area and dimensions as required for occupant needs.
	C-3:	It should be the minimum size needed to meet the criteria stated in the Circulation and Serving Activity performance statements.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings.
Commentary	•	Generally, the minimum Laundry area should increase in size with an increase in the number of bedrooms to allow for more and larger fixtures and accessories.

FIG. X2.49 Functionality of Laundry Space in Regard to Shape and Size

L—FUNCTIONALITY		
1.10.1. PRIVATE SPACES—OTHER-LAUNDRY		
C. Functionality of the Laundry Space in Regard to Spatial Relationships		
Objective		The Laundry Space should be easily accessed from bedrooms and bathrooms without disrupting the activities in those spaces.
Criteria	C-1:	There should be a way of conveniently depositing soiled laundry out of sight and out of the way.
	C-2:	Other spaces should be shielded or separated from the noise of laundry operation.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary	•	If the Laundry Space is on the same floor as the rest of the rooms, it could be in an enclosed room with a door off a hallway.
	•	If the Laundry Space is in a basement or cellar, a laundry chute leading from the upper floors would provide a convenient way to deposit soiled laundry without having to carry it down the stairs.

FIG. X2.50 Functionality of Laundry Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.10.1. PRIVATE SPACES—OTHER-LAUNDRY		
D. Functionality of the Laundry Space in Regard to Circulation		
Objective		The internal circulation in the Laundry Space should be sequentially related to work centers as specified by the specifier.
Criteria	C-1:	It should be convenient to transfer laundry from one appliance or counter to another.
	C-2:	The minimum clear passage width, that services the laundry equipment and activities, should be large enough so two people can pass each other and for the relocation of laundry equipment.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary	•	An example of a minimum width of the circulation path could be 900 mm (3 ft).

FIG. X2.51 Functionality of Laundry Space in Regard to Circulation

L—FUNCTIONALITY		
1.10.2. PRIVATE SPACES—OTHER-GARAGE		
A. Functionality of Garage Space in Regard to Activity Support		
Objective		Provision should be made for parking and protecting automobile(s).
Criteria	C-1:	Provision should be made for one passenger automobile.
	C-2:	A Garage Space should protect the car from the weather.
	C-3:	Power should be provided for car maintenance equipment.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings.
Commentary	•	Automobile parking for each dwelling unit is not a universal need. A housing development on an island or in a highly urbanized area may not need automobile parking.
	•	Parking may be adjacent to the dwelling or in a central location on a multiple dwelling site.
	•	Sometimes the Garage Space is also used for accessory storage.

FIG. X2.52 Functionality of Garage Space in Regard to Activity Support

L—FUNCTIONALITY		
1.10.2. PRIVATE SPACES—OTHER-GARAGE		
B. Functionality of the Garage Space in Regard to Shape and Size		
Objective		The Garage Space should meet the needs of the dwelling occupants.
Criteria	C-1:	A sheltered space should be provided for at least one passenger automobile.
	C-2:	When a Garage Space is provided, a minimum space should be provided as indicated in the Automobile, Roads and Parking sections in the General Planning and Design Data chapter of "Graphic Standards" and the sections covering automobile parking in "Time-Saver Standards for Building Types."
	C-3:	There should be enough room around the perimeter of each of the motor vehicles so that the doors to the motor vehicle can open without being obstructed by or will strike obstructions or other vehicles.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings.
Commentary	•	Generally, the minimum Garage area should increase in size with an increase in the number of bedrooms to allow for more and larger automobiles.

FIG. X2.53 Functionality of Garage Space in Regard to Shape and Size

L—FUNCTIONALITY		
1.10.2. PRIVATE SPACES—OTHER-GARAGE		
C. Functionality of the Garage Space in Regard to Spatial Relationships		
Objective		The Garage Space should be easily accessible from the dwelling without disrupting the activities in the dwelling.
Criteria	C-1:	There should have convenient access to the service or main entrance.
	C-2:	The noise, fumes (including carbon monoxide) and activity in the Garage Space should be isolated from the dwelling spaces.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary	•	If the Garage Space is attached to the dwelling, it needs to be isolated so that carbon monoxide and other gases will not enter the interior (people occupied) spaces. See Standard Guide D—Health and Hygiene.
	•	See Standard Guide G—Acoustics for noise control.

FIG. X2.54 Functionality of Garage Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.10.2. PRIVATE SPACES—OTHER-GARAGE		
D. Functionality of the Garage Space in Regard to Circulation		
Objective		The Garage Space should be large enough to allow for the entry and egress of occupants and automobiles.
Criteria	C-1:	The minimum clear passage width of the pedestrian circulation path, around at least three side of the parked motor vehicle, should be large enough so one person can pass by.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
Commentary	•	An example of the minimum width of the pedestrian circulation path should be 760 mm (30 in.) around all four sides of a parked motor vehicle.

FIG. X2.55 Functionality of Garage Space in Regard to Circulation

L—FUNCTIONALITY		
1.10.3. PRIVATE SPACES—OTHER-WORK SPACE		
A. Functionality of Work Space in Regard to Activity Support		
Objective		A space should be provided for minor repairs, maintenance and hobbies.
Criteria	C-1:	Space for a work bench should be provided.
	C-2:	The Work Space should be protected from the weather.
	C-3:	Power for tools should be provided.
	C-4:	Access to water should be provided for cleaning.
Evaluation Methods	E-1 thru E-4:	EM-1: Observation and Review drawings.
Commentary	•	None

FIG. X2.56 Functionality of the Work Space in Regard to Activity Support

L—FUNCTIONALITY		
1.10.3. PRIVATE SPACES—OTHER-WORK SPACE		
B. Functionality of the Work Space in Regard to Shape and Size		
Objective		The Work Space should be of a shape and size which will facilitate intended activities.
Criteria	C-1:	A sheltered space should be provided for a work bench large enough for the equipment to be used and the activities that will be done.
	C-2:	Work Space should have minimum area and dimensions as required for occupant needs.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary	•	An example of a typical work bench, not including equipment space requirements, may be at least 600 mm (2 ft) wide by 900 mm (3 ft) long.
	•	If a Work Space is to be used for an activity such as wood working, space for tools such a table saw, a band saw, a drill press, a lathe, etc. may be needed.
	•	The minimum Work Space area may increase in size with an increase in the number of dwelling occupants.
	•	Sometimes the Garage Space is used as a Work Space.

FIG. X2.57 Functionality of the Work Space in Regard to Shape and Size

L—FUNCTIONALITY		
1.10.3. PRIVATE SPACES—OTHER-WORK SPACE		
C. Functionality of the Work Room in Regard to Spatial Relationships		
Objective		The Work Space should be accessible from other areas of the dwelling without disrupting other activities.
Criteria	C-1:	There should be convenient access to the service entrance, main entrance or hallway.
	C-2:	The noise, fumes and activity in the Work Space should be isolated from the dwelling unit.
	C-3:	There should have convenient access to the garage and exterior spaces.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings.
Commentary	•	See Standard Guide G—Acoustics for noise control.

FIG. X2.58 Functionality of the Work Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.10.3. PRIVATE SPACES—OTHER-WORK SPACE		
D. Functionality of the Work Room in Regard to Circulation		
Objective		The Work Space should be large enough to allow for entry and egress of occupants.
Criteria	C-1:	The minimum width of the circulation path should be wide enough for two persons to pass each other, be wide enough for any equipment relocation, and should be provided on at least on the long side of the work bench.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
Commentary	•	An example of the minimum width of the circulation path, provided on at least one side of the location of the work bench, could be 900 mm (3 ft).

FIG. X2.59 Functionality of the Work Space in Regard to Circulation

L—FUNCTIONALITY		
1.10.4. PRIVATE SPACES—OTHER-MECHANICAL SPACE		
A. Functionality of Mechanical Space in Regard to Activity Support		
Objective		A space should be provided for mechanical equipment as needed by the dwelling unit.
Criteria	C-1:	A minimum space should be provided as indicated in the Mechanical chapter of “Graphic Standards” for needed equipment.
	C-2:	Provide power for maintenance equipment.
	C-3:	Provide access to water as required for equipment.
	C-4:	Provide access to fuel as required for equipment.
Evaluation Methods	E-1 thru E-4:	EM-1: Observation and Review drawings.
Commentary	•	None

FIG. X2.60 Functionality of the Mechanical Space in Regard to Activity Support

L—FUNCTIONALITY		
1.10.4. PRIVATE SPACES—OTHER-MECHANICAL SPACE		
B. Functionality of the Mechanical Space in Regard to Shape and Size		
Objective		The Mechanical Space should be of a shape and size which will facilitate the mechanical needs of the dwelling unit.
Criteria	C-1:	A sheltered space should be provided for mechanical equipment.
	C-2:	The Mechanical Space should be provided with minimum area and dimensions for mechanical equipment as required for clearances as specified by the equipment manufacturer.
	C-3:	The Mechanical Space should be provided with minimum area and dimensions for mechanical equipment as required for clearances as required by the local authorities and referenced standards.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	Generally, the minimum Mechanical Space area should increase with an increase in the size of the dwelling.
	•	Usually the Mechanical Space is in the basement, service closet or garage.An applicable standard may be Chapter 13, General Mechanical System Requirements, of the International Residential Code™.

FIG. X2.61 Functionality of the Mechanical Space in Regard to Shape and Size

L—FUNCTIONALITY		
1.10.4. PRIVATE SPACES—OTHER-MECHANICAL SPACE		
C. Functionality of the Mechanical Space in Regard to Spatial Relationships		
Objective		The Mechanical Space should be accessible from the dwelling unit without disrupting other activities in the dwelling unit.
Criteria	C-1:	There should be convenient access for service personnel.
	C-2:	The noise, fumes and activity of the Mechanical Space should be isolated from the dwelling unit.
	C-3:	There should be convenient access to the garage, hallway or exterior spaces.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings and EM-8: Bubble Diagram Study.
Commentary	•	See Standard Guide G—Acoustics for noise control.
	•	See Standard Guide E—Indoor Air Quality for fume control.
	•	Mechanical space in this performance statement refers to spaces primarily intended to contain mechanical equipment. This does not intend to refer to individual equipment such as an air conditioner within a bedroom for example.

FIG. X2.62 Functionality of the Mechanical Space in Regard to Spatial Relationships

L—FUNCTIONALITY		
1.10.4. PRIVATE SPACES—OTHER-MECHANICAL SPACE		
D. Functionality of the Mechanical Space in Regard to Circulation		
Objective		The internal circulation in the Mechanical Space should allow for entry and egress of occupants and equipment.
Criteria	C-1:	The minimum width of the circulation path on at least one side of all equipment and work surfaces should be wide enough for two persons to pass each other and for the moving of the mechanical equipment.
	C-2:	The minimum size of a door to a Mechanical Space should be large enough in width and height for two persons to pass each and for the relocation of mechanical equipment.
Evaluation Methods	E-1 thru E-2:	EM-1: Observation and Review drawings.
Commentary	•	An example of the minimum width of the circulation path on at least one side of all equipment and work surfaces could be 900 mm (3 ft).
	•	An example of the minimum size of a door to a Mechanical Space could be 900 mm (3 ft) wide by 2 m (6 ft, 8 in.) high.
	•	Depending on the size of the mechanical equipment, the door may need to be larger.

FIG. X2.63 Functionality of the Mechanical Space in Regard to Circulation

L—FUNCTIONALITY		
2.1. STRUCTURE—FOUNDATION		
A. Functionality of the Foundation in Regard to Activity Support		
Objective		The Foundation should support the dwelling structure.
Criteria	C-1:	The Foundation should transfer all the dead loads of the superstructure, enclosure, and contents to the bearing soil/rock.
	C-2:	The Foundation should transfer all the live loads; such as wind, earth movement, occupants, vehicles; that affect the superstructure, enclosure, and contents; to the bearing soil/rock.
	C-3:	The Foundation should comply with all applicable standards.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	Chapter 4, Foundations, of the International Residential Code™, may be an applicable standard.
	•	See Standard Guide A—Structural Safety and Serviceability for further discussion of structural support.

FIG. X2.64 Functionality of the Foundation in Regard to Activity Support

L—FUNCTIONALITY		
2.2. STRUCTURE - SUPERSTRUCTURE		
A. Functionality of the Superstructure in Regard to Activity Support		
Objective		The Superstructure should support the dwelling enclosure.
Criteria	C-1:	The Superstructure should transfer all the dead loads of the enclosure and contents to the foundation.
	C-2:	The Superstructure should transfer all the live loads; such as wind, earth movement, occupants, vehicles; that affect the enclosure, and contents; to the foundation.
	C-3:	The Superstructure should comply with all applicable standards.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	Chapters 5, Floors, 6, Wall Construction, and 8, Roof-Ceiling Construction, of the International Residential Code, may be applicable standards.
	•	See Standard Guide A—Structural Safety and Serviceability for further discussion of structural support.

FIG. X2.65 Functionality of the Superstructure in Regard to Activity Support

L—FUNCTIONALITY		
3.1.1. EXTERIOR ENCLOSURE -GRADE ENCLOSURE - FLOOR ON GRADE		
A. Functionality of Floors on Grade in Regard to Activity Support		
Objective		Walls should prohibit the entry and egress of air/gas, heat, cold, moisture, etc. as appropriate.
Criteria	C-1:	Floors on Grade should have U-factor (1/R) appropriate for the region and use.
	C-2:	Floors on Grade should resist the passage of air/gas and moisture as appropriate for the region.
	C-3:	Floors on Grade should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation of insulation products.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	A concrete slab on grade located on Long Island, NY may have R-10 perimeter insulation.
	•	The thermal comfort of a dwelling may be affected by the thermal resistance value of this building element. See the Whole Building performance statement on Comfort for a discussion on thermal comfort.
	•	See the International Energy Conservation Code™, Tables 502.2.4(1) thru (9) for examples of U-factors for different degree-day values.
	•	See the International Energy Conservation Code™, Table 602.1 for examples of R-values for different degree-day values.
	•	E154-99 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover may be an applicable standard.
	•	Chapter 5, Floors, of the International Residential Code may be an applicable standard.
	•	ASTM E241, the ASTM manual titled "Moisture Control in Buildings" (ASTM MNL18), and the "Builder's Foundation Handbook" may be applicable standards for moisture penetration control.
	•	See Standard Guide "E"—Indoor Air Quality, for a discussion on radon infiltration control.

FIG. X2.66 Functionality of Floors on Grade in Regard to Activity Support

L—FUNCTIONALITY		
3.1.2. EXTERIOR ENCLOSURE -GRADE ENCLOSURE - FLOOR OVER AIR SPACE		
A. Functionality of Floors over Air Space in Regard to Activity Support		
Objective		Floors over Air Space should prohibit the entry and egress of air, moisture heat, cold, sound, view, etc. as appropriate.
Criteria	C-1:	Floors over Air Space should have U-factor (1/R) appropriate for the region and use.
	C-2:	Floors over Air Space should resist the passage of air as appropriate for the region.
	C-3:	Floors over Air Space should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation of insulation products.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	A fully insulated 2 by 8 in. wood joist floor above an unheated crawlspace, located on Long Island, NY may have a value of R-19.
	•	The thermal comfort of a dwelling may be affected by the thermal and air infiltration resistance value of this building element. See the Whole Building performance statement on Comfort for a discussion on thermal comfort.
	•	The location of vapor barriers depend on the climatic regions. In warm climates where the exterior temperature is typically higher than the interior temperature, the vapor barrier would be located as close to the exterior as possible. In cold climates where the exterior temperature is typically lower than the interior temperature, the vapor barrier would be located as close to the interior as possible.
	•	An applicable standard for vapor barriers may be Section R322, Moisture Vapor Retarders, of International Residential Code™.
	•	See the International Energy Conservation Code™, Tables 502.2.4(1) thru (9) for examples of U-factors for different degree-day values.
	•	See the International Energy Conservation Code™, Table 602.1 for examples of R-values for different degree-day values.
	•	E154-99 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover may be an applicable standard.
	•	Chapter 5, Floors, of the International Residential Code may be an applicable standard.
	•	E1825-96 Standard Guide for Evaluation of Exterior Building Wall Materials, Products, and Systems may be an applicable standard.
	•	ASTM E241, the ASTM manual titled "Moisture Control in Buildings" (ASTM MNL18), and the "Builder's Foundation Handbook" may be applicable standards for moisture penetration control.
	•	See Standard Guide "G"—Acoustics for acoustical control at exterior floors.

FIG. X2.67 Functionality of Floors over Air Space in Regard to Activity Support

L—FUNCTIONALITY		
3.2.1. EXTERIOR ENCLOSURE—VERTICAL and SLOPED ENCLOSURE—WALLS		
A. Functionality of Walls in Regard to Activity Support		
Objective		Walls should prohibit the entry and egress of air, moisture, heat, cold, sound, view, etc. as appropriate.
Criteria	C-1:	Walls should have U-factor (1/R) appropriate for the region and use.
	C-2:	Walls should resist the passage of air as appropriate for the region and use.
	C-3:	Walls should resist the passage of moisture as appropriate for the region and use.
	C-4:	Walls should comply with all applicable standards.
Evaluation Methods	E-1:	Wall test apparatus in the C976-90(1996)ε1 Standard Test Method for Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-1: Observation and Review drawings.
	E-4:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	A fully insulated 2″x6″ wood stud exterior wall located on Long Island, NY may have a U-factor of 0.05.
	•	The thermal comfort of a dwelling may be affected by the thermal and air infiltration resistance value of this building element. See the Whole Building performance statement on Comfort for a discussion on thermal comfort.
	•	The location of vapor barriers depend on the climatic regions. In warm climates where the exterior temperature is typically higher than the interior temperature, the vapor barrier would be located as close to the exterior as possible. In cold climates where the exterior temperature is typically lower than the interior temperature, the vapor barrier would be located as close to the interior as possible.
	•	An applicable standard for vapor barriers may be Section R322, Moisture Vapor Retarders, of International Residential Code™.
	•	See Standard Guide "E"—Indoor Air Quality, Exterior Enclosures, Vertical and Sloped Enclosures, for a discussion on control of Condensation within Wall Assemblies.
	•	See the International Energy Conservation Code™, Tables 502.2.1.2(1), (2), and(3) for examples of U-factors for different degree-day values.
	•	See the International Energy Conservation Code™, Table 602.1 for examples of R-values for different degree-day values.
	•	E1677-95(2000) Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls may be an applicable standard.
	•	E154-99 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover may be an applicable standard.
	•	Chapter 6, Wall Construction, of the International Residential Code may be an applicable standard.
	•	E1825-96 Standard Guide for Evaluation of Exterior Building Wall Materials, Products, and Systems may be an applicable standard.
	•	See Standard Guide "G"—Acoustics for acoustical control at exterior walls.
	•	See Standard Guide "E"—Indoor Air Quality, for a discussion on control of rain penetration.

FIG. X2.68 Functionality of Walls in Regard to Activity Support

L—FUNCTIONALITY		
3.2.2. EXTERIOR ENCLOSURE—VERTICAL and SLOPED ENCLOSURE—WINDOWS		
A. Functionality of Windows in Regard to Activity Support		
Objective		Windows should permit or prohibit the entry and egress of air, heat, cold, sound, view, etc. as needed and/or desired by the occupants.
Criteria	C-1:	The operable windows should be under the control of the occupants.
	C-2:	Operable windows should have durable insect screens.
	C-3:	Windows should have U-factor and Solar Heat Gain Coefficient appropriate for the region and specific use.
	C-4:	Windows should have a Visible Transmittance appropriate for the region and specific use.
	C-5:	A closed operable window should have an Air Leakage Rate appropriate for the region and specific use.
	C-6:	A closed operable window should have Water Infiltration appropriate for the region and specific use.
	C-7:	Windows should comply with all applicable standards.
Evaluation Methods	E-1 thru E-4:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-5:	EM-5: Observation of typical product and review manufacturer's documentation; or EM-10: ASTM E783-93 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
	E-6:	EM-5: Observation of typical product and review manufacturer's documentation; or EM-11: ASTM E1105-96 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference; or E547-96 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential; or E331-96 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
	E-7:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	A window installed in Long Island, NY may have a U-factor of 0.35 and a Solar Heat Gain Coefficient (SHGC) of 0.40.
	•	The thermal comfort of a dwelling may be affected by the thermal and air infiltration resistance value of this building element. See the Whole Building performance statement on Comfort for a discussion on thermal comfort.
	•	See the International Energy Conservation Code™, Table 602.1 for examples of U-factors for different degree-day values.
	•	See the International Energy Conservation Code™, Table 102.5.2(3) for examples of SHGC values for some typical fenestration materials.
	•	The International Energy Conservation Code™ sections 502.1.5 and 602.2 state that the maximum SHGC for glazing fenestration in locations where the Farenheit heating degree days is less than 3500 shall not exceed 0.40.
	•	An example of Visible Transmittance for a typical exterior window may be at least 0.30 for windows where vision through is desired.
	•	An example of the Air Leakage Rate for a typical exterior window in the closed position may be of no more than 1.5 $L/(s{\cdot}m^2)$ (0.3 cfm/ft^2) at a pressure of 75 Pa (1.57 psf).
	•	An example of Water Infiltration for a typical exterior window in the closed position may be zero Water Infiltration at a minimum of 140 Pa (2.86 psf) test pressure or 15 % of design pressure whichever is more stringent.
	•	The values indicated, in this commentary, for Air Leakage and Water Infiltration are U.S. industry standards for residential windows.
	•	An air leakage rate is meaningless without a stated differential pressure. The current rate in national standards and in the building codes requires that leakage rates be measured per square meter or square foot of frame area not per foot of perimeter crack. Use of perimeter crack was too subjective and could allow a product to seem to comply by creatively calculating crack length. Single digit accuracy reflects more closely the actual tested performance of the product in the field as opposed to values measured in the perfect conditions existing in the test laboratory.
	•	The pressure used for water penetration testing is normally 15 % of design pressure and is referred to as test pressure not design pressure. Design pressure would usually be at least 720 Pa (15 psf).
	•	An applicable standard for laboratory testing of window air leakage may be E283-91(1999) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
	•	An applicable standard may be ASTM E330 "Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
	•	An applicable standard may be ANSI/AAMA/NWWDA 101/I.S.2-97, Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.
	•	See Standard Guide "C"—Accident Safety.
	•	See Standard Guide "E"—Indoor Air Quality, for a discussion on control of rain penetration and thermal comfort.
	•	See Standard Guide "F"—Light.
	•	See Standard Guide "G"—Acoustics.
	•	See Standard Guide "H"—Durability.
	•	See Standard Guide "J"—Security.
	•	See Standard Guide "M"—Aesthetics.
	•	See Standard Guide "P"—Sustainability for energy usage issues.

FIG. X2.69 Functionality of Windows in Regard to Activity Support

L—FUNCTIONALITY		
3.2.2. EXTERIOR ENCLOSURE—VERTICAL and SLOPED ENCLOSURE—WINDOWS		
B. Functionality of Windows in Regard to Shape and Size		
Objective		Windows should be of the proper shape and size to support the needs of the occupants.
Criteria	C-1:	Windows shall provide a glazing area large enough for the intended use or appropriate for each space.
	C-2:	The Windows shape and size should comply with the authorities having jurisdiction requirements for light, ventilation, egress, etc.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-1: Observation and Review Drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	The most stringent of U.S. model building codes indicates a minimum net clear opening should be 0.530 m^2 (530 000 mm^2, 5.7 ft^2); minimum net clear height of opening should be 610 mm (24 in.); minimum net clear width should be 508 mm (20 in.) for emergency egress/escape.
	•	A standard code requirement for the amount of glazing area for natural light in a habitable room is not less than 8 % of the floor area of each habitable room.
	•	See Standard Guide "B"—Fire Safety.
	•	See Standard Guide "C"—Accident Safety.
	•	See Standard Guide "I"—Accessibility.
	•	An applicable standard may be section R303, Light, Ventilation and Heating, of the International Residential Code™ in regard minimum size as required for light and ventilation to light and ventilation requirements.
	•	An applicable standard may be section R310.1, Emergency Escape and Rescue Openings of the International Residential Code™.

FIG. X2.70 Functionality of Windows in Regard to Shape and Size

L—FUNCTIONALITY		
3.2.2. EXTERIOR ENCLOSURE—VERTICAL and SLOPED ENCLOSURE—WINDOWS		
D. Functionality of Windows in Regard to Operability		
Objective		The operable Windows should be convenient and simple to operate.
Criteria	C-1:	Where required by code, occupant or access for the disabled, the manual controls should be operable by one hand and not require tight grasping, pinching, or twisting of the wrist.
	C-2:	The window should operate easily if it, opens, closes, locks, and/or operates for cleaning. Types of operation is not limited to the ones listed.
	C-3:	Windows should comply with all applicable standards for emergency escape and fire department access.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation and EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See Standard Guide "B"—Fire Safety.
	•	See Standard Guide "C"—Accident Safety.
	•	See Standard Guide "I"—Accessibility.
	•	Guidance can also be obtained in ICC/ANSI A117.1-98 "Accessible and Usable Buildings and Facilities."
	•	Applicable standards may include AAMA 901-96,Voluntary Specification for Rotary Operators In Window Applications, AAMA 902-99, Voluntary Specification for Sash Balances (Revised), and ANSI/AAMA/NWWDA 101/I.S.2-97, Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors

FIG. X2.71 Functionality of Windows in Regard to Operability

L—FUNCTIONALITY		
3.2.3. EXTERIOR ENCLOSURE—VERTICAL and SLOPED ENCLOSURE—DOORS		
A. Functionality of Doors in Regard to Activity Support		
Objective		Doors should permit or prohibit the entry and egress of people animals, air, heat, cold, sound, view, etc. as needed and/or desired by the occupants.
Criteria	C-1:	The doors should be under the control of the occupants.
	C-2:	Doors should have durable insect screens or a durable screen door accessory.
	C-3:	Doors should have U-factor appropriate for the region and use.
	C-4:	The windows in a door should have a Visible Transmittance appropriate for the region and use.
	C-5:	A closed door should have an Air Leakage Rate appropriate for the region and use.
	C-6:	A closed door should have Water Infiltration appropriate for the region and use.
	C-7:	Doors should comply with all applicable standards.
Evaluation Methods	E-1 thru E-4:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-5:	EM-5: Observation of typical product and review manufacturer's documentation; or EM-10: ASTM E783-93 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
	E-6:	EM-5: Observation of typical product and review manufacturer's documentation; or EM-11: ASTM E1105-96 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference; or E547-96 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential; or E331-96 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
	E-7:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	A door installed in Long Island, NY may have a U-factor of 0.30.
	•	The thermal comfort of a dwelling may be affected by the thermal and air infiltration resistance value of this building element. See the Whole Building performance statement on Comfort for a discussion on thermal comfort.
	•	The International Energy Conservation Code™ section 502.2.4.6 requires that opaque doors have a maximum U-factor of 0.35.
	•	An example of Visible Transmittance for a typical window in an exterior door may be at least 0.30 for windows where vision through is desired.
	•	An example of the Air Leakage Rate for a typical exterior door in the closed position may be no more than 1.5 L/(s·m^2) (0.3 cfm/ft^2) at a pressure of 75 Pa (1.57 psf).
	•	An example of Water Infiltration for a typical exterior door in the closed position may be zero Water Infiltration at a minimum of 140 Pa (2.86 psf) test pressure or 15 % of design pressure whichever is more stringent.
	•	The values indicated, in this commentary, for Air Leakage and Water Infiltration are U.S. industry standards for residential windows.
	•	An air leakage rate is meaningless without a stated differential pressure. The current rate in national standards and in the building codes requires that leakage rates be measured per square metre or square foot of frame area not per foot of perimeter crack. Use of perimeter crack was too subjective and could allow a product to seem to comply by creatively calculating crack length. Single digit accuracy reflects more closely the actual tested performance of the product in the field as opposed to values measured in the perfect conditions existing in the test laboratory.
	•	The pressure used for water penetration testing is normally 15 % of design pressure and is referred to as test pressure not design pressure. Design pressure would usually be at least 720 Pa (15 psf).
	•	An applicable standard for laboratory testing of door air leakage may be E283-91(1999) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
	•	An applicable standard may be Section R311, Exits, of the International Residential Code™.
	•	An applicable standard may be ANSI/DASMA 102-1996, Specifications for Sectional Overhead-Type Doors.
	•	Exterior garage doors that serve an unheated garage may have little or no thermal resistance requirements, air leakage requirements, and water infiltration requirements.
	•	See Standard Guide "B"—Fire Safety.
	•	See Standard Guide "E"—Indoor Air Quality, for a discussion on control of rain penetration.
	•	See Standard Guide "G"—Acoustics.
	•	See Standard Guide "I"—Accessibility.
	•	See Standard Guide "J"—Security.
	•	See Size and Shape performance statement below.

FIG. X2.72 Functionality of Doors in Regard to Activity Support

L—FUNCTIONALITY		
3.2.3. EXTERIOR ENCLOSURE—VERTICAL and SLOPED ENCLOSURE—DOORS		
B. Functionality of Doors in Regard to Shape and Size		
Objective		Doors should be of the proper shape and size to support the needs of the occupants.
Criteria	C-1:	The Doors should be the correct shape and large enough for occupant entry and egress.
	C-2:	The Doors should be the correct shape and large enough for furniture and equipment entry and egress. The size of the furniture should comply with at least the minimum dimensions indicated in the reference documents specified in section X2.2.3.
	C-3:	The Doors shape and size should comply with the authorities having jurisdiction requirements for egress, light, ventilation, etc.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See Standard Guide "I"—Accessibility.
	•	An applicable standard may be section R311, Exits, of the International Residential Code™.
	•	Minimum sizes for bedroom doors are usually 770 mm (30 in.) and bathroom doors are usually 720 m (28 in.).

FIG. X2.73 Functionality of Doors in Regard to Shape and Size

L—FUNCTIONALITY		
3.2.3. EXTERIOR ENCLOSURE—VERTICAL and SLOPED ENCLOSURE—DOORS		
D. Functionality of Doors in Regard to Circulation		
Objective		The placement of the Doors should promote convenient Circulation.
Criteria	C-1:	Doors should open onto rooms able to be occupied so as not to encroach upon hallways accessing more than one room.
	C-2:	Door swings should not encroach upon the door swings of adjacent doors unless the door swings would not hinder circulation.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
Commentary	•	None

FIG. X2.74 Functionality of Doors in Regard to Circulation

L—FUNCTIONALITY		
3.2.3. EXTERIOR ENCLOSURE—VERTICAL and SLOPED ENCLOSURE—DOORS		
E. Functionality of Doors in Regard to Operability		
Objective		The Doors should be convenient and simple to operate.
Criteria	C-1:	Where required by code, occupant or access for the disabled, the manual controls should be operable by one hand and not require tight grasping, pinching, or twisting of the wrist.
	C-2:	The door should operate easily if it, but not be limited to, opens, closes, locks, and operates for cleaning.
	C-3:	Doors should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See Standard Guide "I"—Accessibility.
	•	Guidance can also be obtained in ICC/ANSI A117.1-98 "Accessible and Usable Buildings and Facilities."
	•	Applicable standards may be NWWDA I.S.1 "Industry Standard for Wood Flush Doors," and AWI "Architectural Woodwork Quality Standards;" including Section 1300 "Architectural Flush Doors," for grade of door, core construction, finish and other requirements exceeding those of NWWDA quality standard.
	•	An applicable standard may be ANSI/DASMA 102-1996, Specifications for Sectional Overhead-Type Doors.
	•	Section R311 of the International Residential Code™ has requirements for type of latch or lock, and type of door operation for the required exit door from a dwelling unit.

FIG. X2.75 Functionality of Doors in Regard to Operability

L—FUNCTIONALITY		
3.3.1. EXTERIOR ENCLOSURE—ROOFS—ROOF COVERINGS		
A. Functionality of Roof Coverings in Regard to Activity Support		
Objective		Roof Coverings should prohibit the entry and egress of air, moisture, heat, cold, sound, etc. as appropriate.
Criteria	C-1:	Roof Coverings should have U-factor (1/R) appropriate for the region and use (above conditioned attics and along with the ceiling assembly for cathedral ceilings).
	C-2:	Roof Coverings should resist the passage of moisture as appropriate for the region and use.
	C-3:	Roof Coverings should resist the passage of air as appropriate for the region and use.
	C-4:	Roof Coverings should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation of insulation products.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-1: Observation and Review drawings.
	E-4:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	A insulated wood joist cathedral ceiling, located on Long Island, NY may have a insulating value of R-38.
	•	The thermal comfort of a dwelling may be affected by the thermal and air infiltration resistance value of this building element. See the Whole Building performance statement on Comfort for a discussion on thermal comfort.
	•	Screened enclosures of outdoor pools may require the roof covering to only resist the passage of insects.
	•	The location of vapor barriers depend on the climatic regions. In warm climates where the exterior temperature is typically higher than the interior temperature, the vapor barrier would be located as close to the exterior as possible. In cold climate where the exterior temperature is typically lower than the interior temperature, the vapor barrier would be located as close to the interior as possible.
	•	An applicable standard for vapor barriers may be Section R322, Moisture Vapor Retarders, of International Residential Code™.
	•	See the International Energy Conservation Code™, Tables 502.2.4(1) thru (9) for examples of U-factors for different degree-day values. The values for cathedral ceiling and ceilings over conditioned attics are listed under ceilings.
	•	See the International Energy Conservation Code™, Table 602.1 for examples of R-values for different degree-day values. The values for cathedral ceiling and ceilings over conditioned attics are listed under ceilings.
	•	Chapter 8, Roof-Ceiling Construction, and Chapter 9, Roof assemblies, of the International Residential Code™, may be an applicable standard.
	•	See Standard Guide "G"—Acoustics for acoustical control at roofs.
	•	See Standard Guide "E"—Indoor Air Quality, Exterior Enclosures—Roofs for further discussion of Control of Water Leakage.
	•	See activity support performance statement for ceilings below for additional discussion of thermal resistance at the ceiling assembly where an unconditioned attic separates the roof assembly from the ceiling assembly.

FIG. X2.76 Functionality of Roof Coverings in Regard to Activity Support

L—FUNCTIONALITY		
3.3.2. EXTERIOR ENCLOSURE—ROOFS—SKYLIGHTS		
A. Functionality of Skylights in Regard to Activity Support		
Objective		Skylights should prevent the outdoor activities and/or environment from interfering with the indoor activities or visa versa, as appropriate.
Criteria	C-1:	Skylights should permit or prevent the entry and egress of occupants (specific to roof window type skylights only), outside air, heat, cold, sound, view, etc. as needed and/or desired by the occupants.
	C-2:	The Skylights should be under the control of the occupants.
	C-3:	The Skylights should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	A skylight above a conditioned space, located on Long Island, NY may have a U-factor of 0.35 and a Solar Heat Gain Coefficient (SHGC) of 0.40.
	•	The thermal comfort of a dwelling may be affected by the thermal and air infiltration resistance value of this building element. See the Whole Building performance statement on Comfort for a discussion on thermal comfort.
	•	Section R308.6, Skylights and Sloped Glazing, of the International Residential Code™, may be an applicable standard.

FIG. X2.77 Functionality of Skylights in Regard to Activity Support

L—FUNCTIONALITY		
3.3.2. EXTERIOR ROOFS—SKYLIGHTS		
C. Functionality of Skylights in Regard to Operability		
Objective		Skylights should be convenient and simple to operate.
Criteria	C-1:	Where required by code, occupant or access for the disabled, the manual controls should be operable by one hand and not require tight grasping, pinching, or twisting of the wrist.
	C-2:	The ease of operation shall include, but not limited to opening, closing, locking and cleaning.
	C-3:	Skylights should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-3:	EM-4: Comply with applicable standards as required by the authority having jurisdiction.
Commentary	•	See Standard Guide "I"—Accessibility.
	•	Section R326.1 of the International Residential Code™ references the International Building Code® for accessibility for the disabled. The International Residential Code™ requires buildings with four or more attached dwelling units to have some of the dwelling units, depending on total number of and location of attached dwelling units, to be accessible to the disabled in compliance with ICC/ANSI A117.1-98.
	•	Guidance can also be obtained in ICC/ANSI A117.1-98 "Accessible and Usable Buildings and Facilities." Section 1002.9 of this document requires controls of operable windows to be accessible to the disabled in dwelling units required to be accessible to the disabled.
	•	The Fair Housing Act Guidelines requires buildings with four or more attached dwelling units to have some of the dwelling units, depending on total number of and location of attached dwelling units, to have environmental controls (windows for ventilation) be accessible to the disabled.

FIG. X2.78 Functionality of Skylights in Regard to Operability

L—FUNCTIONALITY		
4.1.1. INTERIOR SPACE DIVISION— PARTITIONS		
A. Functionality of Partitions in Regard to Activity Support		
Objective		Partitions should support the activities occurring in each space.
Criteria	C-1:	Partitions should prevent the entry of light, people, pets, sound, view, etc. through the partition as needed and/or desired by the occupants.
	C-2:	Partitions should be constructed so it could support anchoring devices for hanging pictures.
	C-3:	Partitions should comply with all applicable standards of authority having jurisdiction.
Evaluation Methods	E-1:	EM-1 Observation and Review Drawings.
	E-2:	EM-1 Observation and Review Drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	The intent of the prevention of light, people, pets, sound, view, etc. through the partition as needed and/or desired by the occupants is to prevent the activities on one side of the Partition from interfering with the activities on the other side of the Partition. For instance, it may be desirable for a wall to be insulated to prevent the sound of a radio in a living room from disturbing a person in a bedroom. Another example could be the motion occurring in an exercise space would need to be separated by an opaque partition from a space such as a study.
	•	An applicable standard may be section R602.5, Interior nonbearing walls, of the International Residential Code™.
	•	An applicable standard may be ASTM E119, Standard Test Method for Fire Tests of Building Construction and Materials, for any walls required to have fire resistance.
	•	See Standard Guide “G”—Acoustics, for acoustical control from one space to another.
	•	See Standard Guides “F”—Light, and “P”—Sustainability, for discussions on how partition colors can affect light reflectance and heat absorption.
	•	See Standard Guide “J”—Security, for discussions of security implications of partitions.

FIG. X2.79 Functionality of Partitions in Regard to Activity Support

L—FUNCTIONALITY		
4.1.1. INTERIOR SPACE DIVISION— PARTITIONS		
B. Functionality of Partitions in Regard to Visual Privacy		
Objective		Unless otherwise specified, the Partitions should shield from view when and where needed.
Criteria	C-1:	A person standing on one side of a Partition should not be able to make out specific shapes on the other side.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
Commentary	•	Solid Partitions can be used.

FIG. X2.80 Functionality of Partitions in Regard to Visual Privacy

L—FUNCTIONALITY		
4.1.2. INTERIOR SPACE DIVISION— DOORS		
A. Functionality of Doors in Regard to Activity Support		
Objective		Doors should prevent the activities on one side from interfering with activities on the other side.
Criteria	C-1:	Doors should prevent or permit the entry of people, pets, sound, view, etc. as needed and/or desired by the occupants.
	C-2:	The doors should be under the control of the occupants.
	C-3:	Doors should comply with all applicable standards.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	In other words doors should be able to be opened when there is no desire for any restriction of people, view, sound, etc. and closed when restriction to access is desired.
	•	See Standard Guide “G”—Acoustics for acoustical control from one space to another.
	•	See Standard Guide “J”—Security.

FIG. X2.81 Functionality of Doors in Regard to Activity Support

L—FUNCTIONALITY		
4.1.2. INTERIOR SPACE DIVISION— DOORS		
B. Functionality of Doors in Regard to Shape and Size		
Objective		Doors should be of the proper shape and size to support the needs of the occupants.
Criteria	C-1:	The Doors should be the correct shape and large enough for occupant entry and egress.
	C-2:	The Doors should be the correct shape and large enough for furniture and equipment ingress and egress. The size of the furniture should be determined from the minimum dimensions indicated in the reference documents specified in section X2.2.3.
	C-3:	The Door shape and size should comply with requirements of the authorities having jurisdiction requirements for egress, etc.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	An applicable standard in New York State is Section 713.2, Doors, of New York State Uniform Fire Prevention and Building Code [9 NYCRR]

FIG. X2.82 Functionality of Doors in Regard to Shape and Size

L—FUNCTIONALITY		
4.1.2. INTERIOR SPACE DIVISION— DOORS		
C. Functionality of Doors in Regard to Visual Privacy		
Objective		Doors should prevent vision from one space to another when and where desired and allow vision through the doorway when and where desired.
Criteria	C-1:	A person standing on one side of a door should not be able to make out specific shapes in the other space when the vision prevention device is in operation.
	C-2:	The occupants should have full control of the vision control device.
Evaluation Methods	E-1 thru E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
Commentary	•	Some interior doors may contain large amounts of glazing to provide a sense of visual openness while maintaining sound and passage control.
	•	The vision control device is applicable if the door has a window or opening. Solid doors act as their own vision control devices.
	•	Doors can be closed for temporary privacy.
	•	See Standard Guide "G"—Acoustics for acoustical control from one space to another.

FIG. X2.83 Functionality of Doors in Regard to Visual Privacy

L—FUNCTIONALITY		
4.1.2. INTERIOR SPACE DIVISION— DOORS		
D. Functionality of Doors in Regard to Circulation		
Objective		The Doors should promote convenient Circulation.
Criteria	C-1:	Doors should open onto rooms able to be occupied so as not to encroach upon hallways accessing more than one room.
	C-2:	Door swings should not encroach upon the door swings of adjacent doors unless the door swings would not hinder circulation.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
Commentary	•	None

FIG. X2.84 Functionality of Doors in Regard to Circulation

L—FUNCTIONALITY		
4.1.2. INTERIOR SPACE DIVISION— DOORS		
E. Functionality of Doors in Regard to Operability		
Objective		The Doors should be convenient and simple to operate.
Criteria	C-1:	Where required by code, occupant or access for the disabled, the manual controls should be operable by one hand, and not require tight grasping, pinching, or twisting of the wrist.
	C-2:	The ease of operation should include, but not be limited to, opening, closing, locking and cleaning.
	C-3:	Doors should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See Standard Guide "I"—Accessibility.

FIG. X2.85 Functionality of Doors in Regard to Operability

L—FUNCTIONALITY		
4.2.1. INTERIOR SPACE DIVISION— FLOORS		
A. Functionality of Floors in Regard to Activity Support		
Objective		Floors should support the activities occurring in each space.
Criteria	C-1:	Floors should vertically subdivide the space into horizontal levels (first floor, second floor, etc).
	C-2:	Floors should be relatively flat so large objects and furniture are stable and do not move from the force of gravity acting upon them.
	C-3:	Floors should transfer the live loads of the occupants, furniture, equipment, etc. to the superstructure.
	C-4:	Floors should prevent the entry of light, sound, view, etc. through the floor as needed and/or desired by the occupants.
	C-5:	Floors should comply with all applicable standards of authority having jurisdiction.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
Evaluation Methods	E-2:	EM-13: E1486-98M Standard Test Method for Determining Floor Tolerances Using Waviness, Wheel Path and Levelness Criteria.
Evaluation Methods	E-3:	EM-1: Observation and Review drawings.
Evaluation Methods	E-4:	EM-1: Observation and Review drawings.
Evaluation Methods	E-5:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	The intent of the prevention of light, sound, view, etc. through the floor as needed and/or desired by the occupants is to prevent the activities on one side of the floor from interfering with the activities on the other side of the floor. For instance, it may be desirable for a floor to be insulated to prevent the sound of a radio in a living room from disturbing a person in a bedroom above or below. Another example could be the motion occurring in an exercise space would need to be separated by an opaque floor which may also isolate the vibration from a space below such as a study.
	•	It may be specified that the floor does not slope more than 1.5 %.
	•	Chapters 5, Floors, of the International Residential Code, may be an applicable standard.
	•	See Standard Guide “A”—Structural Safety and Serviceability.
	•	See Standard Guide “B”—Fire Safety
	•	See Standard Guide “C”—Accident Safety
	•	See Standard Guide “G”—Acoustics

FIG. X2.86 Functionality of Floors in Regard to Activity Support

L—FUNCTIONALITY		
4.2.2. INTERIOR SPACE DIVISION— CEILINGS		
A. Functionality of Ceilings in Regard to Activity Support		
Objective		Ceilings should support the activities occurring in each space.
Criteria	C-1:	Ceilings may shield the space below from undesirable floor or attic structure above.
	C-2:	Ceiling structure (otherwise known as attic or floor structure) should transfer the live loads of any attic storage, floor loads, etc. to the superstructure.
	C-3:	Ceilings along with aforementioned floors should prevent the entry of light, sound, view, etc. through the floor as needed and/or desired by the occupants.
	C-4:	Ceilings should comply with all applicable standards of authority having jurisdiction.
	C-5:	Ceiling should have U-factor (1/R) and moisture resistance appropriate for the region and use when located below an unconditioned attic.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-1: Observation and Review drawings.
	E-4:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
	E-5:	EM-5: Observation of typical product and review manufacturer’s documentation of insulation products.
Commentary	•	It may not always be desirable for a ceiling to shield the space below from the attic or floor structure above. The ceiling may be part of an exposed attic or floor structure.
	•	The intent of the prevention of light, sound, view, etc. through the ceiling as needed and/or desired by the occupants is to prevent the activities on one side of the ceiling from interfering with the activities on the other side of the ceiling. For instance, it may be desirable for a ceiling, along with the floor construction, to be insulated to prevent the sound of a radio in a living room from disturbing a person in a bedroom above. Another example could be the motion occurring in an exercise space would need to be separated by an opaque ceiling, along with the floor construction, which may also isolate the vibration from a space above such as a study.
	•	A insulated″ wood joist ceiling below an unconditioned attic, located on Long Island, NY may have a value of R-38.
	•	The thermal comfort of a dwelling may be affected by the thermal and air infiltration resistance value of this building element. See the Whole Building performance statement on Comfort for a discussion on thermal comfort.
	•	See the International Energy Conservation Code™, Tables 502.2.4(1) thru (9) for examples of U-factors for different degree-day values.
	•	See the International Energy Conservation Code™, Table 602.1 for examples of R-values for different degree-day values.
	•	Chapter 8, Roof-Ceiling Construction, of the International Residential Code, may be an applicable standard.
	•	Ceilings may help light the space with its shape and color. See Standard Guide “F” - Light.
	•	ee the roof coverings activity support performance statement above for a discussion of thermal resistance for cathedral type ceilings and roofs over conditioned attics.
	•	See also floors activity support performance statement above.

FIG. X2.87 Functionality of Ceilings in Regard to Activity Support

L—FUNCTIONALITY		
4.2.3. Interior Space Division—Floor/Ceiling Openings		
A. Functionality of Floor/Ceiling Openings in Regard to Visual Privacy		
Objective		Unless otherwise specified, the Floor/Ceiling Openings should be able to prevent vision through the them when and where needed.
Criteria	C-1:	A Floor/Ceiling Opening shall not penetrate a private space such as a bathroom or a bedroom unless a permanent or movable(temporary) vision prevention device is provided.
	C-2:	The occupants should have full control of movable vision control devices.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
Commentary	•	Translucent glass can be used for permanent visual privacy.
	•	A tall vision blocking opaque wall around perimeter above the opening can be used as a permanent visual privacy.
	•	Shades or blinds can be used for temporary visual privacy.
	•	Doors(hatch) can be closed for temporary visual privacy.

FIG. X2.88 Functionality of Floor/Ceiling Openings in Regard to Visual Privacy

L—FUNCTIONALITY		
4.3. INTERIOR SPACE DIVISION— STAIRS AND RAMPS		
A. Functionality of Stairs and Ramps in Regard to Activity Support		
Objective		Stairs and Ramps should support vertical travel.
Criteria	C-1:	Stairs and Ramps should provide easy and safe access for traveling up or down.
	C-2:	Grab bars and railings should be provided for occupant support and safety.
	C-3:	Stairs and Ramps should comply with all applicable standards.
	C-4:	
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
	E-4:	EM-1: Observation and Review drawings.
Commentary	•	Local authorities having jurisdiction will require generally accepted shape and location of accessory items such as grab bars and railings.
	•	An applicable standard may be Section R314, Stairways, of the International Residential Code.
	•	Section R314, Stairways, of the International Residential Code requires handrails to be at 865 mm to 965 mm (34 to 38 in.) above the stair's nosing, and at least 900 mm (3ft) high guards at landings 762 mm (30 in.) above level below.
	•	An applicable standard may be Section R313, Ramps, of the International Residential Code.
	•	ICC/ANSI A117.1-98 "Accessible and Usable Buildings and Facilities" requires ramps to have a slope no greater than 1 unit rise for each 12 units of run, and requires handrails to be at 865 to 965 mm (34 to 38 in.) above the ramp's surface.
	•	See Standard Guide "C"—Accident Safety.
	•	See Standard Guide "I"—Accessibility.

FIG. X2.89 Functionality of Stairs and Ramps in Regard to Activity Support

L—FUNCTIONALITY		
4.3. INTERIOR SPACE DIVISION— STAIRS AND RAMPS		
B. Functionality of Stairs and Ramps in Regard to Shape and Size		
Objective		Stairs and Ramps should be of the proper shape and size to support the needs of the occupants.
Criteria	C-1:	The Stairs and Ramps should be the correct shape and large enough for occupant entry and egress. This would include width of stair/ ramp, depth of tread, length of run, height of riser, and slope of ramp.
	C-2:	The Stairs and Ramps should be the correct shape and large enough for furniture and equipment entry and egress. The size of the furniture should comply with at least the minimum dimensions indicated in the reference documents specified in section X2.2.3.
	C-3:	The shape and size of Stairs and Ramps should comply with the authorities having jurisdiction requirements for egress, etc.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	Local authorities having jurisdiction will require generally accepted dimensions of treads and risers.
	•	Local authorities having jurisdiction will require generally accepted dimensions of width and head clearance.
	•	Section R314, Stairways, of the International Residential Code requires risers to be no higher than 197 mm (7¾ in.), treads no less in depth than 254 mm (10 in.), and a minimum headroom of 2 m (6 ft, 8 in.).
	•	An applicable standard may be Section R313, Ramps, of the International Residential Code.
	•	ICC/ANSI A117.1-98 "Accessible and Usable Buildings and Facilities" requires ramps to be at least 900 mm (3ft) wide.
	•	An applicable standard may be Section R314, Stairways, of the International Residential Code.
	•	See Standard Guide "I"—Accessibility.

FIG. X2.90 Functionality of Stairs and Ramps in Regard to Shape and Size

L—FUNCTIONALITY		
4.3. INTERIOR SPACE DIVISION— STAIRS AND RAMPS		
C. Functionality of Stairs and Ramps in Regard to Circulation		
Objective		The Stairs and Ramps should promote convenient circulation.
Criteria	C-1:	The shape and size of the Stairs and Ramps should comply with the size and shape performance statement in this section.
	C-2:	The placement of the Stairs and Ramps, in relation to rooms and paths of travel, should promote convenient Circulation.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings and EM-8: Bubble Diagram Study.
Commentary	•	None

FIG. X2.91 Functionality of Stairs and Ramps in Regard to Circulation

L—FUNCTIONALITY		
5.1. PLUMBING—PLUMBING FIXTURES		
A. Functionality of the Plumbing Fixtures in Regard to Operability		
Objective		The Plumbing Fixtures should be convenient and simple to operate.
Criteria	C-1:	Where required by code, occupant or access for the disabled, the manual controls should be operable by one hand and not require tight grasping, pinching, or twisting of the wrist.
	C-2:	The plumbing fixtures should be installed so their controls can be easily and effectively operated.
	C-3:	The automatic controls should initiate operation when required.
	C-4:	Plumbing Fixtures should comply with all applicable standards.
Evaluation Methods	E-1 thru E-3:	EM-1: Observation and Review drawings and EM-5: Observation of typical product and review manufacturer's documentation.
	E-4:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	An example of automatic controls are infrared sensors and anti-scald temperature controls.
	•	Applicable standards may be ASSE/ANSI 1037, Performance Requirements for Pressurized Flushing Devices for Plumbing Fixtures and Chapter 27, Plumbing Fixtures, of the International Residential Code™.
	•	See Standard Guide "E"—Indoor Environment.
	•	See Standard Guide "I"—Accessibility.

FIG. X2.92 Functionality of Plumbing Fixtures in Regard to Operability

L—FUNCTIONALITY		
5.1. PLUMBING—PLUMBING FIXTURES		
A. Functionality of the Plumbing Fixtures in Regard to Comfort		
Objective		The Plumbing Fixtures should be physically comfortable to use.
Criteria	C-1:	Water closet (toilet) fixture should be comfortable to sit on, stand in front of, and use as applicable.
	C-2:	Lavatory or sink fixture should be comfortable to stand in front of, and use as applicable.
	C-3:	Other Plumbing Fixtures should be comfortable to use as applicable.
	C-4:	Plumbing Fixtures should be installed so they are comfortable to use as applicable.
	C-5:	Plumbing Fixtures should comply with all applicable standards.
Evaluation Methods	E-1 thru E-4:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-5:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See "Humanscale 7/8/9" selector 7 for anthropomorphic dimensions and chapter 8 for space planning.
	•	See Standard Guide "I"—Accessibility.
	•	An applicable standard may be Chapter 27, Plumbing fixtures, of the International Residential Code™.
	•	An applicable standard may be ASME/ANSI A112.19.2M, Vitreous China Plumbing Fixtures.

FIG. X2.93 Functionality of Plumbing Fixtures in Regard to Comfort

L—FUNCTIONALITY		
5.2. PLUMBING—WATER DISTRIBUTION		
A. Functionality of the Water Distribution in Regard to Activity Support		
Objective		The Water Distribution system should support the activities of hygiene, cleaning, HVAC systems, etc.
Criteria	C-1:	Access to a reliable source of hot and cold water should be provided to the appropriate areas including kitchens, bathrooms, laundry rooms, exterior faucet, etc.
	C-2:	Water Distribution system should be sized to supply an adequate pressure and supply for intended uses.
	C-3:	Water Distribution system should comply with all applicable standards for supply systems and water quality.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-6: Typical unit supply and pressure test.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See section 6.3, Water Supply , for a discussion on site related issues.
	•	An example of the requirements for the typical unit supply and pressure test is as follows: the minimum capacities at point of outlet discharge for a kitchen sink could be called out as 9.5 L/m (2.5 gpm) flow rate and 55 kPa (8 psi) flow pressure.
	•	An applicable standard may be Chapter 29, Water Supply and Distribution, of the International Residential Code.
	•	See Standard Guide “C”—Accident Safety for a discussion on scald protection.
	•	Water quality is a very important aspect of a water distribution system. It is not within the scope of this guide to cover water quality issues.
	•	See Standard Guide “D”—Health and Hygiene for discussions involving the use of water for health and hygiene protection, and water quality issues. Also covered is backflow prevention from the dwelling unit to central type water supply when appicable.

FIG. X2.94 Functionality of Water Distribution in Regard to Activity Support

L—FUNCTIONALITY		
5.3. PLUMBING—SANITARY WASTE		
A. Functionality of the Sanitary Waste system in Regard to Activity Support		
Objective		The Sanitary Waste system should support the activities of hygiene, cleaning, HVAC systems, etc.
Criteria	C-1:	Access to a reliable source of waste water removal should be provided to the appropriate areas including kitchens, bathrooms, laundry rooms, etc.
	C-2:	The Sanitary Waste system should be sized to provide adequate waste water and solid waste removal volume and velocity.
	C-3:	The Sanitary Waste system should comply with all applicable standards.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-3: Typical unit waste water removal volume and velocity test.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	The specifier could indicate that, during the typical unit waste water removal volume and velocity test, the waste water level in the water appliance reservoir (sink bowl, water closet bowl, etc) does not increase, in any of the dwelling units water appliances, during the simultaneous operation of two main water appliances, with waste water connections, such as a shower and a toilet (water closet).
	•	An applicable standard may be Chapter 30, Sanitary Drainage, and Chapter 31, Vents, of the International Residential Code™.
	•	See Standard Guide “D”—Health and Hygiene for discussions on the removal of waste water and its affect on health and hygiene. Also covered are backflow prevention and prevention of sewer gas entry into the dwelling unit, through traps and other sewer gas seals.

FIG. X2.95 Functionality of Sanitary Waste in Regard to Activity Support

L—FUNCTIONALITY		
5.4. PLUMBING— RAIN WATER DRAINAGE		
A. Functionality of Rain Water Drainage in Regard to Activity Support		
Objective		The Rain Water Drainage should divert rain water away from the dwelling without interfering with site activities.
Criteria	C-1:	Rain water should be collected from roof areas transferred off roof, down to grade and at far enough away from foundation wall to prevent the collected rain water from infiltrating back through the foundation/basement wall.
	C-2:	Rain water should be collected from paved areas and then diverted to grass areas or other means to direct the water back into the ground.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
Commentary	•	See Not Interfere with Neighbor performance statement.
	•	Gutters may be used to collect rainwater from the roof, and leaders and downspouts may be used to direct the water to the ground level.
	•	Splash blocks or sloped extended leaders or downspouts, that are at least 609.6 mm (2 ft) long, located at the bottom of the leaders or downspouts are ways of diverting the collected the rainwater away from the foundation wall.
	•	Paved areas that are mildly sloped (1 to 2 %) to one side or crowned in the middle are ways to drain water off paved areas.
	•	See Standard Guide “E”—Indoor Air Quality for discussions of control of groundwater and rain runoff, control of crawl space moisture, and control of rain penetration for the exterior enclosure and foundation.

FIG. X2.96 Functionality of Rain Water Drainage in Regard to Activity

L—FUNCTIONALITY		
5.4. PLUMBING— RAIN WATER DRAINAGE		
B. Functionality of Rain Water Drainage in Regard to Circulation		
Objective		The Rain Water Drainage should promote safe circulation.
Criteria	C-1:	Downspouts or leaders shall not discharge rainwater onto circulation paths.
	C-2:	Rain water should be collected from site circulation paths and then diverted to grass areas or other means to direct the water back into the ground.
	C-3:	Site circulation paths should be designed so as to collect rain water.
	C-4:	Site circulation paths should not be used to carry rain water away from other areas.
Evaluation Methods	E-1 thru E-4:	EM-1: Observation and Review drawings.
Commentary	•	Paved areas that are mildly sloped (1 to 2 %) to one side or crowned in the middle are ways to drain water off paved areas.

FIG. X2.97 Functionality of Rain Water Drainage in Regard to Circulation

L—FUNCTIONALITY		
5.4. PLUMBING— RAIN WATER DRAINAGE		
B. Functionality of Rain Water Drainage in Regard to Not Interfering with Neighbor		
Objective		Rain Water Drainage should be constructed as not to interfere with the use of neighboring properties.
Criteria	C-1:	The Rain Water Drainage System should not discharge onto the Neighbor's property or structures.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
Commentary	•	Rain water may be permitted to drain into streams, ponds and catchment basins where permitted by code.

FIG. X2.98 Functionality of Rain Water Drainage in Regard to Not Interfering with Neighbor

L—FUNCTIONALITY		
6.1.4. HVAC SYSTEMS—HEATING CONTROLS and INSTRUMENTATION		
A. Functionality of Heating Controls and Instrumentation in Regard Operability		
Objective		The Heating System should be convenient and simple to operate.
Criteria	C-1:	Where required by code, occupant or access for the disabled, the manual controls should be operable by one hand, and not require tight grasping, pinching, or twisting of the wrist.
	C-2:	The automatic controls initiate operation when required.
	C-3:	The Heating System should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-23:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See Standard Guide "E"—Indoor Environment.
	•	See Standard Guide "I"—Accessibility.

FIG. X2.99 Functionality of Heating Controls and Instrumentation in Regard to Operability

L—FUNCTIONALITY		
6.2.4. HVAC SYSTEMS—COOLING CONTROLS and INSTRUMENTATION		
A. Functionality of the Cooling Controls and Instrumentation in Regard Operability		
Objective		The Cooling System should be convenient and simple to operate.
Criteria	C-1:	Where required by code, occupant or access for the disabled, the manual controls should be operable one hand, and not require tight grasping, pinching, or twisting of the wrist.
	C-2:	The automatic controls initiate operation when required.
	C-3:	The Cooling System should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See Standard Guide "E"—Indoor Environment.
	•	See Standard Guide "I"—Accessibility.

FIG. X2.100 Functionality of Cooling Controls and Instrumentation in Regard to Ease of Operability

L—FUNCTIONALITY		
6.3.3. HVAC SYSTEMS—VENTILATION CONTROLS and INSTRUMENTATION		
A. Functionality of the Ventilation Controls and Instrumentation in Regard to Operability		
Objective		The Ventilation System should be convenient and simple to operate.
Criteria	C-1:	Where required by code, occupant or access for the disabled, the manual controls should be operable one hand, and not require tight grasping, pinching, or twisting of the wrist.
	C-2:	The automatic controls initiate operation when required.
	C-3:	The Cooling System should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See Standard Guide "E"—Indoor Environment.
	•	See Standard Guide "I"—Accessibility.

FIG. X2.101 Functionality of Ventilation Controls and Instrumentation in Regard to Operability

L—FUNCTIONALITY		
8.1. ELECTRICAL SYSTEMS—SERVICE AND DISTRIBUTION		
A. Functionality of the Service and Distribution in Regard to Activity Support		
Objective		The Service and Distribution shall provide the power needed for dwelling activities.
Criteria	C-1:	The required voltage, amperage, and frequency should be provided for dwelling unit equipment.
	C-2:	The Service and Distribution shall be reliable.
	C-3:	The Electrical System should comply with all applicable standards.
Evaluation Methods	E-1:	EM-7: Typical unit electrical system test.
	E-2:	EM-7: Typical unit electrical system test.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	An example of typical voltage, amperage, and frequency, in the continental United States, for appliances and equipment, could be 120/24 volts AC, 150 amps, at 60 hertz for a single family dwelling unit. A supply voltage of 12 volts DC may occur with a dwelling unit which produces its own electricity and has DC appliances.
	•	The reliability standard will differ depending upon region and other factors. This is because the power supply (maybe from a distant power plant), which may be out of the control of the dwelling unit and/or residential development, may have a history of electrical brownouts and blackouts.
	•	An example of a reliability standard, for an area with a good service history, could be that the dwelling unit has full electrical service with the proper voltage, amperage, and frequency for 363 days out of 365 days per year.
	•	An applicable standard may be Part VIII, Electrical, of the International Residential Code™.
	•	NFPA 70, National Electric Code may be an applicable standard.
	•	See section 6.4 for a discussion of site related issues and power production.
	•	See Standard Guide "C"—Accident Safety.

FIG. X2.102 Functionality of Service and Distribution in Regard to Activity Support

L—FUNCTIONALITY		
8.2. ELECTRICAL SYSTEMS—LIGHTING and BRANCH WIRING		
A. Functionality of the Lighting and Branch Wiring in Regard to Activity Support		
Objective		The Lighting and Branch Wiring should support activities, throughout the dwelling, by providing light and power as required.
Criteria	C-1:	Artificial light should be provided where and when in the amount needed to support activities including but not limited to reading, entertaining, cooking, etc.
	C-2:	The Branch Wiring should provide reliable and adequate power to equipment that support activities including but not limited to reading, entertaining, cooking, home computer use, etc.
	C-3:	Adequate electrical outlets should be provided in the individual spaces in regard to the activities that would typically occur in the space.
	C-4:	The Electrical System should comply with all applicable standards.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-7: Typical unit electrical system test.
	E-3:	EM-1: Observation and Review drawings.
	E-4:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	It is not in the scope of this guide to cover the lighting requirements for a dwelling unit. That is covered in the Standard Guide “F” - Light.
	•	Proper artificial lighting is very important in regard to the use dangerous equipment when natural light is not sufficient.
	•	Typical small equipment power requirements, in the continental United States, could be 120 volts AC, 15 amps, at 60 hertz.
	•	Some window air conditioners, electric cooking ranges, and portable electric resistance heaters, in the continental United States, require 240 volts AC with larger amperage.
	•	The number of electrical outlets required in a room used for computer operation or cooking may need to be more than a room used exclusively for reading.
	•	An applicable standard for electrical outlet placement could be Section E3801 of the International Residential Code™.
	•	An applicable standard may be Part VIII, Electrical, of the International Residential Code™.
	•	NFPA 70, National Electric Code may be an applicable standard.
	•	See Standard Guide “C”—Accident Safety, for discussions of lighting and electrical system affects on safety.
	•	See Standard Guide “J”—Security, for discussions of lighting and electrical system affects on security.
	•	See Performance Statement below covering Lighting and Branch Wiring in Regard to Circulation.
	•	See Performance Statements below covering communication and security networks.

FIG. X2.103 Functionality of Lighting and Branch Wiring in Regard to Activity Support

L—FUNCTIONALITY		
8.2. ELECTRICAL SYSTEMS—LIGHTING and BRANCH WIRING		
B. Functionality of the Lighting and Branch Wiring in Regard to Circulation		
Objective		The Lighting and Branch Wiring should support ease of movement, throughout the dwelling, by providing light and power as required.
Criteria	C-1:	The Lighting and Branch Wiring should provide artificial light where and when needed to support ease of movement throughout the dwelling as required and around the exterior.
	C-2:	The Branch Wiring should provide reliable power to equipment that may affect movement with loss of power.
	C-3:	The Electrical System should comply with all applicable standards.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	It is not in the scope of this guide to cover the lighting requirements for a dwelling unit. That is covered in the Standard Guide “F”—Light.
	•	Proper artificial lighting is very important in regard to areas such as stairways, landings and walkways when natural light is not sufficient.
	•	Power loss to equipment such as automatic garage doors or wheelchair lifts will affect ease of movement.
	•	An applicable standard may be Part VIII, Electrical, of the International Residential Code™.
	•	NFPA 70, National Electric Code may be an applicable standard.
	•	See Standard Guide “F”—Light, for further discussion of interior and exterior lighting of dwelling units.

FIG. X2.104 Functionality of Lighting and Branch Wiring in Regard to Circulation

L—FUNCTIONALITY		
9.1. COMMUNICATION and SECURITY NETWORKS—TELEPHONE		
A. Functionality of the Telephone System in Regard to Activity Support		
Objective		The Telephone System should support local and long distance reception, transmission and distribution of voice, computer and possibly video signals.
Criteria	C-1:	The Telephone System should be able to receive, distribute, and send audio and possibly video telephone signals whether cable or wireless.
	C-2:	The Telephone System should be able to receive, distribute and send audio and video, computer signals whether cable or wireless.
	C-3:	The Telephone System should be able to be upgraded to meet the needs of the television and computer technologies.
	C-4:	Telephone outlets and/or hard wired equipment should be placed in adequate numbers and locations to support the needs of the dwelling unit occupants.
	C-5:	The Telephone System should have access to power.
	C-6:	The Telephone System should comply with all applicable standards.
Evaluation Methods	E-1 thru E-3:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-4:	EM-1: Observation and Review drawings.
	E-5:	EM-1: Observation and Review drawings.
	E-6:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	The system may be part of the television, telephone and security systems.
	•	Examples of typical telephone locations, in a dwelling unit, may be in the kitchen, den, bedroom, home office, and workshop.
	•	Refer to section 6.5 for a discussion of site related issues.

FIG. X2.105 Functionality of Telephone System in Regard to Activity Support

L—FUNCTIONALITY		
9.2. COMMUNICATION and SECURITY NETWORKS—INTERCOM		
A. Functionality of the Intercom System in Regard to Activity Support		
Objective		The Intercom System should support the local reception and distribution of voice and possibly video transmissions.
Criteria	C-1:	The Intercom System should be able to transfer voice and possibly visual communication from one space to another. Communication to and from the exterior may also be needed.
	C-2:	The Intercom System should be able to interface with the latest in home technology.
	C-3:	Intercom outlets and/or hard wired equipment should be placed in adequate numbers and locations to support the needs of the dwelling unit occupants.
	C-4:	The Intercom System should have access to power.
	C-5:	The Intercom System should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-3:	EM-1: Observation and Review drawings.
	E-4:	EM-1: Observation and Review drawings.
	E-5:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	The system may be part of the television, telephone and security systems.
	•	Examples of typical intercom locations, in a dwelling unit, may be in the kitchen, infant's bedroom, home office, and workshop.
	•	Refer to section 6.5 for a discussion of site related issues.
	•	See Standard Guide "J"—Security for intercom security interface.

FIG. X2.106 Functionality of Intercom System in Regard to Activity Support

L—FUNCTIONALITY		
9.3. COMMUNICATION and SECURITY NETWORKS—TELEVISION		
A. Functionality of the Television System Regard to Activity Support		
Objective		The Television System should support the reception and display of electronic transmissions.
Criteria	C-1:	The Television System should be able to receive and display, along with sound, television broadcasts whether cable or wireless.
	C-2:	The Television System should be able to receive and display, along with sound, computer signals whether cable or wireless.
	C-3:	The Television System should be able to be upgraded to meet the needs of television and computer technologies.
	C-4:	The Television System should have access to power.
	C-5:	Television outlets should be placed in adequate numbers and locations to support the needs of the dwelling unit occupants.
	C-6:	The Television System should comply with all applicable standards.
Evaluation Methods	E-1 thru E-3:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-4:	EM-1: Observation and Review drawings.
	E-5:	EM-1: Observation and Review drawings.
	E-6:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	The Television System will differ depending on services available locally.
	•	Examples of typical Television outlets locations, in a dwelling unit, may be in the kitchen, teenage child's bedroom, home office, living room, and den.
	•	Refer to section 6.5 for a discussion of site related issues.

FIG. X2.107 Functionality of Television System Regard to Activity Support

L—FUNCTIONALITY		
9.3. COMMUNICATION and SECURITY NETWORKS—TELEVISION		
B. Functionality of the Television System Regard to Visual Privacy		
Objective		The television image should not be visible to persons the user of the television does not desire to see the image.
Criteria	C-1:	If so desired, the television image should not be visible from outside the house.
	C-2:	If so desired, the television image should not be visible from another room.
Evaluation Methods	E-1:	EM-1: Observation and Review Drawings.
	E-2:	EM-1: Observation and Review Drawings.
Commentary	•	The location of a television in a room can limit observation from outside the room.
	•	A television can be provided with side angle blinders (much like a race horse) to prevent observation of the image from all angles but directly in front of the television.

FIG. X2.108 Functionality of Television System Regard to Visual Privacy

L—FUNCTIONALITY		
10. FUEL NETWORKS		
A. Functionality of the Fuel Networks in Regard to Activity Support		
Objective		The Fuel Networks shall provide the fuel needed for dwelling activities.
Criteria	C-1:	The required pressure and fuel type should be provided for dwelling unit equipment.
	C-2:	Storage should be provided for fuels not provided through a cental distribution network.
	C-3:	The Service and Distribution should provide an adequate pressure and supply for intended uses.
	C-4:	The Fuel Networks should comply with all applicable standards.
Evaluation Methods	E-1:	EM-1: Observation and Review Drawings.
	E-2:	EM-1: Observation and Review Drawings.
	E-3:	EM-12: Typical unit fuel supply and pressure test.
	E-4:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See the Gas Supply discussion (6.6) in Section 6, Site Considerations Affecting Functionality, for a discussion of gas networks.
	•	Typical fuels that may need storage include oil and propane. Local authorities have jurisdiction may have strict regulations on fuel storage.
	•	A typical size for interior oil tank for a single dwelling may be 1041 L (275 gal).
	•	The pressure in the oil line to the oil burner, in a typical dwelling unit, may be produced by the forces of gravity on the oil in the tank. As a result the placement of the oil tank can affect the oil supply to the burner even through the burner may have a oil pump.
	•	The volume of natural gas that needs to be supplied is determined from the requirements of the gas appliance.
	•	NFPA 54, National Fuel Gas Code ANSI Z223.1-1996; NFPA 31 Standard for the Installation of Oil-Burning Equipment; and NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances, may be an applicable standards.
	•	Applicable standards may be Chapter 22, Special Piping and Storage Systems, and Chapter 24, Fuel Gas, of the International Residential Code™.
	•	See Standard Guide "C"—Accident Safety.
	•	See Standard Guide "B"—Fire Safety.

FIG. X2.109 Functionality of Fuel Networks in Regard to Activity Support

L—FUNCTIONALITY		
11. FITTINGS, FURNISHINGS, and EQUIPMENT—GENERAL CONSIDERATIONS		
A. Functionality of Fittings, Furnishings and Equipment in Regard to Activity Support		
Objective		Fittings, Furnishings and Equipment should be comfortable and convenient to use.
Criteria	C-1:	The size and shape of the Fittings, Furnishings and Equipment should be matched to intended use and anthropomorphic dimensions.
	C-2:	The location of the Fittings, Furnishings and Equipment should be convenient.
	C-3:	The size of the furniture should comply with at least the minimum dimensions indicated in the reference documents specified in section X2.2.3.
	C-4:	Access to power and/or fuel as required should be provided.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-4:	EM-1: Observation and Review drawings.
Commentary	•	People of various ages and sizes should be able to sit, recline, and operate the fittings, furniture and equipment.
	•	Fittings and equipment include, but are not limited to, light switches, thermostats, door hardware, appliances, equipment controls, and casework hardware.

FIG. X2.110 Functionality of Fittings, Furnishings and Equipment in Regard to Activity Support

L—FUNCTIONALITY		
11. FITTINGS, FURNISHINGS, and EQUIPMENT—GENERAL CONSIDERATIONS		
B. Functionality of Fittings, Furnishings and Equipment in Regard to Circulation		
Objective		Fittings, Furnishings and Equipment should be easy to move around and within when appropriate.
Criteria	C-1:	The size and shape of the Fittings, Furnishings and Equipment should fit within the space being used.
	C-2:	Movable Fittings, Furnishings and Equipment should be able to be relocated as appropriate.
	C-3:	The size of the furniture should comply with the range of dimensions indicated in the reference documents specified in section X2.2.3.
Evaluation Methods	E-1:	EM-1: Observation and Review drawings.
	E-2:	EM-1: Observation and Review drawings.
	E-3:	EM-5: Observation of typical product and review manufacturer's documentation.
Commentary	•	Occupants should be able to move around fixed Fittings, Furnishings and Equipment.
	•	Movable Fittings, Furnishings and Equipment should be able to be relocated without damaging fixed items and structures.

FIG. X2.111 Functionality of Fittings, Furnishings and Equipment in Regard to Ease of Circulation

L—FUNCTIONALITY		
11. FITTINGS, FURNISHINGS, and EQUIPMENT—GENERAL CONSIDERATIONS		
11-C. Functionality of Fittings, Furnishings and Equipment in Regard to Operability		
Objective		Fittings, Furnishings and Equipment should be convenient and simple to operate.
Criteria	C-1:	Where required by code, occupant or access for the disabled, the manual controls should be operable by one hand, and not require tight grasping, pinching, or twisting of the wrist.
	C-2:	The automatic controls should initiate operation when required.
	C-3:	Fittings, Furnishings and Equipment should comply with all applicable standards.
Evaluation Methods	E-1:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-2:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-3:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	See Standard Guide "I"—Accessibility.

FIG. X2.112 Functionality of Fittings, Furnishings and Equipment in Regard to Operability

L—FUNCTIONALITY		
11. FITTINGS, FURNISHINGS, and EQUIPMENT—GENERAL CONSIDERATIONS		
11-D. Functionality of Fittings, Furnishings and Equipment in Regard to Comfort		
Objective		The Fittings, Furnishings and Equipment should be physically comfortable to use.
Criteria	C-1:	Fittings, Furnishings and Equipment should not cause injury or pain.
	C-2:	Furniture should be comfortable to sit on, stand in front of, sit at or use as applicable.
	C-3:	Equipment should be comfortable to stand in front of, sit in front of and/or use as applicable.
	C-4:	Fittings, Furnishings and Equipment should comply with all applicable standards.
Evaluation Methods	E-1 thru E-3:	EM-5: Observation of typical product and review manufacturer's documentation.
	E-4:	EM-4: Verify with authority having jurisdiction (AHJ) what are the applicable standards.
Commentary	•	Some examples of fittings are door knobs/levers, cabinet knobs/levers, handrails, etc.
	•	Some examples of furniture are couches, chairs, tables, beds, etc.
	•	Some examples of equipment are air conditioners, appliances, HVAC controls, etc.
	•	See "Humanscale 7/8/9" Selector 7 for anthropomorphic dimensions and Selector 8 for space planning.
	•	See Standard Guide "I"—Accessibility.

FIG. X2.113 Functionality of Fittings, Furnishings and Equipment in Regard to Comfort