3.0 Screening Phase (Tier 1)

3.1 General

A Tier 1 Evaluation shall be conducted for all buildings after the evaluation requirements of Chapter 2 have been completed. Tier 1 of the evaluation process is shown schematically in Figure 3-1.

Initially, the design professional shall determine whether the building meets the benchmark building criteria of Section 3.2. If the building meets the benchmark building criteria, it shall be deemed to meet the structural requirements of this Handbook for the specified level of performance; a Tier 1 Evaluation for foundations and nonstructural elements remains applicable.

If the building is not a benchmark building, the design professional shall select and complete the appropriate checklists in accordance with Section 3.3.

Structural checklists are not used for unreinforced masonry bearing wall buildings with flexible diaphragms. The structural evaluation of this type of building shall be completed using the Tier 2 Special Procedure of Section 4.2.6; a Tier 1 Evaluation for foundations and nonstructural elements remains applicable for this type of building.

A list of deficiencies identified by evaluation statements for which the building was found to be non-compliant shall be compiled upon completion of the Tier 1 Checklists.

Further evaluation requirements shall be determined in accordance with Section 3.4 once the checklists have been completed.

Commentary:

The purpose of the screening phase of the evaluation process is to identify quickly buildings that comply with the provisions of this handbook. A Tier 1 Evaluation also familiarizes the design professional with the building, its potential deficiencies and its potential behavior.

A Tier 1 Evaluation is required for all buildings so that potential deficiencies may be quickly identified. Further evaluation using a Tier 2 or Tier 3 Evaluation will then focus, as a minimum, on the potential deficiencies identified in Tier 1.

3.2 Benchmark Buildings

A structural seismic evaluation using this Handbook need not be performed for buildings designed and constructed or evaluated in accordance with the benchmark documents listed in Table 3-1; an evaluation for foundations and nonstructural elements remains applicable. Table 3-1 identifies documents whose seismic design, construction or evaluation provisions are acceptable for certain building types so that further evaluation is not required. If the seismicity of a region has changed since the benchmark dates listed in Table 3-1, a building must have been designed and constructed or evaluated in accordance with the current seismicity of the region to be compliant with this section. The design professional shall document in the final report the evidence used to determine that the building is designed and constructed or evaluated in accordance with the documents listed in Table 3-1 and current seismicity of the region.

The applicable level of performance is indicated in Table 3-1 for each document as a superscript.

Commentary:

While benchmark buildings need not proceed with further evaluation, it should be noted that they are not simply exempt from the criteria of this Handbook. The design professional must clearly demonstrate the building is compliant with the

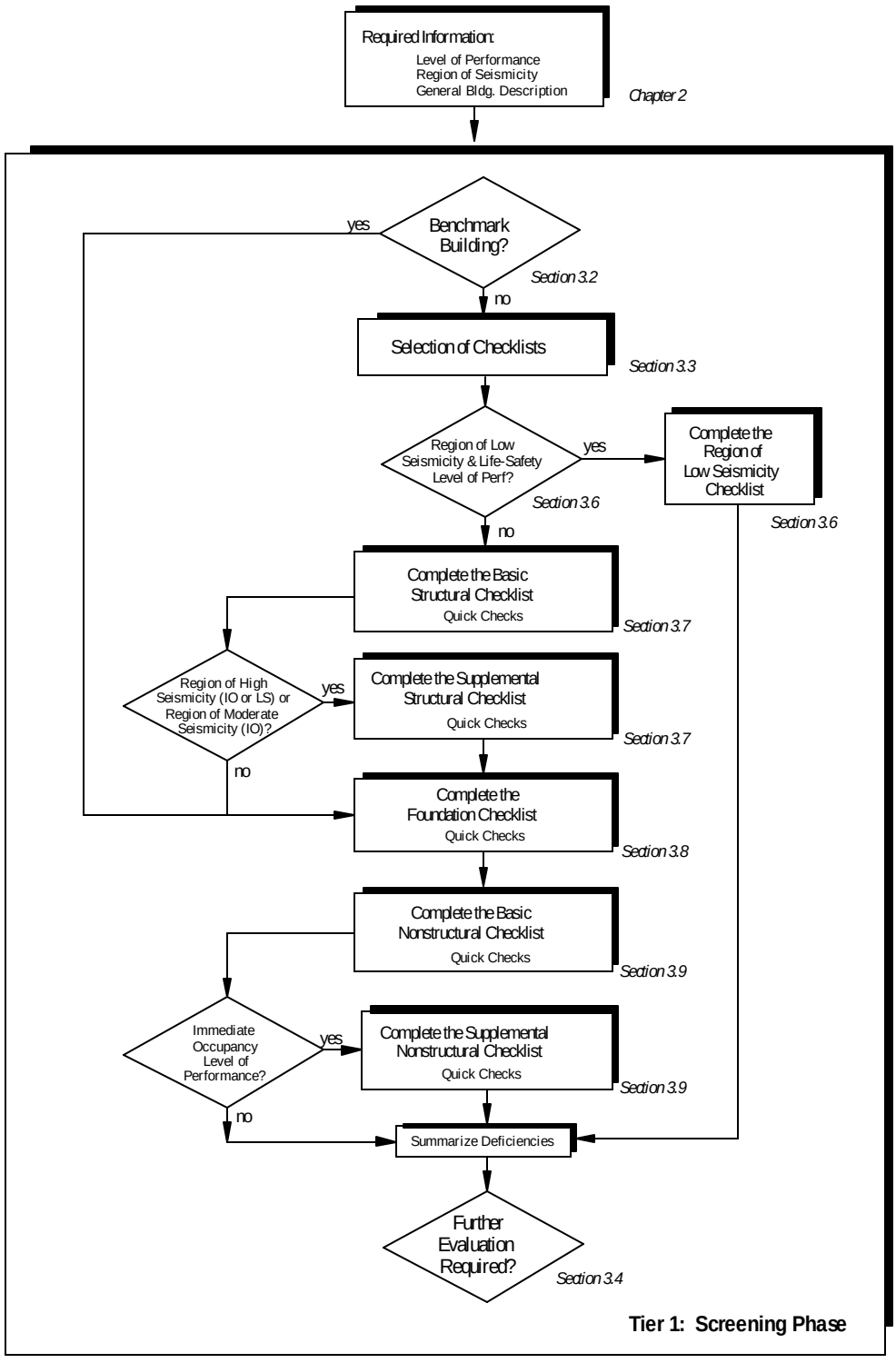

Figure 3-1. Tier 1 Evaluation Process

Table 3-1. Benchmark Buildings

	Model Building Seismic Design Provisions				FEMA 178[ls]	CBC[io]
Building Type [1]	BOCA[ls]	SBCC[ls]	UBC[ls]	NEHRP[ls]		
Wood Frame, Wood Shear Panels (Type W1 & W2)[2]	1992	1993	1976	1985	*	1973
Wood Frame, Wood Shear Panels (Type W1A)	1992	1993	1976	1985	*	1973
Steel Moment Resisting Frame (Type S1 & S1A)	**	**	1994[4]	**	*	1995
Steel Braced Frame (Type S2 & S2A)	1992	1993	1988	1991	1992	1973
Light Metal Frame (Type S3)	*	*	*	*	1992	1973
Steel Frame w/ Concrete Shear Walls (Type S4)	1992	1993	1976	1985	1992	1973
Reinforced Concrete Moment Resisting Frame (Type C1)[3]	1992	1993	1976	1985	*	1973
Reinforced Concrete Shear Walls (Type C2 & C2A)	1992	1993	1976	1985	*	1973
Steel Frame with URM Infill (Type S5, S5A)	*	*	*	*	*	*
Concrete Frame with URM Infill (Type C3 & C3A)	*	*	*	*	*	*
Tilt-up Concrete (Type PC1 & PC1A)	*	*	1997	*	*	*
Precast Concrete Frame (Type PC2 & PC2A)	*	*	*	*	1992	1973
Reinforced Masonry (Type RM1)	*	*	1997	*	*	*
Reinforced Masonry (Type RM2)	1992	1993	1976	1985	*	*
Unreinforced Masonry (Type URM)[5]	*	*	1991[6]	*	1992	*
Unreinforced Masonry (Type URMA)	*	*	*	*	*	*

[1]Building Type refers to one of the Common Building Types defined in Table 2-2.
[2]Buildings on hillside sites shall not be considered Benchmark Buildings.
[3]Flat Slab Buildings shall not be considered Benchmark Buildings.
[4]Steel Moment-Resisting Frames shall comply with the 1994 UBC Emergency Provisions.
[5]URM buildings evaluated using the ABK Methodology (ABK, 1984) may be considered benchmark buildings.
[6]Refers to the UCBC Section of the UBC.

[ls]Only buildings designed and constructed or evaluated in accordance with these documents and being evaluated to the Life-Safety Performance Level may be considered Benchmark Buildings.
[io]Buildings designed and constructed or evaluated in accordance with these documents and being evaluated to either the Life-Safety or Immediate Occupancy Performance Level may be considered Benchmark Buildings.

*No benchmark year; buildings shall be evaluated using this handbook.
**Local provisions shall be compared with the UBC.

BOCA - Building Officials and Code Administrators, *National Building Code.*
SBCC - Southern Building Code Congress, *Standard Building Code*
UBC - International Conference of Building Officials, *Uniform Building Code*
NEHRP - Federal Emergency Management Agency, *NEHRP Recommended Provisions for the Development of Seismic Regulations for New Buildings*
CBC - California Building Standards Commission, *California Building Code*

benchmark document. Knowledge that a code was in effect at the time of construction is not sufficient. A statement on the drawings simply stating that it was designed to the benchmark document will not suffice. Sometimes, details in the existing building will not correspond to the construction documents. Sometimes, the building is not properly detailed to meet the benchmark document. This may occur due to renovations or poor construction management. Only through a site visit, an examination of existing documentation, and other requirements of Chapter 2 will the design professional be able to determine whether the structure being evaluated complies with this section.

3.3 Selection and Use of Checklists

Required checklists, as a function of region of seismicity and level of performance, are listed in Table 3-2. Each of the required checklists designated in Table 3-2 shall be completed for a Tier 1 Evaluation. Each of the evaluation statements on the checklists shall be marked "compliant" (C), "noncompliant" (NC), or "not applicable" (N/A). Compliant statements identify issues that are acceptable according to the criteria of this Handbook, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated.

Quick Checks for Tier 1 shall be performed in accordance with Section 3.5 when necessary to complete an evaluation statement.

The Region of Low Seismicity Checklist, located in Section 3.6, shall be completed for buildings in regions of low seismicity being evaluated to the Life Safety Performance Level. For buildings in regions of low seismicity being evaluated to the Immediate Occupancy Performance Level and buildings in regions of moderate or high seismicity, the appropriate Structural, Geologic Site Hazards, and Nonstructural Checklists shall be completed in accordance with Table 3-2.

The appropriate Structural Checklists shall be selected based on the Common Building Types defined in Table 2-2. The General Structural Checklists shall be used for buildings that cannot be classified as one of the Common Building Types defined in Table 2-2.

A building with a different lateral-force-resisting system in each principal direction shall use two sets of structural checklists, one for each direction. A building with more than one type of lateral-force-resisting system along a single axis of the building shall be classified as a mixed system. The General Structural Checklists shall be used for this type of building.

Two separate Structural Checklists are provided for each building type: a Basic Structural Checklist and a Supplemental Structural Checklist. As shown in Table 3-2, the Basic Structural Checklist shall be completed for buildings in regions of low seismicity being evaluated to the Immediate Occupancy Performance Level and buildings in regions of moderate and high seismicity. The Supplemental Structural Checklist shall be completed in addition to the Basic Structural Checklist for buildings in regions of moderate seismicity being evaluated to the Immediate Occupancy Performance Level and buildings in regions of high seismicity.

The Geologic Site Hazards and Foundations Checklist shall be completed for all buildings except those in regions of low seismicity being evaluated to the Life Safety Performance Level.

Two separate Nonstructural Checklists also are provided: a Basic and Supplemental Nonstructural Checklist. As shown in Table 3-2, the Basic Nonstructural Checklist shall be completed for all buildings except those in regions of low seismicity being evaluated to the Life Safety Performance Level. The Supplemental Nonstructural Checklists shall be completed in addition to the Basic Nonstructural Checklist for buildings in regions of moderate or high seismicity being evaluated to the Immediate Occupancy Performance Level.

Commentary:

The evaluation statements provided in the checklists form the core of the Tier 1 Evaluation Methodology. These evaluation statements are based on observed earthquake structural damage during actual

during actual earthquakes. The checklists do not necessarily identify the response of the structure to ground motion; rather, the design professional obtains a general sense of the structure's deficiencies and potential behavior during an earthquake. By quickly identifying the potential deficiencies in the structure, the design professional has an better idea of what to examine and analyze in a Tier 2 or Tier 3 Evaluation.

The General Structural Checklists are a complete listing of all evaluation statements used in Tier 1 Evaluations. They should be used for buildings with structural systems that do not match the common building types. While the general purpose of the Tier 1 Checklists is to identify potential weak-links in structures that have been observed in past significant earthquakes, the General Checklists, by virtue of their design, do not accomplish this. They only represent a listing of all possible deficiencies. The design professional must consider first the applicablility of the potential deficiency to the building system being considered. Generally, only the deficiencies that participate in the yielding elements of the building need be considered.

While the section numbers in parentheses following each evaluation statement correspond to Tier 2 Evaluation procedures, they also correspond to commentary in Chapter 4 regarding the statement's purpose. If the design professional requires additional information on particular evaluation statements, please refer to the commentary associated with the Tier 2 procedure for that evaluation statement..

3.4 Further Evaluation Requirements

Upon completion of the Tier 1 Evaluation, further evaluation shall be conducted in accordance with Table 3-3.

A Full-Building Tier 2 Evaluation shall be completed for buildings with more than the number of stories listed in Table 3-3. 'NL' designates No Limit on the number of stories.

A Full-Building Tier 2 Evaluation also is required for buildings designated in Table 3-3 by 'T2'. A Tier 3 Evaluation shall be required for buildings designated by 'T3' in Table 3-3.

For buildings not requiring a Full-Building Tier 2 Evaluation or a Tier 3 Evaluation, a Deficiency-Only Tier 2 Evaluation may be conducted if potential deficiencies are identified by the Tier 1 Evaluation. Alternatively, the design professional may choose to end the investigation and report the deficiencies in accordance with Chapter 1.

Commentary:

In most cases, the Tier 1 identification of potential deficiencies leads to further evaluation of only these deficiencies. As defined in Chapter 4, the required analysis may be localized to the specific deficiencies or it may involve a global analysis to evaluate the specific deficiency. Each checklist evaluation statement concludes with a reference to the applicable section in Chapter 4; the Tier 2 procedures as well as commentary on the statements' purpose.

The 'NL' designation for most buildings being evaluated to the Life Safety Performance Level is consistent with FEMA 178, which had no restriction on the use of the checklists. The 'SP' designation for unreinforced masonry bearing wall buildings with flexible diaphragms also is consistent with FEMA 178.

The 'T2,' 'T3,' and number of story designations in the Immediate Occupancy Performance Level category indicates that the building cannot be deemed to meet the requirements of this Handbook without a full evaluation of the building. Based on past performance of these types of buildings in earthquakes, the behavior of the structure must be examined and understood. However, the Tier 1 Checklists will provide insight and information about the structure prior to a Tier 2 or Tier 3 Evaluation.

Table 3-2. Checklists Required for a Tier 1 Evaluation

Region of Seismicity	Level of Performance[2]	Required Checklists[1]					
		Region of Low Seismicity (Sec. 3.6)	Basic Structural (Sec. 3.7)	Supplemental Structural (Sec. 3.7)	Geologic Site Hazard and Foundation (Sec. 3.8)	Basic Nonstructural (Sec. 3.9.1)	Supplemental Nonstructural (Sec. 3.9.2)
Low	LS	√					
	IO		√		√	√	
Moderate	LS		√		√	√	
	IO		√	√	√	√	√
High	LS		√	√	√	√	
	IO		√	√	√	√	√

[1]A checkmark (√) designates that the checklist that must be completed for a Tier 1 evaluation as a function of the region of seismicity and level of performance.
[2]LS = Life-Safety; IO = Immediate Occupancy; defined in Section 2.3.

Table 3-3. Further Evaluation Requirements[1]

	Number of Stories beyond which a Full-Building Tier 2 Evaluation is Required					
	Low		Moderate		High	
Model Building Type	**LS**	**IO**	**LS**	**IO**	**LS**	**IO**
Wood Frames						
Light (W1)	NL	2	NL	2	NL	2
Multistory, Multi-Unit Residential (W1A)	NL	3	NL	2	NL	2
Commercial and Industrial (W2)	NL	2	NL	2	NL	2
Steel Moment Frames						
Rigid Diaphragm (S1)	NL	3	NL	T2	NL	T2
Flexible Diaphragm (S1A)	NL	3	NL	T2	NL	T2
Steel Braced Frames						
Rigid Diaphragm (S2)	NL	3	NL	2	NL	2
Flexible Diaphragm (S2A)	NL	3	NL	2	NL	2
Steel Light Frames (S3)	NL	1	NL	1	NL	1
Steel Frame with Concrete Shear Walls (S4)	NL	4	NL	4	NL	3
Steel Frame with Infill Masonry Shear Walls						
Rigid Diaphragm (S5)	NL	2	NL	T2	NL	T2
Flexible Diaphragm (S5A)	NL	2	NL	T2	NL	T2
Concrete Moment Frames (C1)	NL	2	NL	T2	NL	T2
Concrete Shear Walls						
Rigid Diaphragm (C2)	NL	4	NL	4	NL	3
Flexible Diaphragm (C2A)	NL	4	NL	4	NL	3
Concrete Frame with Infill Masonry Shear Walls						
Rigid Diaphragm (C3)	NL	2	NL	T2	NL	T2
Flexible Diaphragm (C3A)	NL	2	NL	T2	NL	T2
Precast/Tilt-up Concrete Shear Walls						
Flexible Diaphragm (PC1)	NL	1	NL	T2	NL	T2
Rigid Diaphragm (PC1A)	NL	1	NL	T2	NL	T2
Precast Concrete Frames						
With Shear Walls (PC2)	NL	4	NL	4	NL	3
Without Shear Walls (PC2A)	NL	T2	NL	T2	NL	T2
Reinforced Masonry Bearing Walls						
Flexible Diaphragm (RM1)	NL	3	NL	T2	NL	T2
Rigid Diaphragm (RM2)	NL	3	NL	3	NL	2
Unreinforced Masonry Bearing Walls						
Flexible Diaphragm (URM)	NL	T3	SP	T3	SP	T3
Rigid Diaphragm (URMA)	NL	1	NL	T3	NL	T3
Mixed Systems	NL	2	NL	T2	NL	T2

[1]A Full-Building Tier 2 or Tier 3 Evaluation shall be completed for buildings with more than the number of stories listed herein .
SP - Special Procedure (A Tier 2 Evaluation is required using the Special Procedure defined in Section 4.2.6; the Geologic Site Hazards and Foundations Checklist and the Nonstructural Checklist shall be completed prior to performing the Special Procedure Analysis) .
NL - No Limit (No limit on the number of stories).
T2 - Tier 2 (A Full-Building Tier 2 Evaluation is required; proceed to Chapter 4).
T3 - Tier 3 (A Tier 3 Evaluation is required; proceed to Chapter 5).