This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

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An American National Standard

Standard Practice for Setting the Requirements for the Serviceability of a Building or Building-Related Facility, and for Determining What Serviceability is Provided or Proposed[1,2]

This standard is issued under the fixed designation E1679; 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

Most organizations and work groups have only a few generic types of functions, such as general purpose office functions, or office functions requiring special security provisions because receiving many visitors, or having a mix of office and "dry" laboratory functions, and so on. For each typical or generic type of function, facilities are required to have a different mix of functional capabilities to support the activities of those who use, own, or manage that function.

This document is a definitive procedure to (*1*) ascertain the profile of required levels of functionality (functional support) for a specific occupant group, (*2*) ascertain the profile of levels of serviceability (functional capability) that are provided in an existing facility, or called for in the design for a facility, and (*3*) compare what is provided to what is required.

To ascertain the profile provided by a facility, or the profile of an organization's requirements, this practice uses scales that look like multiple choice questionnaires for discrete topics related to buildings and their use. One set of scales is for user functional requirements (demand) and a matching set of scales is for building serviceability (supply).

For each topic of required functionality (demand), the user of this practice employs a classification scale called a "requirement scale" to set the level required. Each requirement scale contains several descriptions of required functionality for that topic, classified in a range from low to high, for example, from Level 0 to Level 9. For each topic of serviceability provided (supply), the user of this practice employs a classification scale called a "rating scale" to ascertain the level of serviceability that is found in the facility. Each rating scale contains several descriptions of serviceability provision for that topic, classified in a range from low to high, for example, from Level 0 to Level 9.

Each such scale, demand or supply, is used like a multiple choice questionnaire to select the level of functionality or of serviceability. Overall required functionality is displayed as a profile of levels (that is, not as a single number) and may be presented as a bar chart. Similarly, overall serviceability provided may be presented as a bar chart. When the two bar charts are compared (gap analysis) the closeness of functional fit of a facility for an organization is displayed.

When comparing the requirement profile prepared by one organization with that prepared by another organization, it is essential that both use the same set of requirement scales. Organizations may use an ASTM standard set of scales; they may create their own; or they may adapt ASTM standard classification scales for specialized, internal application. The organization forgoes the possibility of external comparison in the latter two cases.

This standard practice is an updated version of Practice E1679, to which has been added the provisions of the companion standard, Practice E1334. A whole family of scales which comply with this version of Practice E1679, for use in North America, has been standardized by ASTM, under the jurisdiction of ASTM Subcommittee E06.25 on Whole Buildings and Facilities. A version in French was created by Public Works and Government Services Canada. A set of scales in French, adapted for ways of building and managing facilities in France was created by the French public entity Centre Scientific et Technique du Bâtiment (CSTB). All the ASTM scales are included in ASTM Standards for Whole Building Functionality and Serviceability, ASTM stock number WBDG2009 or later edition. After Practice E1334 and Practice E1679 were standardized, a version of the practice as modified for use in other countries was created as ISO 11863.

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1. Scope

1.1 This practice provides a definitive procedure for setting the level of requirements of the users (functionality) for the functional capability of a building or building-related facility.

1.2 This practice provides a definitive procedure for rating the level of functional capability (serviceability) provided by an existing building or building-related facility, or to be provided according to the design for one.

1.3 This practice provides a definitive procedure for creating or adapting a set of classifications for establishing the levels of functionality required of or the level of capability provided by a building or building-related facility.

1.4 This practice can be used for setting the profile of requirements of an occupant group in an existing building or building-related facility, or of a group planning to move and looking at new accommodations to rent, buy, or build, and it can be used to assess the suitability of their present facilities.

1.5 This practice can be used for setting the profile of requirements of an owner, facility manager, lender, or other investor.

1.6 This practice does not specify what would cause a building to be rated at a given level. That information is found in classifications for specific topics of serviceability that contain a set of rating scales.

1.7 This practice is not intended to be used for regulatory purposes.

1.8 This practice contains the following information, in the sections indicated:

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1.9 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.10 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

E631 Terminology of Building Constructions

E1334 Practice for Rating the Serviceability of a Building or Building-Related Facility (Withdrawn 2013)[4]

E1480 Terminology of Facility Management (Building-Related)

2.2 *International Standards:*[5]

ISO 11863 Buildings and Building-Related Facilities -- Functional and User Requirements and Performance -- Tools for Assessment and Comparison

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of general terms related to building construction used in this standard, refer to Terminology E631.

3.1.2 For standard definitions of additional terms applicable to this practice, see Terminology E1480.

3.1.3 *facility, n*—a physical setting used to serve a specific purpose.

3.1.3.1 *Discussion*—A facility may be within a building, or a whole building, or a building with its site and surrounding environment; or it may be a construction that is not a building. The term encompasses both the physical object and its use. **E631**

3.1.4 *facility performance, n*—the behavior in service of a facility for a specified use.

3.1.4.1 *Discussion*—The scope of this performance is of the facility as a system, including its subsystems, components, and materials and their interactions, such as acoustical, hydrothermal, air purity, and economic; and of the relative importance of each performance requirement. **E631, E1480**

3.1.5 *functionality, adj—of a building*, being suitable for a particular use or function. **E1480**

3.1.6 *rating process, n*—the process of determining the serviceability of a facility for a specified purpose. **E1480**

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *aspect, n—of functionality*, a broad component of serviceability, comprising several related **topics** of functionality.

[1] This practice is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.25 on Whole Buildings and Facilities.

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[2] Portions of this document are based on material originally prepared by the International Centre for Facilities (ICF) and copyright 1993 by ICF and Minister of Public Works and Government Services Canada. Their cooperation in the development of this standard is acknowledged.

[3] 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.

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

[5] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

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3.2.2 *aspect, n—of serviceability*, a broad component of serviceability, comprising several related **topics** of serviceability.

3.2.3 *combination of features, n—of a facility*, two or more features that, when present together in a facility, affect a level of serviceability of that facility.

3.2.4 *demand, n—of a facility*, requirement for functional capability.

3.2.5 *facility serviceability profile, n*—a graphic representation, usually as a bar chart, of the level of serviceability for each topic of serviceability.

3.2.6 *feature, n—of a facility*, a physical element of a building, building component, building subsystem, unit of furnishing or equipment, or of a location, or of an aspect of design, arrangement, form, or color, which helps or hinders the satisfaction of a requirement for functionality.

3.2.6.1 *Discussion*—A feature may be a physical feature or design feature, or both. For example, particular sound absorbency in a ceiling may be adequate in a carpeted space but may be inadequate in a space with a hard floor covering.

3.2.7 *function, n—of a facility*, a purpose of a facility or some portion or component thereof for which it is used or required to be used.

3.2.8 *knowledgeable person, n*—an individual who has technical knowledge concerning the building or facility, for example, about occupant requirements, building design, mechanical systems, operation, and maintenance.

3.2.8.1 *Discussion*—In larger facilities, the senior person who is at a facility full time to manage its operation is unlikely to be an appropriate person to facilitate the setting of required levels of serviceability by the occupant because of that role, but he may be well qualified and appropriate to participate as a knowledgeable person in the process of rating that facility.

3.2.9 *level, n—of functionality or of serviceability*, a number indicating the relative serviceability for one topic, feature or function on a predetermined range, for example, a range from 0 to 9.

3.2.10 *occupant, n—of a facility*, a group, department, agency or corporation, or other organization, or a part thereof, or an individual or individuals thereof, that is or will be occupying space in a particular facility.

3.2.10.1 *Discussion*—Individuals who are authorized to be present only temporarily, or in special circumstances such as those permitted to pass through during an emergency, are visitors rather than occupants for the purposes of this practice.

3.2.11 *office, n*—a place, such as an open workspace, room, suite, or building, in which business, clerical, or professional activities are conducted.

3.2.12 *rating scale, n—for facility serviceability*, a set of descriptions of features or combinations of features, in which each description indicates a specific level of serviceability, with consistent scalar differences from the lowest to the highest level likely to be encountered.

3.2.13 *requirement scale, n—for a topic of facility serviceability*, a set of descriptions of requirements for functional capability for an aspect of functionality, or a functional component thereof, in which each description has been selected to indicate a specific level of functionality, with consistent scalar differences from the lowest to the highest level likely to be encountered.

3.2.14 *scale*—see *rating scale* and *requirement scale*.

3.2.15 *serviceability, n*—the capability of a facility, or of a feature or component thereof, to perform the function(s) for which it is designed, used, or required to be used.

3.2.16 *topic, n—of functionality*, a part of the functionality of a facility for which a requirement scale can be prepared.

3.2.16.1 *Discussion*—At any level of functionality, a topic can be expressed in a statement of a requirement in the normal language of occupants or owners. Taken together, several related topics typically comprise one **aspect** of functionality.

3.2.17 *topic, n—of serviceability*, a part of the serviceability of a facility for which a rating scale can be prepared.

3.2.17.1 *Discussion*—At any level of serviceability, a topic can be expressed as a statement in technical performance language describing the combination of features that meet that requirement. Taken together, several related topics typically comprise one aspect of **serviceability**.

4. Significance and Use

4.1 This practice can be applied to the requirements for facility serviceability of many functional occupant groups, provided that an appropriate set of requirement classifications for each type has been established.

4.2 This practice can be applied to rating the facility serviceability of a building or building-related facility.

4.3 This practice can be used to ascertain the requirements of a group or organization at the time when the group (*1*) needs to ascertain the serviceability of the facility it occupies; (*2*) is contemplating a move and needs to assess the relative capability of several existing facilities to perform as required, before deciding to rent, lease, or buy; (*3*) needs to compare its requirements to the serviceability of a facility that is being planned, or is designed but is not yet built; (*4*) is planning to remodel or rehabilitate the space it occupies and needs to establish the required level of serviceability that the remodeled or rehabilitated facility will have to meet.

4.4 This practice is not affected by the complexity of the requirement for serviceability.

4.5 This practice can be used by any individual with sufficient organizational, functional, and technical knowledge of buildings to act as an informed facilitator. The individual charged with the task of leading the process of establishing the functional requirements of an occupant group or organization needs basic facilitation and interviewing skills. The individual charged with rating the serviceability of a building needs sufficient knowledge of buildings to identify the features that are present.

4.6 This practice provides a means of setting typical required serviceability levels for any serviceability topic, and of comparing the required levels of functionality for one occupant group or organization against levels set by others.

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4.7 This practice provides a means for organizations to set a profile of functional requirements for each type of occupant group within that organization.

4.7.1 This practice provides a means for organizations to identify and validate exceptional needs of their occupants rapidly.

4.7.2 This practice provides a means of comparing the requirement levels of various occupant groups within an organization.

4.8 This practice provides a method for comparing how well an occupant's functional requirements match the capabilities of different buildings or facilities, despite differences such as location, structure, mechanical systems, age, and building shape.

4.9 This practice provides a framework that allows design professionals and facility managers to select the most cost-effective means of providing a facility that will best provide the required levels of serviceability.

4.10 This practice helps the occupants to understand how various functional requirements interact and impact on the overall serviceability of a building or building-related facility and on its level of serviceability for each topic.

4.11 By providing a direct link between the features of a facility and its level of serviceability on any topic, the descriptions of each level clarify how various subsystems and materials used in a facility interact to provide that level of serviceability.

4.12 *Examples of Potential Applications:*

4.12.1 *Project Feasibility*—When the owner of an older building considers remodeling it into apartments, or needs to rehabilitate it to bring it up to current market demand.

4.12.2 *Select Option Before Leasing*—A corporate real estate and facility manager compares ratings of several office facilities before selecting which to lease.

4.12.3 *Compare Serviceability of Design Options*—An architect rates various designs to select the most effective way of achieving design objectives within a fixed construction budget.

4.12.4 *Marketing*—An owner rates a building for several potential uses to identify target markets that would find the building most serviceable in its present condition, or when remodeled for another use.

4.12.5 *Suitability of Existing or Proposed Use*—A potential buyer assesses the suitability of a facility for multi-tenant office use.

4.12.6 *Cost Reduction*—The owner rates various design options to select the most cost-effective means for achieving a target serviceability profile.

4.12.7 *Financial Analysis*—The owner or potential buyer assesses likely benefits of a proposed remodel and conversion from a warehouse to a highly technical manufacturing building.

4.12.8 *Energy and Water Conservation*—The owner or potential buyer compares the likely relative levels of energy or water consumption of a facility, or the likely cost-effectiveness of options to reduce energy and water consumption, or improve indoor air quality.

4.13 This practice is not intended for, and is not suitable for, use for regulatory purposes, nor for fire hazard assessment, nor for fire risk assessment.

5. Essence of the Approach

5.1 The essence of this functionality (demand) and serviceability (supply) gap analysis approach is to ascertain what level of functional capability is required of each facility on each of a broad range of topics, and separately to use physical features of a facility as indicators of its level of capability, that is, how serviceable it is to meet each requirement. For each topic, the approach uses a pair of calibrated scales, one for demand, and one for supply, to measure overall capability and suitability for use. (See Fig. 1 and Appendix X1.)

5.2 Demand scales (functionality requirement scales) describe user needs in non-technical, everyday language that occupants and asset managers can understand. Each demand scale is a multiple-choice questionnaire, that is, a set of possible answers to the question, "what functionality do you need from this facility, or this form of logistics support, to do what you need or want to do, for example, to get the job done?" The multiple choice questionnaires allow people to select which statements best describe the functionality needed to support their mission and enhance their effectiveness. The set of functionality requirement levels for a particular organization should be the core of front-end planning and budgeting for its physical setting, because it is mission-driven, and independent of the facilities the organization now occupies, or other facilities they might possibly occupy in the future.

5.3 Each supply scale (serviceability rating scale) is a similar multiple choice questionnaire, a set of descriptions of a physical feature or level of support, as indicators of its level of capability to respond, that is, how serviceable it is to meet each requirement. Respondents to the supply scales are asked, "Which of these statements best describes what is physically present in the facility, or best describes the level of support provided?"

5.4 The supply scales can also be used to rate the expected capability of a facility not yet built or altered, by asking, "Which of these statements best describes what will be present in the facility, after construction.

5.5 Demand scales are calibrated according to the left hand column in Annex A1, and supply scales are calibrated according to the right hand column in Annex A1.

6. Procedure for Setting the Profile of Required Functionality

6.1 This procedure describes the steps an organization will take to set organization-wide requirements for a type of function using the set of requirements its users select as needed. The steps are summarized in Appendix X2.

6.2 Once an organization has set the typical organizational levels required for its function and established its profile, an occupant group in that organization shall use the same procedure to set their group's occupant requirements that the overall organization has used to set the organizational requirements, using the organization's profile as their starting point.

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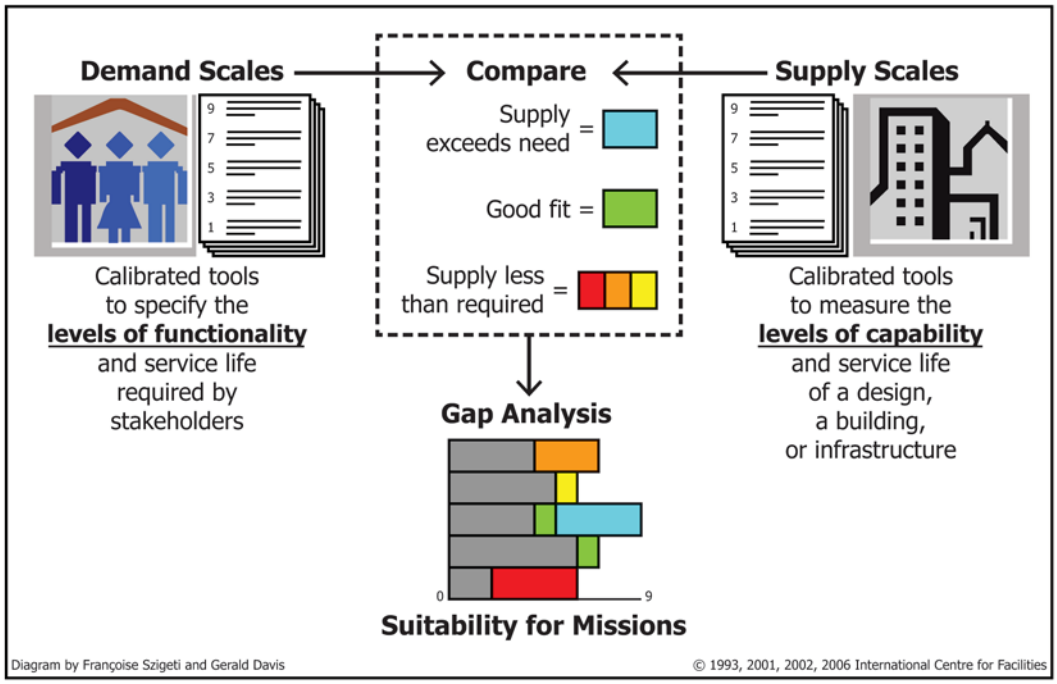

FIG. 1 Core Elements of Approach

Alternatively, if that organizational profile is not applicable or does not exist, an occupant group shall set its profile of requirements without the intermediate step of setting organizational levels of requirement.

6.2.1 Obtain a set of functional requirement classification scales for that type of organization. Verify that a set of classifications has been prepared for that functional type by the organization requesting the rating, or has been standardized by ASTM. If no set of classification scales exist, then it is necessary to create a set of relevant classification scales. For information, an example of a pair of serviceability scales for one topic is included in Appendix X1. If available, obtain the requirements profile from comparable organization(s) with similar functions.

6.2.2 Use that/those set(s) of requirements and bar chart profile as the starting point in development of requirements for a specific organization.

6.2.3 Ascertain the extent to which data gathering will be needed to set any required variation from the typical requirements and profile.

6.2.3.1 While requirements can be set by one individual, if that person has a thorough knowledge of the organization's functional requirements, the preferred method is to arrange focus group interviews with individuals who have the most relevant understanding of how the organization functions and what it needs to function.

6.2.3.2 Approximately one day is required for some focus groups to set requirement levels for all topics in a set of requirement scales, although some groups with experience in joint decision-making can complete the task in about three hours or less.

6.2.3.3 If a focus group(s) is required, provide each participant with the typical bar chart profile and a copy of each of the requirement scales.

6.2.3.4 Ensure that participants have an accurate understanding of the typical requirement scales and bar chart profile before determining or deciding whether any variation(s) is required.

6.2.4 Set the levels of requirement for serviceability. Use the requirement scales to select the desired levels of serviceability.

6.2.4.1 Refer to Appendix X1 for an example of a requirement scale. First read the introductory material for each group of standard scales, and of any scales which will be used but have not been standardized. Then turn to the first topic and read the requirement scale.

6.2.4.2 Read the text of the requirement for Level 5. If Level 5 is a good description of what level of functionality is required, scan the text for Levels 7 and 3 to be certain. If the description for Level 5 is still appropriate, black-in the little circle next to the large Number 5. If not certain, scan the text for Levels 9 and 1. If any one of all these levels is a good description of which level of functionality is required, black-in the little circle next to that number.

6.2.4.3 If the required functionality is a mix of statements from two or more levels, mark or underline the portions of text that apply from each level, and, if appropriate, select and black-in an in-between level, for example Level 2, 4, 6, or 8.

6.2.4.4 If Level 5 is not the level required, or if there is some special factor that makes a requirement particularly important, explain briefly in the "notes" area at the bottom of each scale.

6.2.4.5 If it is difficult to decide which level is required because some information is not available, or some assumptions have to be made, then explain briefly which assumptions were made or which information is missing by writing in the "notes" area at the bottom of each scale.

6.2.4.6 Check off the appropriate items in the two-layer box that appears below each scale.

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(1) The relative importance of a requirement is indicated by checking one of the three boxes: "exceptionally important," "important," or "minor importance." For each scale, check one of these boxes/circles unless the subject is not applicable or not required.

(2) If there is a minimum acceptable threshold level for the topic, check the box "minimum (threshold) =" and write in what that level is. The minimum acceptable threshold levels do *not* need to be the same as the requirement level. How high or low this minimum acceptable threshold level is will depend on which options exist. If an assumption is made concerning other options, or concerning possible tradeoffs, indicate the assumptions in the "notes" space at the bottom of the page.

(3) If the topic is not applicable or not required, check the box "NA or NR."

6.2.4.7 Record the results from the focus group(s), and produce a draft of the organization's bar chart profile.

6.2.5 If there is no variation from the organizational or typical levels, simply adopt the organizational or typical bar chart profile. If there is variation between the responses from the focus group(s), obtain consensus on the variations from the participants. Once consensus is obtained, modify the organizational or typical bar chart profile to include the variation(s). This modified profile becomes the organization's bar chart profile of requirements.

6.2.6 Disseminate the findings as appropriate.

6.3 *Management of Variation(s):*

6.3.1 The modified profile will show variation(s) from the organizational or typical profile. This modified profile is used to manage variation from occupants of that organization.

6.3.2 The modified profile allows the organization to identify and validate exceptional needs of its occupants rapidly.

6.3.3 The modified profile also provides a means of comparing the requirement levels of various occupants within the organization.

7. Procedure for Setting the Profile of Functional Capability for a Building or for Building-Related Facilities

7.1 This practice covers a process for setting the serviceability rating profile for a building. The steps to be followed are summarized in Appendix X2.

7.2 *Start the Process of Rating the Serviceability of an Existing Building*—The rating process is initiated when someone in authority requires a building rating. Rating the serviceability of a building is usually done by a single individual, the rater, who should have experience or training in the rating process, or at most by a team of two. The rater(s) will have primary responsibility for organizing the rating, going to the site, conducting the rating, deciding what levels of serviceability the building provides, and producing the serviceability rating as a bar chart profile. The person in authority will provide authorization and directives so the rater(s) will have the collaboration of a knowledgeable person, authorization to enter the building to be rated, and permission to enter occupant space as necessary.

7.3 *Ascertain the Objectives*—Confirm the reason for the need to know the levels of serviceability the building can provide. This is necessary to ensure that the correct set of serviceability classifications will be used. Knowing the objectives will also enable the rater(s) to make best use of limited time at the site.

7.4 *Prepare to Conduct the Rating*—A total of about one person-day, which can be spread over several days or weeks, is typically required for the rater to prepare for the rating and to make arrangements and appointments as needed.

7.4.1 Identify the correct functional type of building from the most common types such as those listed and described in Appendix X5.

7.4.2 Obtain a set of serviceability classification scales for that type of building. Verify that a set of classification scales has been prepared for that facility type by the organization requesting the rating, or has been standardized by ASTM. If no set of classification scales exist, then it is necessary to create a set of relevant classification scales. For information, an example of a pair of scales for one topic is included in Appendix X1.

7.4.3 Gather information about the building. Arrange for reference information to be available during the visit to the site. This information typically includes a description of the building; its occupants and their functions; diagrammatic or simplified floor plans of the building; building condition report; access to construction drawings and specifications, and to any drawings or specifications revised due to modifications, repairs, remodel, and so forth; information about floor load capacity, roof maintenance and repair history, energy use, and date last reviewed; total population in the building; building statistics including rentable and usable floor area; and any special target(s) for compliance applicable to this building.

7.4.4 Identify a knowledgeable person. The rater will need the collaboration of a knowledgeable person, someone with extensive knowledge of the building and its systems and who will participate in the rating. Ensure that the knowledgeable person has a copy of the applicable rating scales and reviews them prior to the site visit.

7.4.5 Arrange for main site visit. The rater and knowledgeable person agree on the date and time of the main site visit and for making any necessary arrangements. This schedule is confirmed with relevant managers. If the building is occupied, the rater should, before starting the actual rating of the building, brief the relevant top manager(s) responsible at the site about the rating process and ensure that the rating process will not be disruptive to the activity of the occupants.

7.5 *Tour Site and Building, and Review Information:*

7.5.1 Before entering the building, the rater does a quick scan of the exterior of the building, site conditions, and nearby amenities.

7.5.2 The rater enters the building and briefs the relevant manager(s) and knowledgeable person.

7.5.3 The rater reviews plans and other information about the building with the knowledgeable person. The rater receives a briefing from the knowledgeable person. The rater reviews plans and other documents as appropriate.

7.5.4 Tour the building. The knowledgeable person guides the rater through the building, visiting each of the main

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