2

GUIDE TO USE OF THE *PROVISIONS*

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The flow charts and table that follow are provided to assist the user of the *NEHRP Recommended Provisions* and, by extension, the seismic provisions of ASCE 7, *Minimum Design Loads for Buildings and Other Structures*, the *International Building Code*, and *NFPA 5000*. The flow charts provide an overview of the complete process for satisfying the *Provisions*, including the content of all technical chapters. The table that concludes this chapter provides cross references for ASCE 7 and the 2000 and 2000 editions of the *NEHRP Recommended Provisions*.

The flow charts are expected to be of most use to those who are unfamiliar with the scope of the *NEHRP Recommended Provisions*, but they cannot substitute for a careful reading of the *Provisions*. Notes indicate discrepancies and errors in the *Provisions*. Both editions of the *Provisions* can be obtained free from the FEMA Publications Distribution Center by calling 1-800-480-2520. Order by FEMA Publication number; the 2003 *Provisions* is available as FEMA 450 in CD form (only a limited number of paper copies are available) and the 2000 *Provisions* are available as FEMA 368 and 369 (2 volumes and maps).

Although the examples in this volume are based on the 2000 *Provisions*, they have been annotated to reflect changes made to the 2003 *Provisions*. Annotations within brackets, [ ], indicate both organizational changes (as a result of a reformat of all of the chapters of the 2003 *Provisions*) and substantive technical changes to the 2003 *Provisions* and its primary reference documents. For those readers coming from ASCE 7-05, see the cross reference table at the end of this chapter.

The level of detail shown varies, being greater where questions of applicability of the *Provisions* are pertinent and less where a standard process of structural analysis or detailing is all that is required. The details contained in the many standards referenced in the *Provisions* are not included; therefore, the actual flow of information when proportioning structural members for the seismic load effects specified in the *Provisions* will be considerably more complex.

On each chart the flow generally is from a heavy-weight box at the top-left to a medium-weight box at the bottom-right. User decisions are identified by six-sided cells. Optional items and modified flow are indicated by dashed lines.

Chart 2.1 provides an overall summary of the process which begins with consideration of the Scope of Coverage and ends with Quality Assurance Requirements. All of the specific provisions pertaining to nonbuilding structures are collected together on one page (Chart 2.20); application for nonbuilding structures requires the use of various portions of the *Provisions* with appropriate modification.

Additions to, changes of use in, and alterations of existing structures are covered by the *NEHRP Recommended Provisions* (see Chart 2.3), but evaluation and rehabilitation of existing structures is not.

In recent years FEMA has sponsored several coordinated efforts dealing with seismic safety in existing buildings. A *Handbook for Seismic Evaluation of Buildings* (FEMA 310) was developed as an update to the original FEMA 178, although this document has since been replaced by the ASCE 31 Standard (*Seismic Evaluation of Existing Buildings*). *Guidelines for the Seismic Rehabilitation of Buildings* (FEMA 273) and a corresponding *Commentary* (FEMA 274) have also been developed. A prestandard (FEMA 356, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings*) based on FEMA 273 has been developed and is in balloting as ASCE 41. In addition, specific recommendations have been developed for the evaluation, repair, and rehabilitation of earthquake-damaged concrete and masonry wall buildings (FEMA 306, 307, and 308) and for the evaluation, rehabilitation, post-earthquake assessment, and repair of steel moment frame structures (FEMA 351 and 352).

Chart 2.1
Overall Summary of Flow

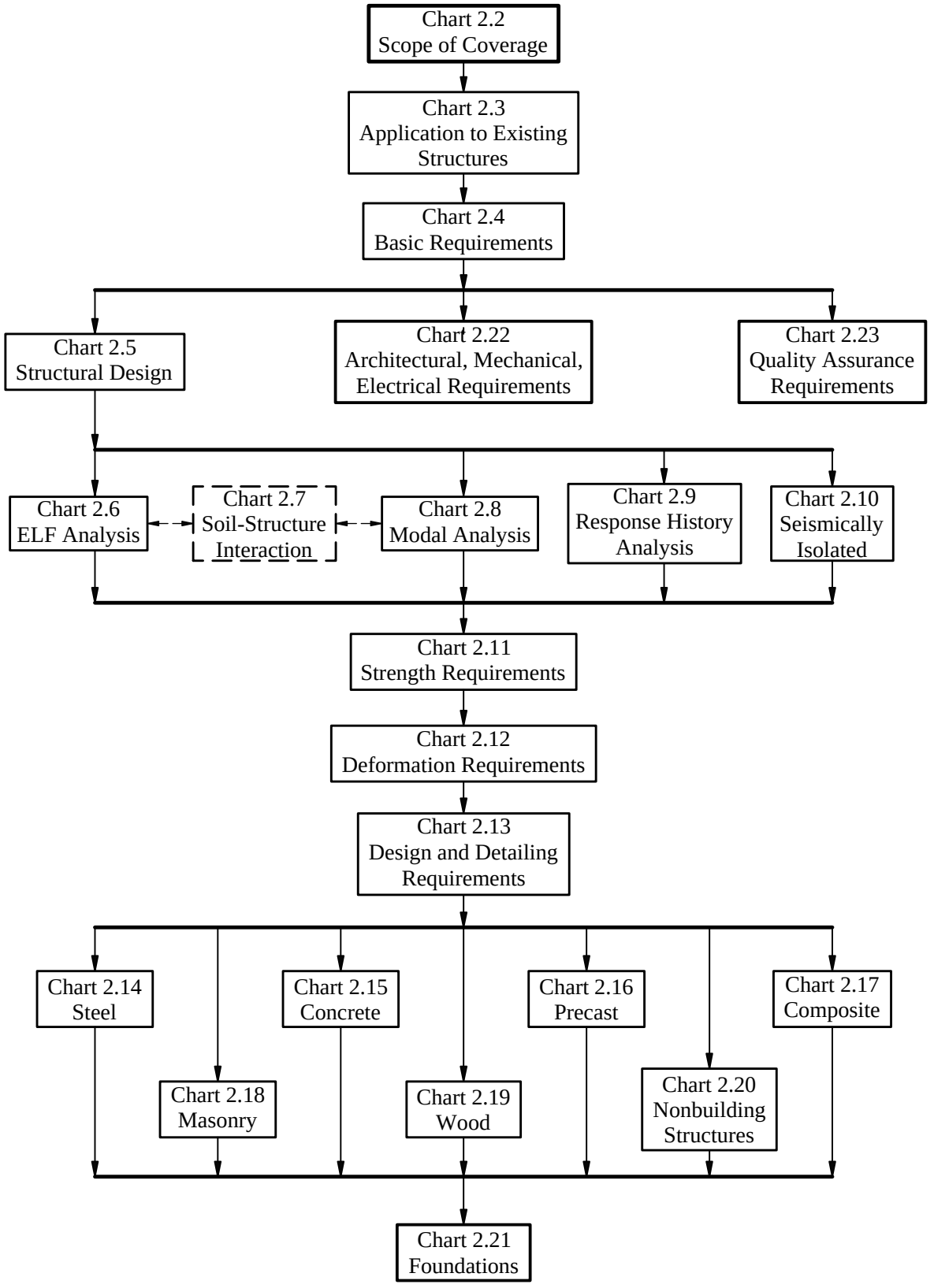
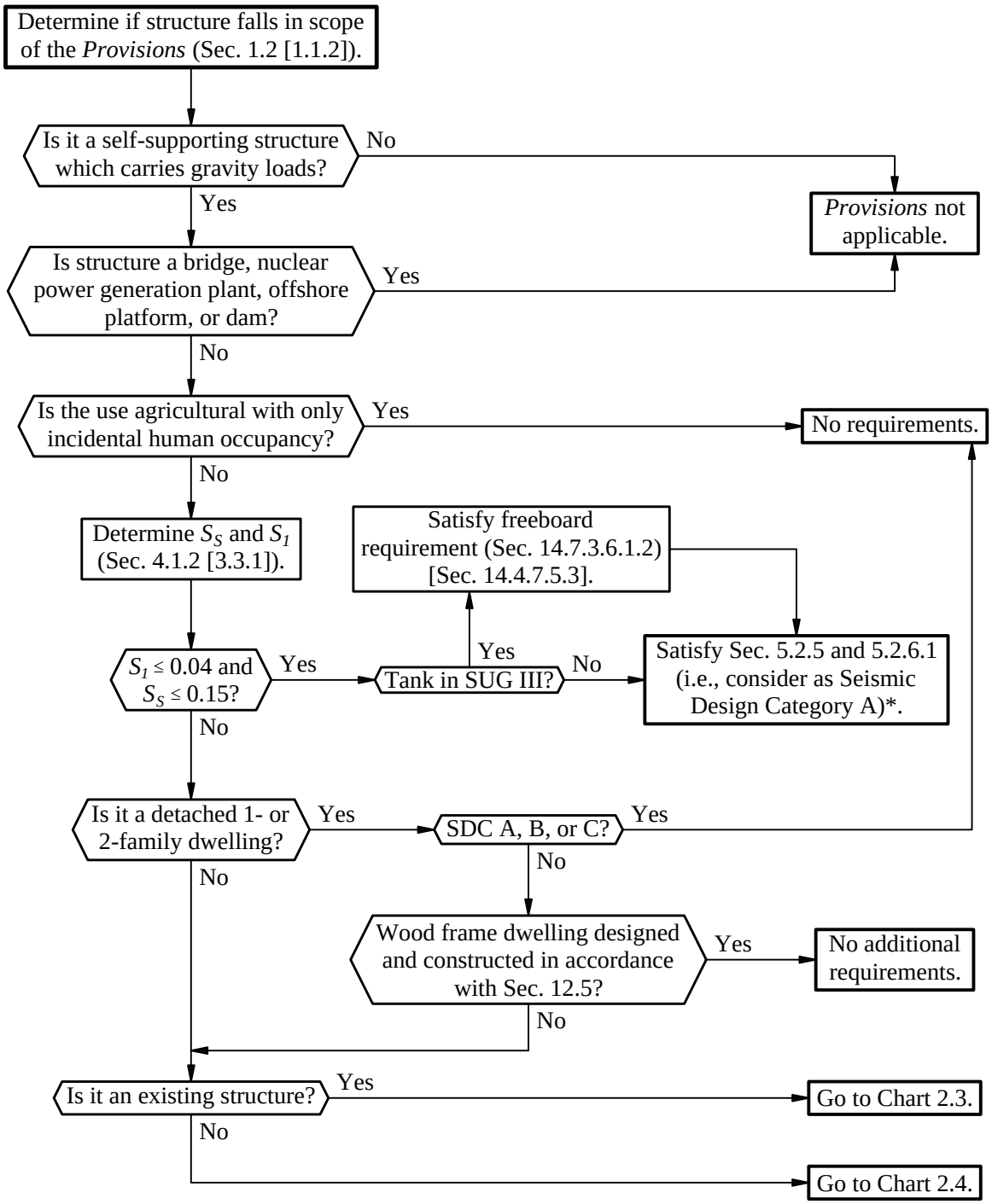
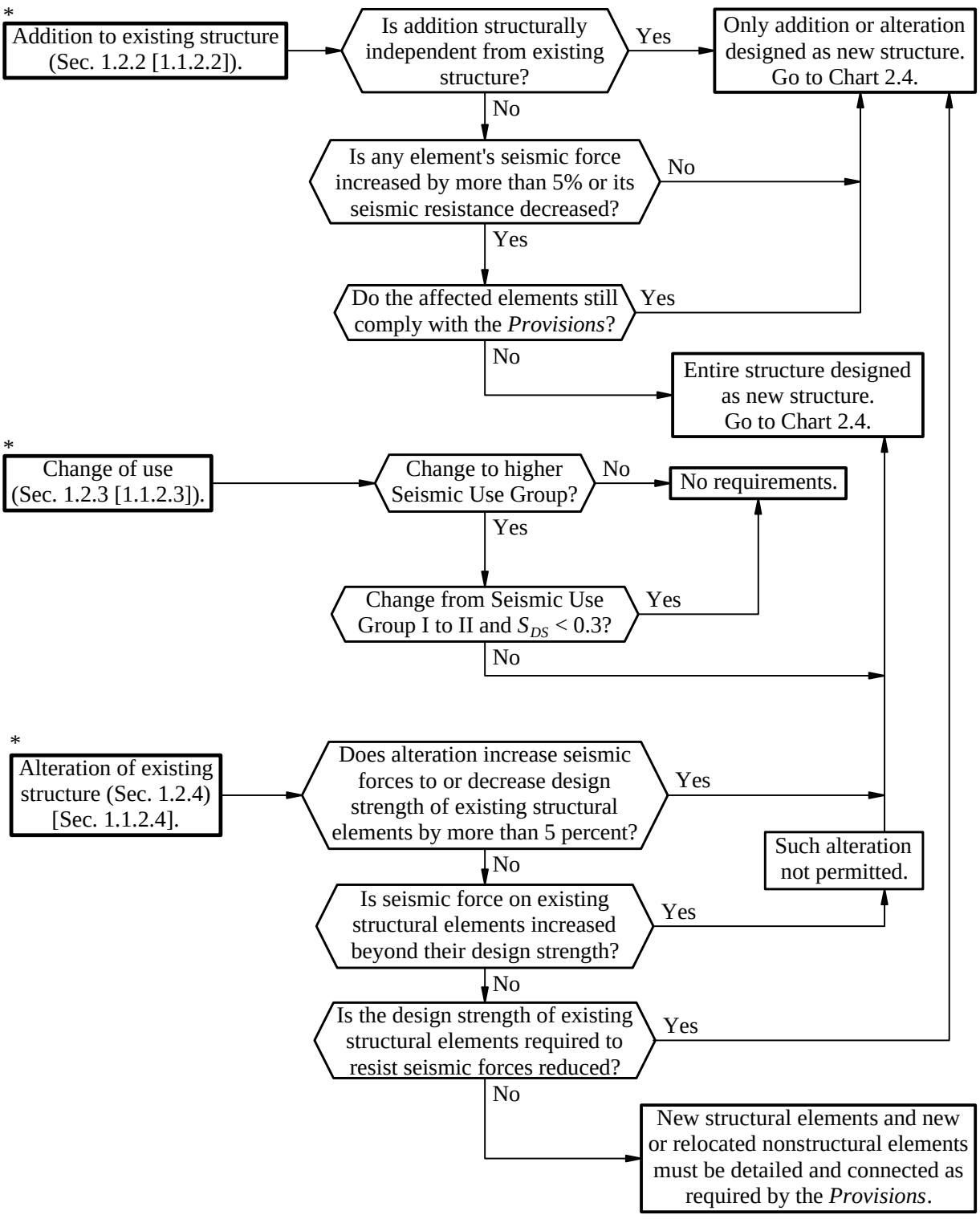


Chart 2.2
Scope of Coverage



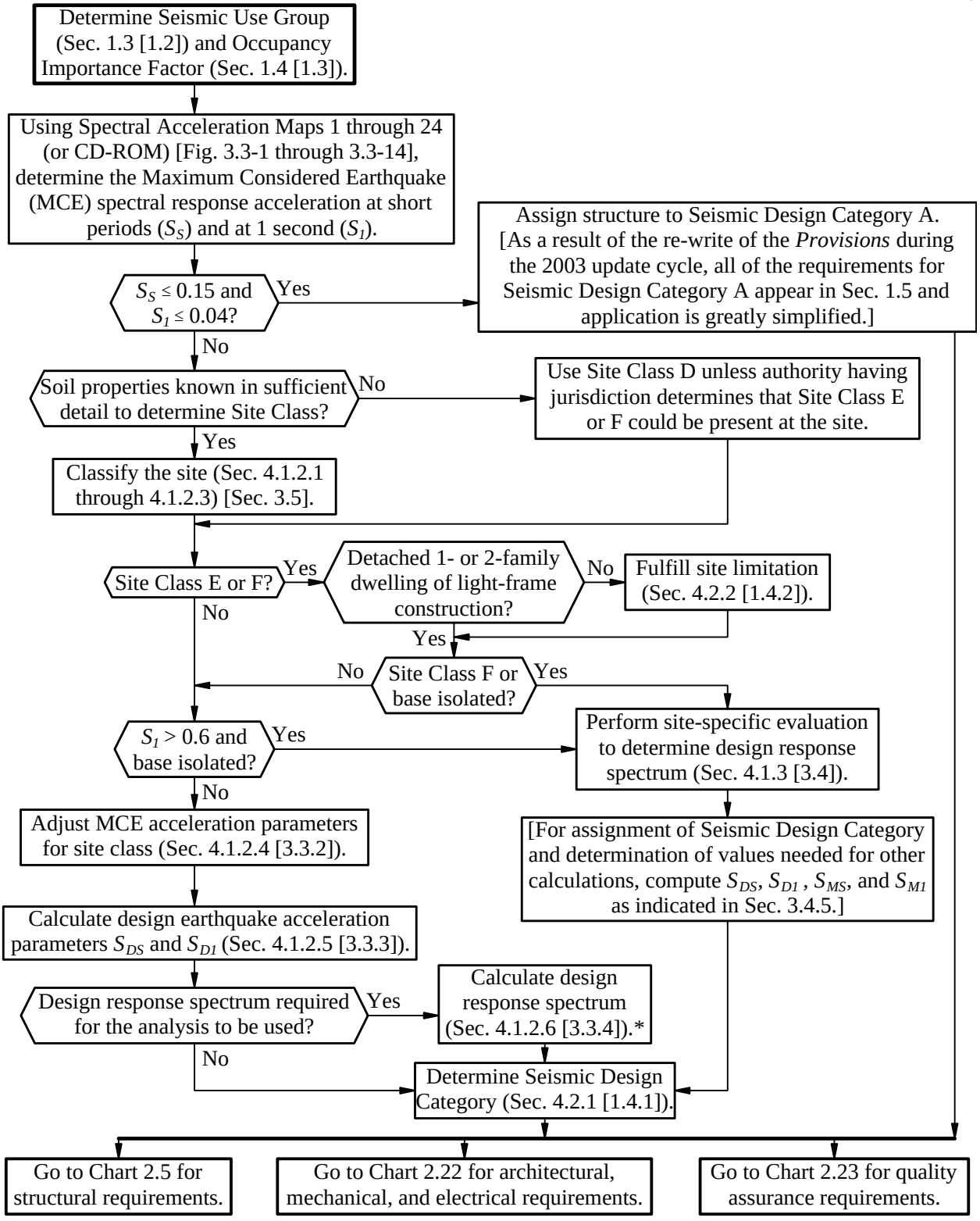
*The *Provisions* has never defined clearly the scope of application for structures assigned to Seismic Design Category A. Although the framers of the *Provisions* intended application of only a few simple requirements in Seismic Design Category A, a strict reading of the 2000 *Provisions* would lead to a substantial list of items that remain within the scope. [As a result of the complete re-write of the *Provisions* at the beginning of the 2003 update cycle, this situation is improved considerably as the requirements for Seismic Design Category A all appear in Sec. 1.5.]

Chart 2.3
Application to Existing Structures



* The *Provisions* applies to existing structures only in the cases of additions to, changes of use in, and alterations of such structures.

Chart 2.4
Basic Requirements



* [Sec. 3.3.4 of the 2003 *Provisions* defines reduced spectral ordinates for periods greater than T_L.]

Chart 2.5
Structural Design

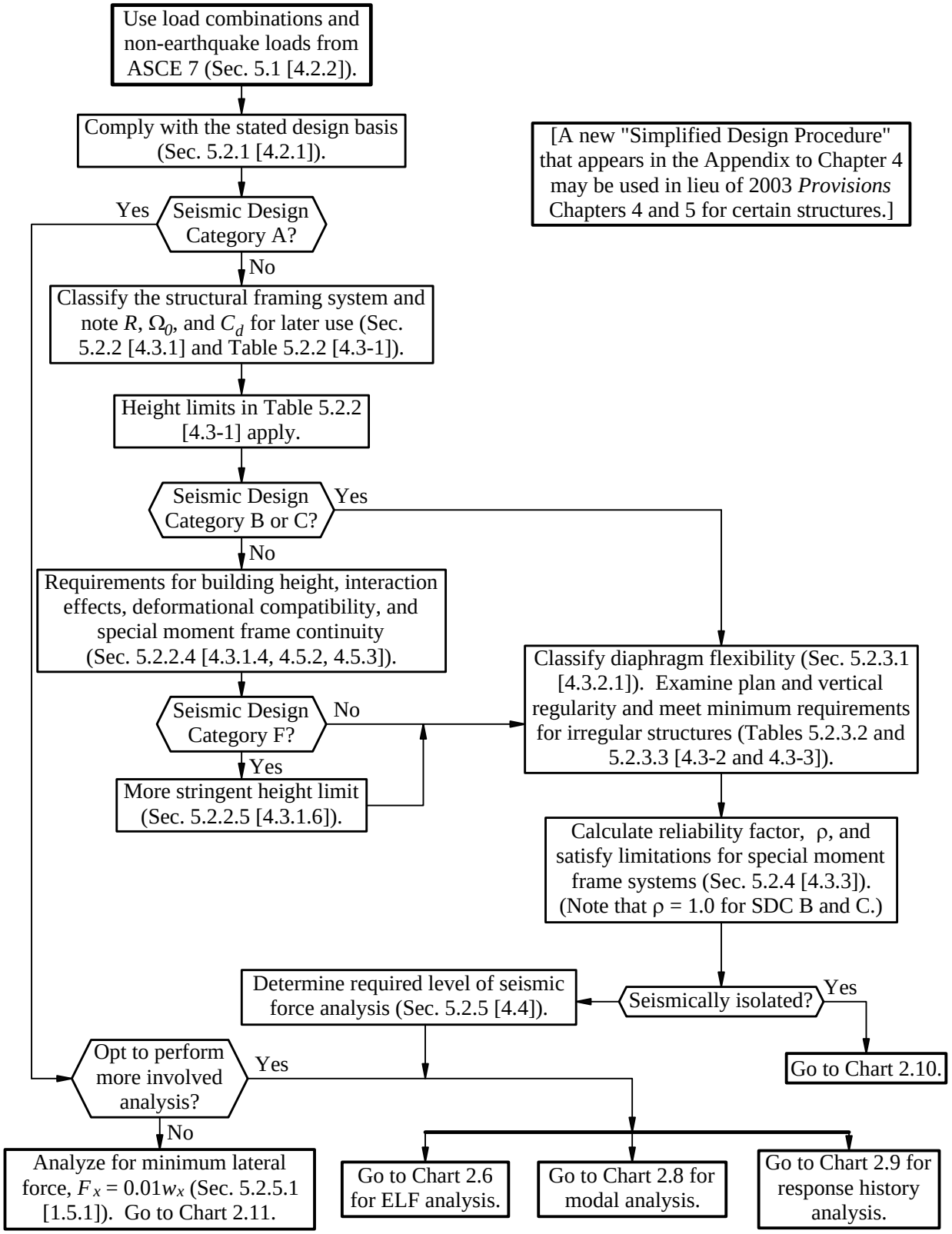


Chart 2.6
Equivalent Lateral Force (ELF) Analysis

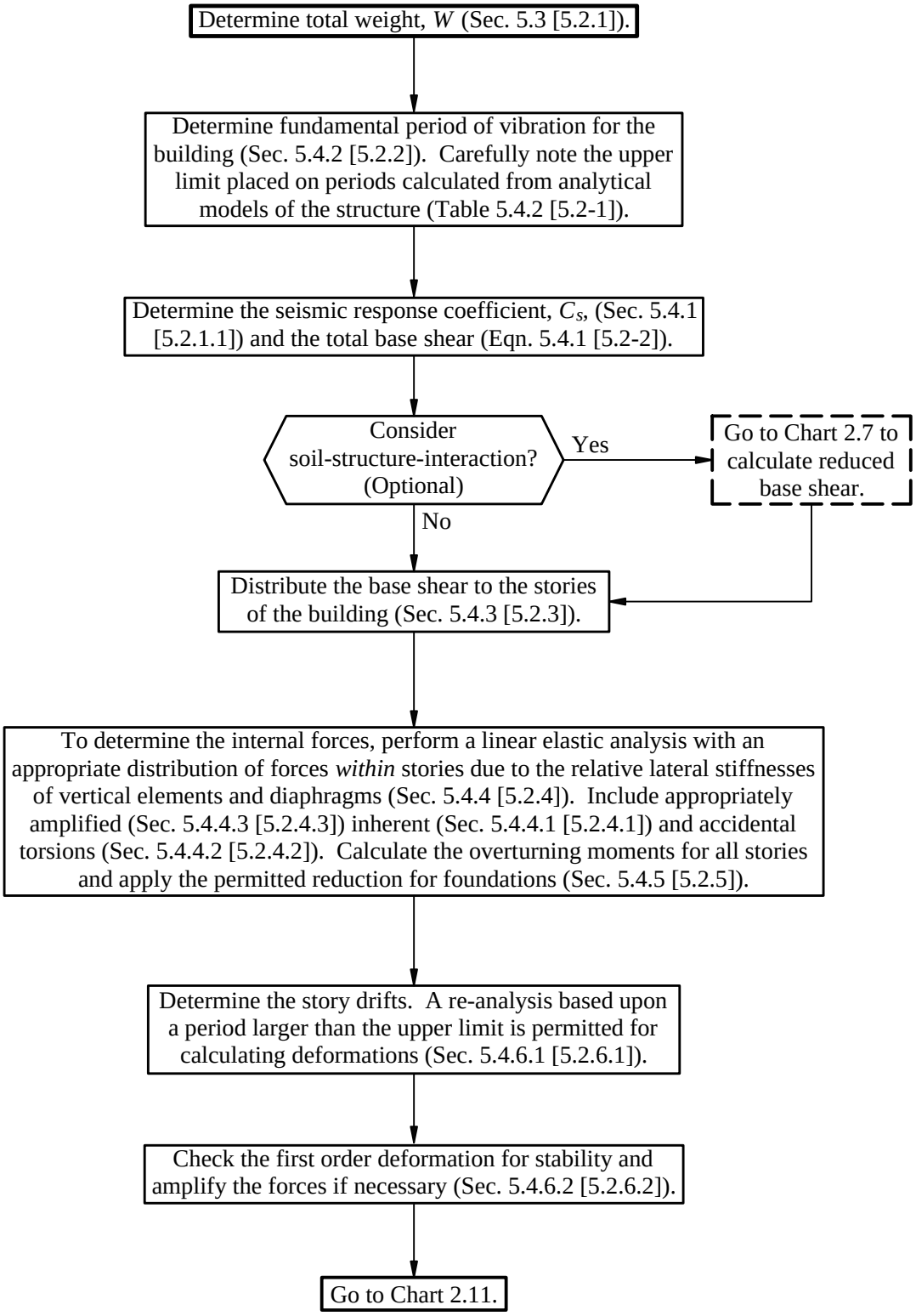


Chart 2.7
Soil-Structure Interaction (SSI)

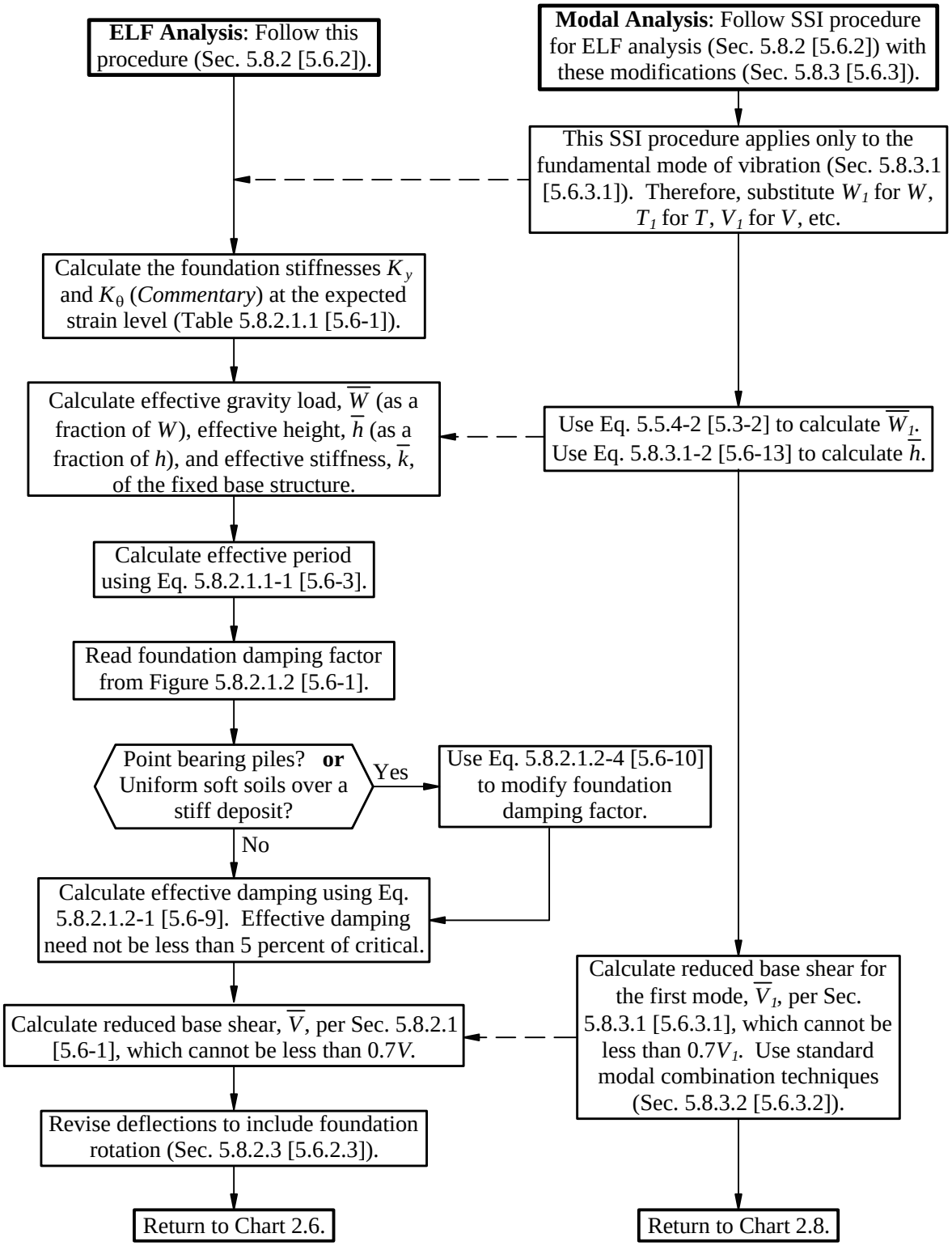
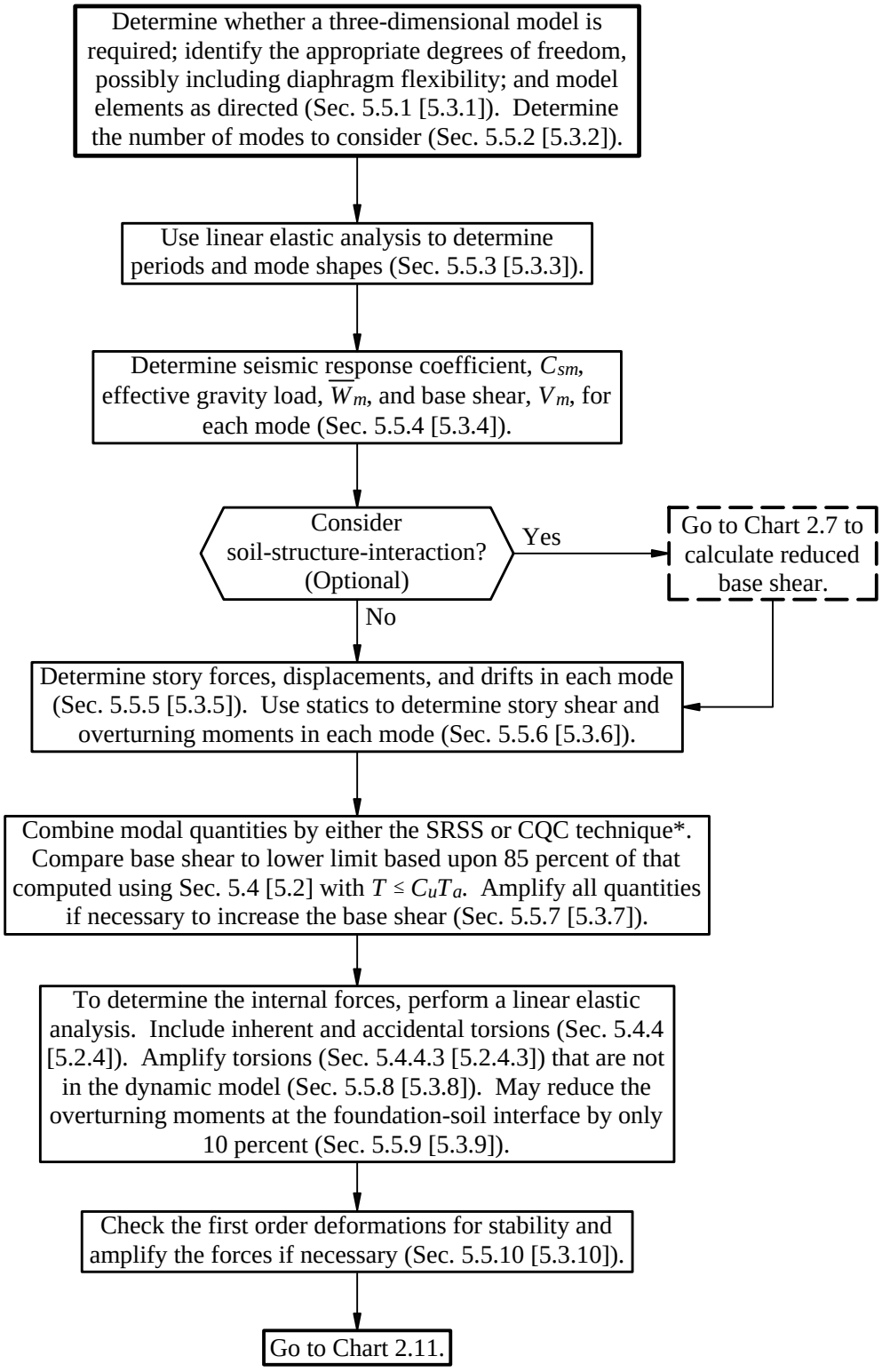


Chart 2.8
Modal Analysis



*As indicated in the text, use of the CQC technique is required where closely spaced periods in the translational and torsional modes will result in cross-correlation of the modes.

Chart 2.9
Response History Analysis

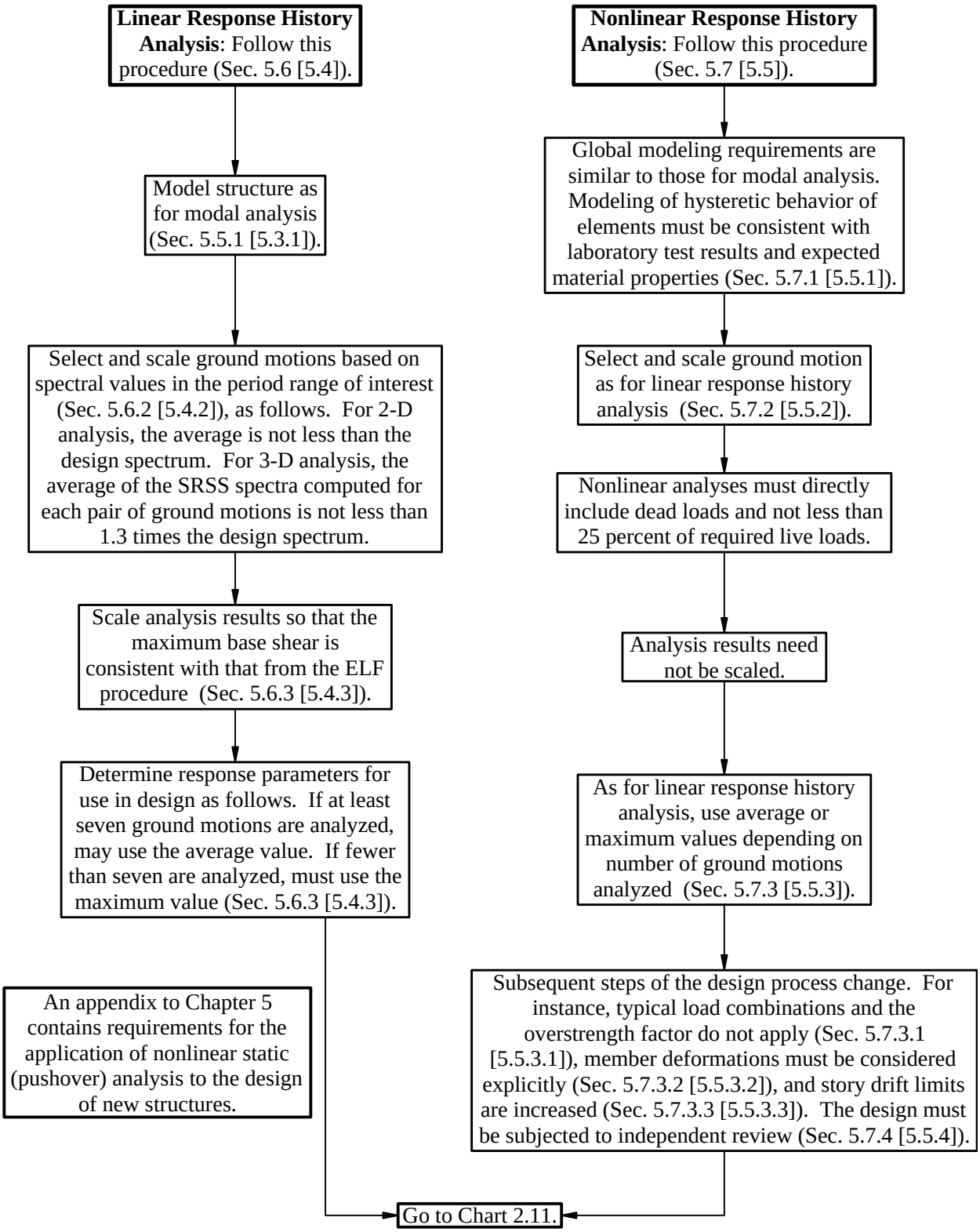


Chart 2.10
Seismically Isolated Structures

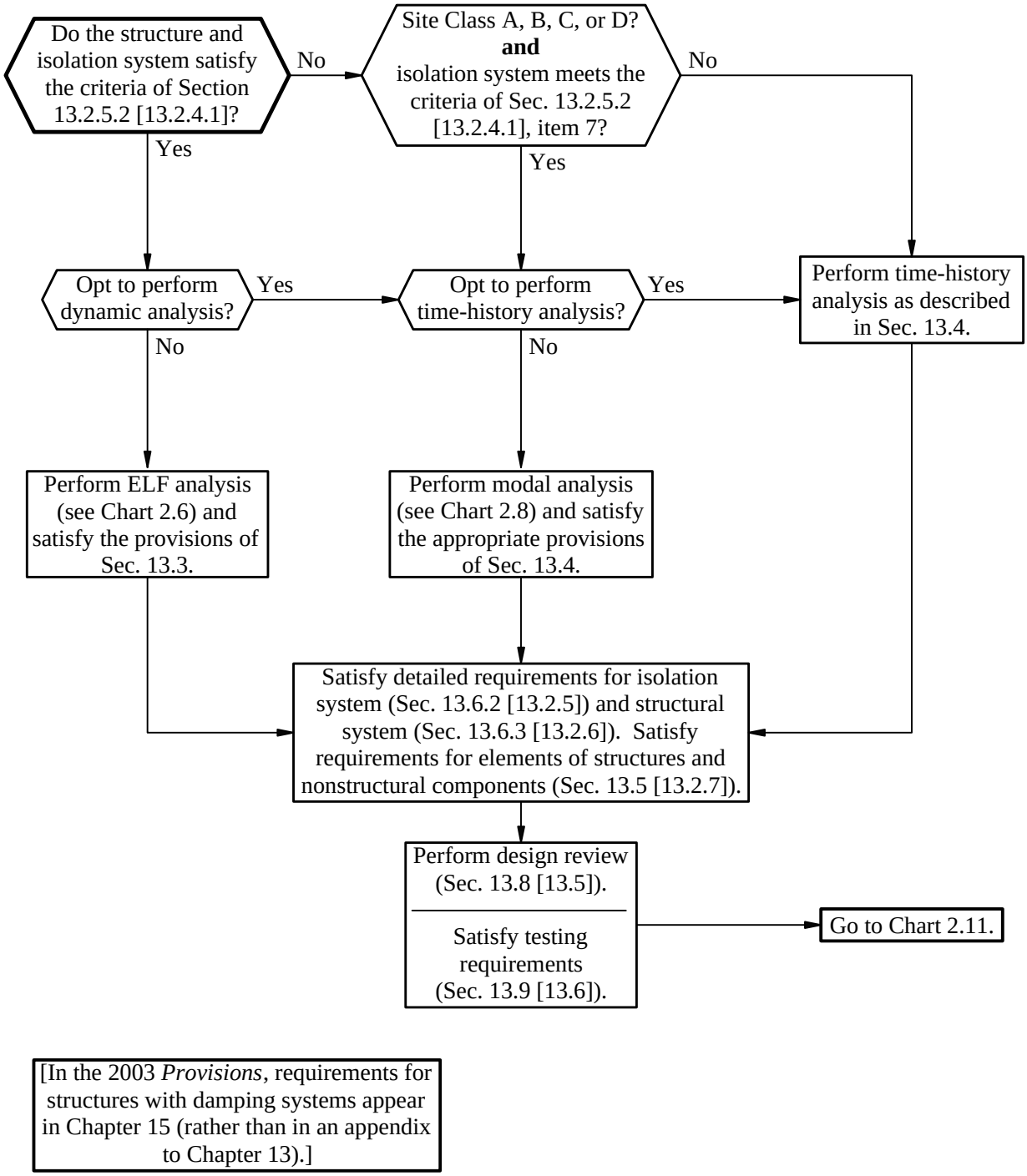


Chart 2.11
Strength Requirements

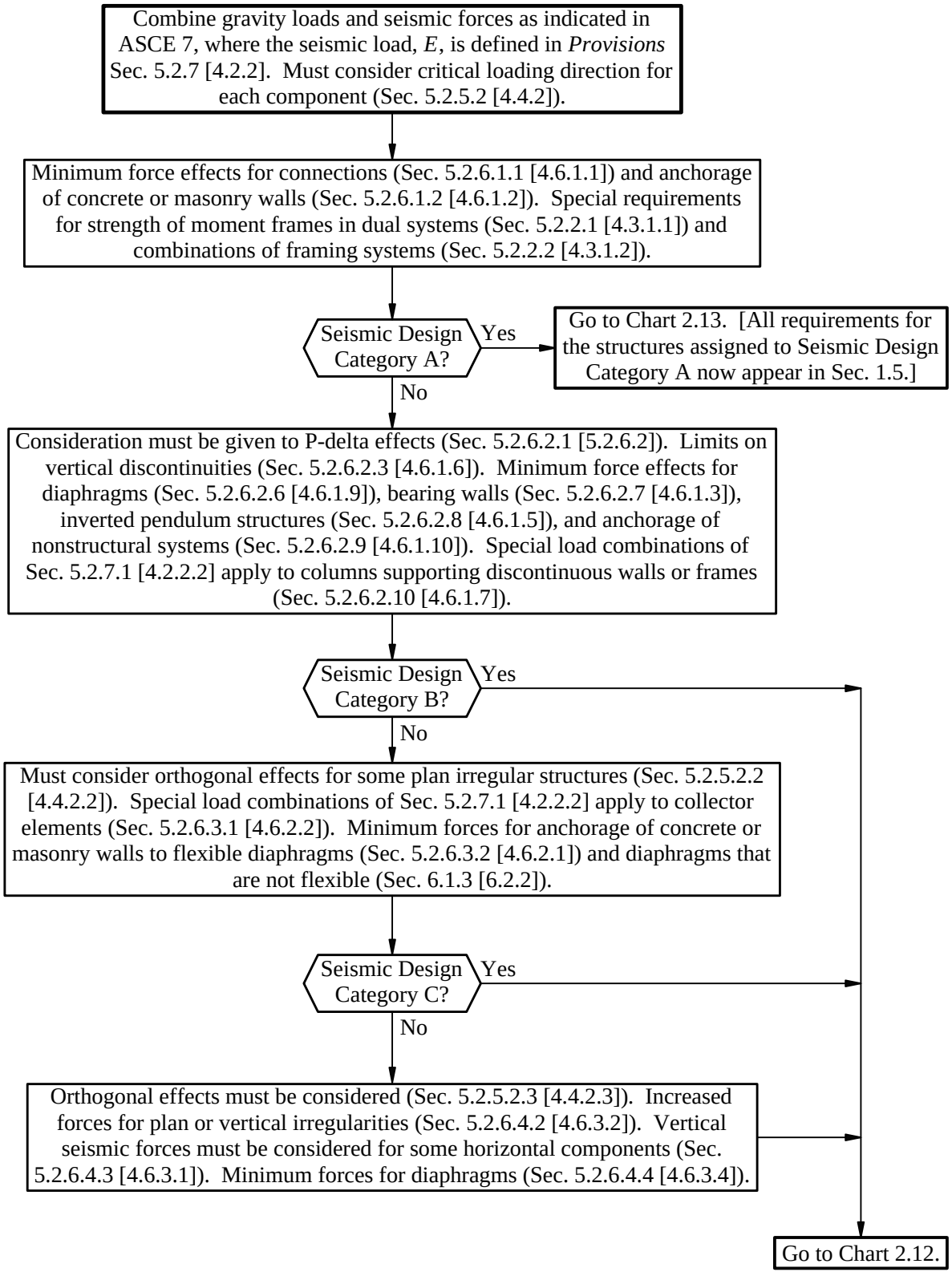


Chart 2.12
Deformation Requirements

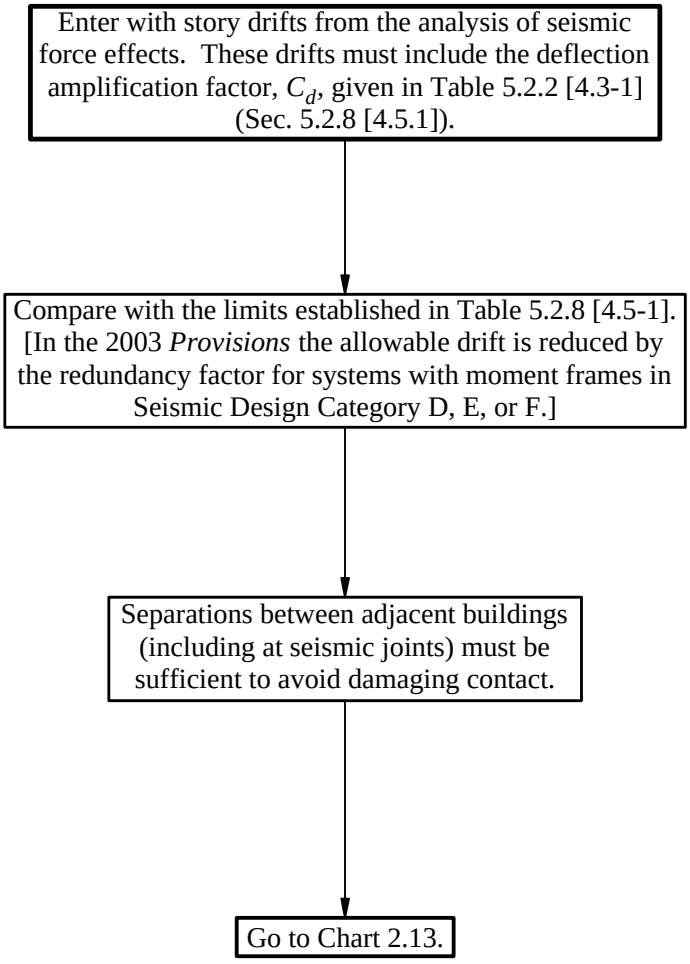


Chart 2.13
Design and Detailing Requirements

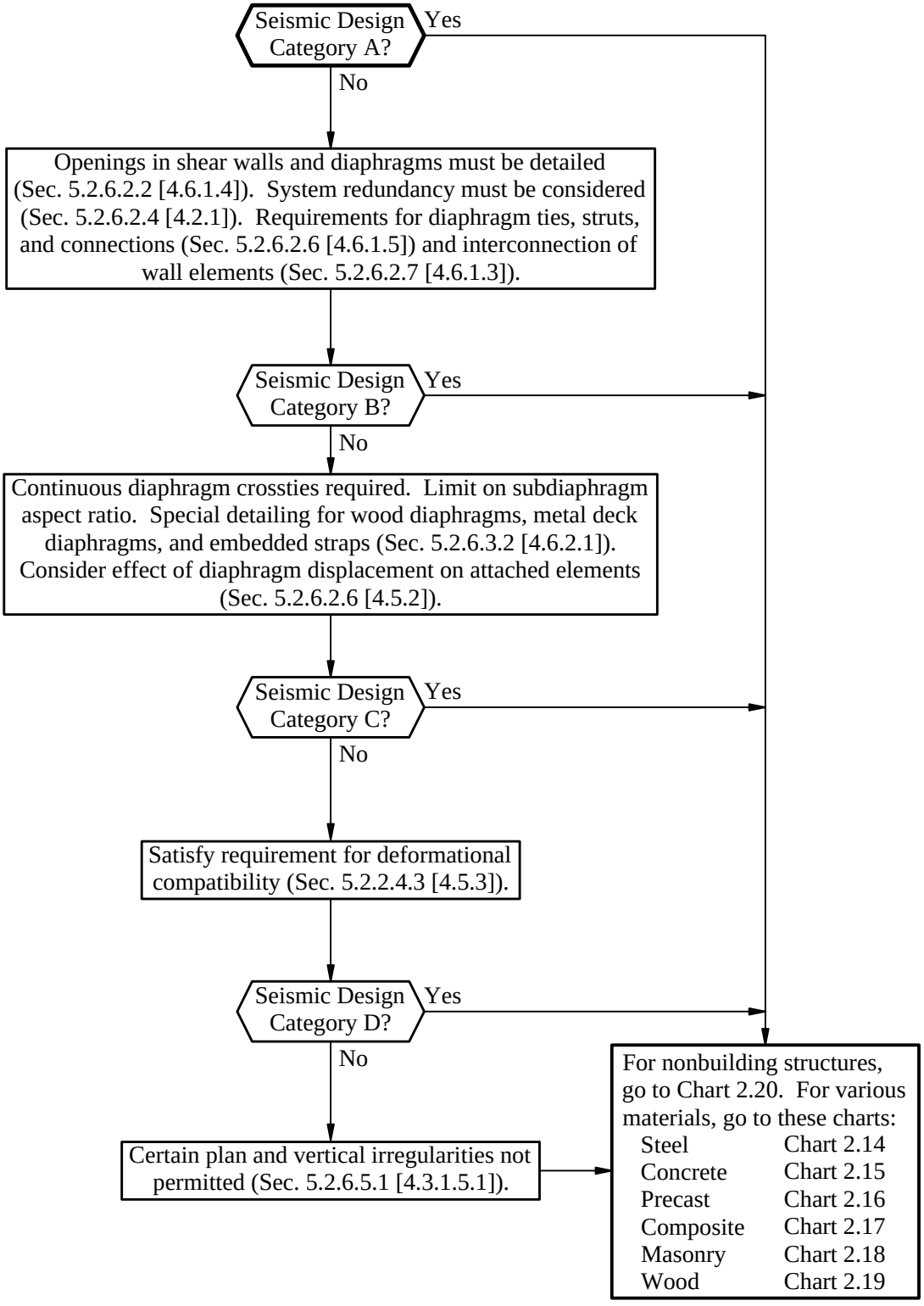


Chart 2.14
Steel Structures

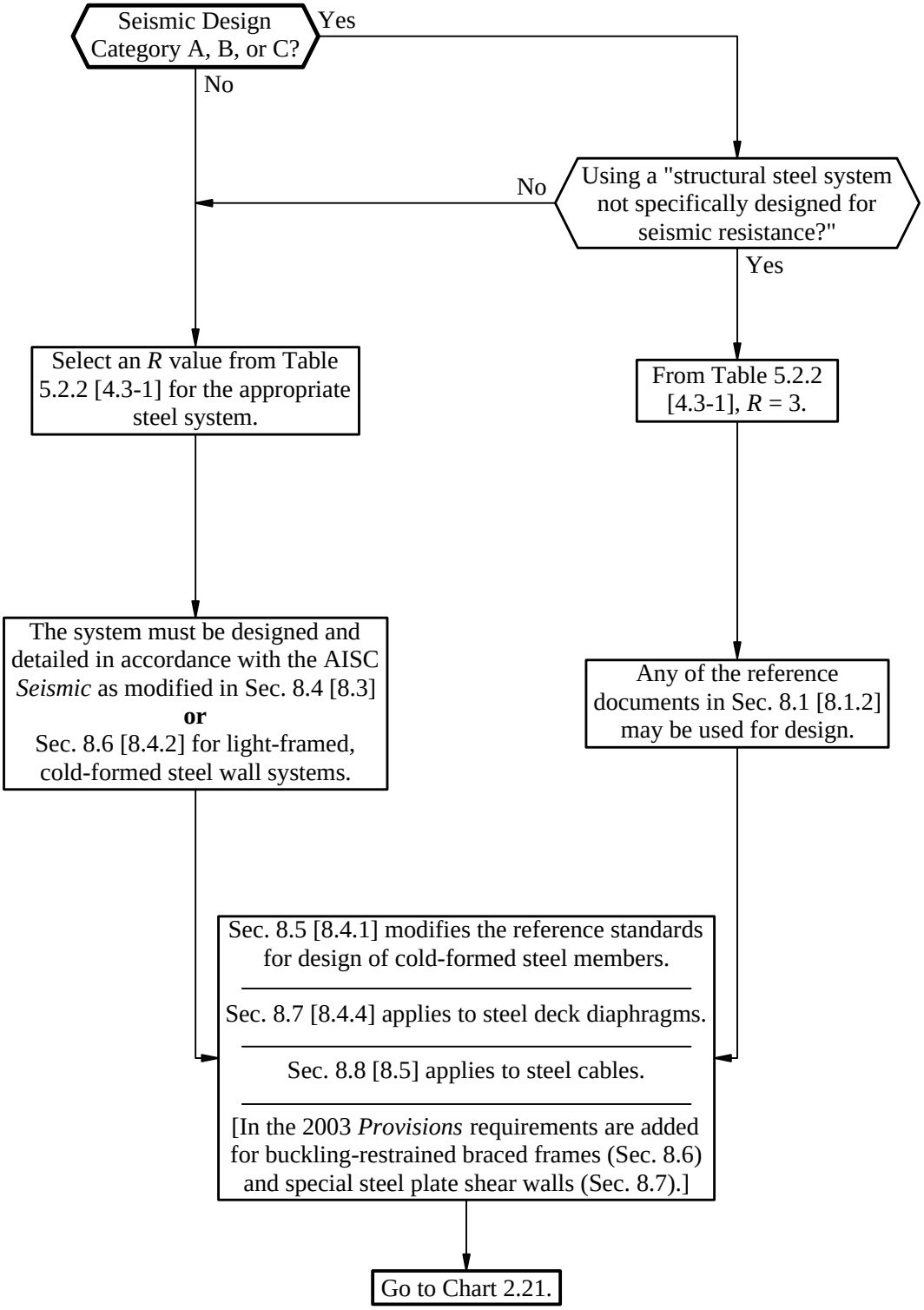


Chart 2.15
Concrete Structures

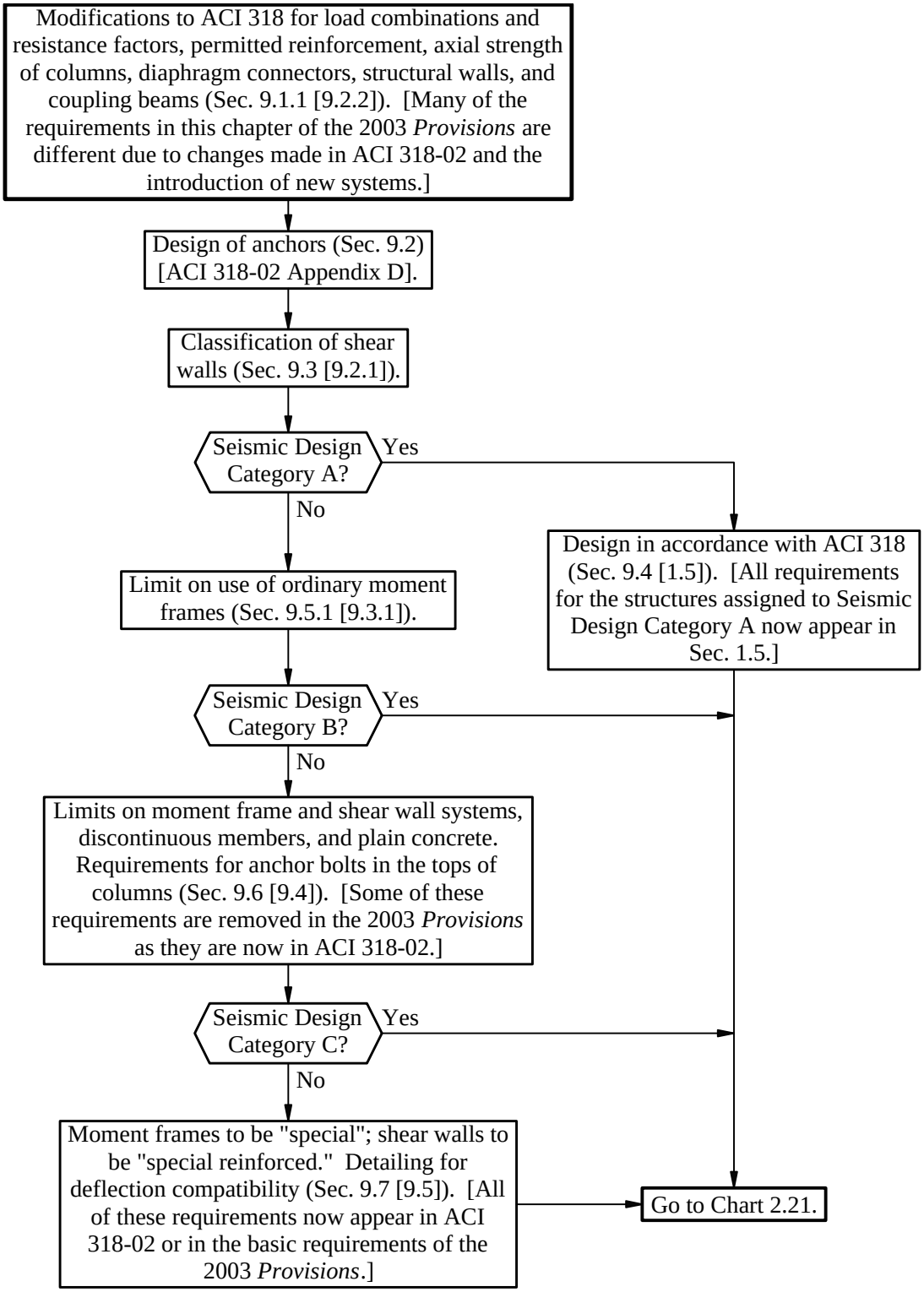


Chart 2.16
Precast Concrete Structures

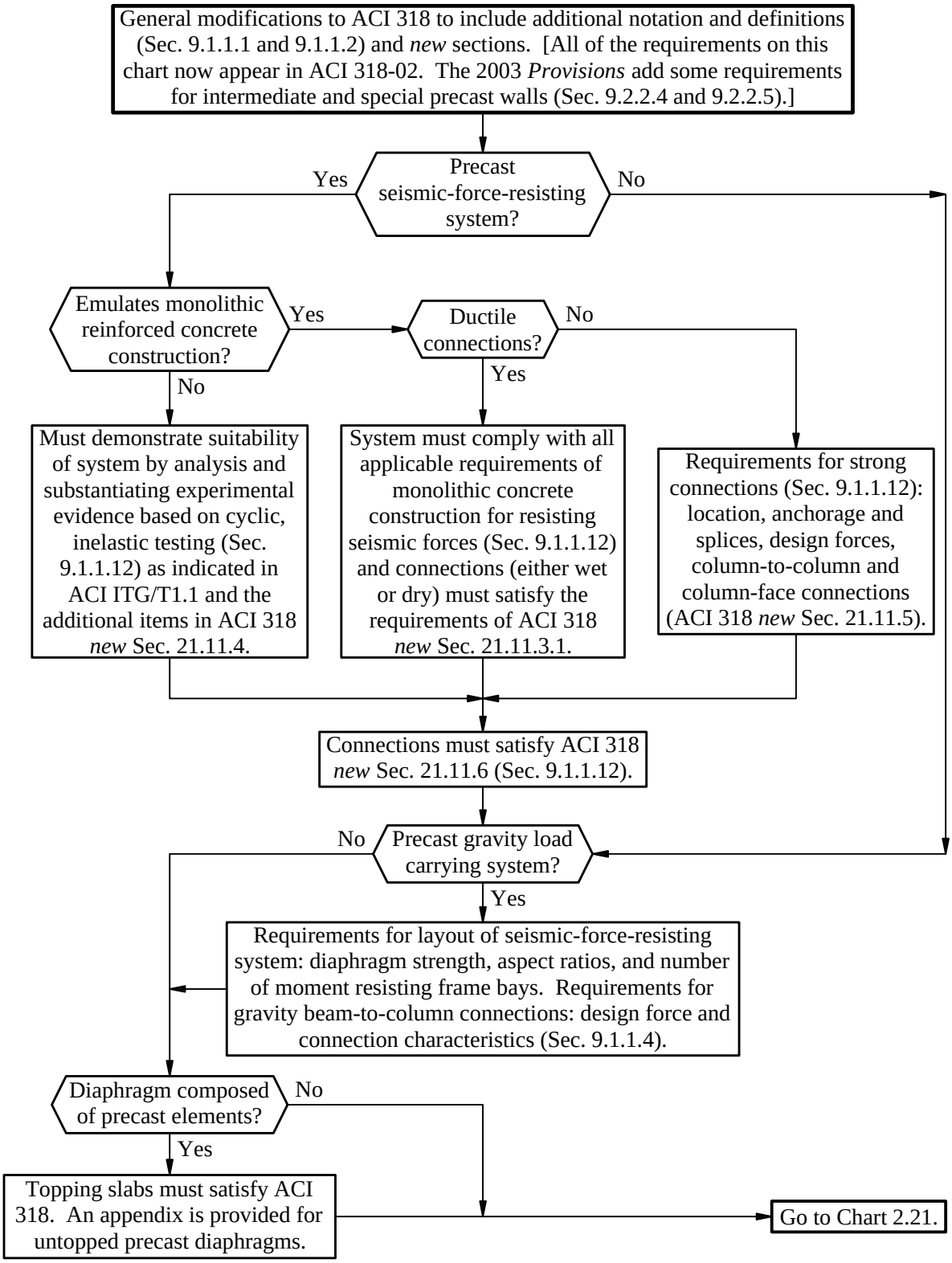


Chart 2.17
Composite Steel and Concrete Structures

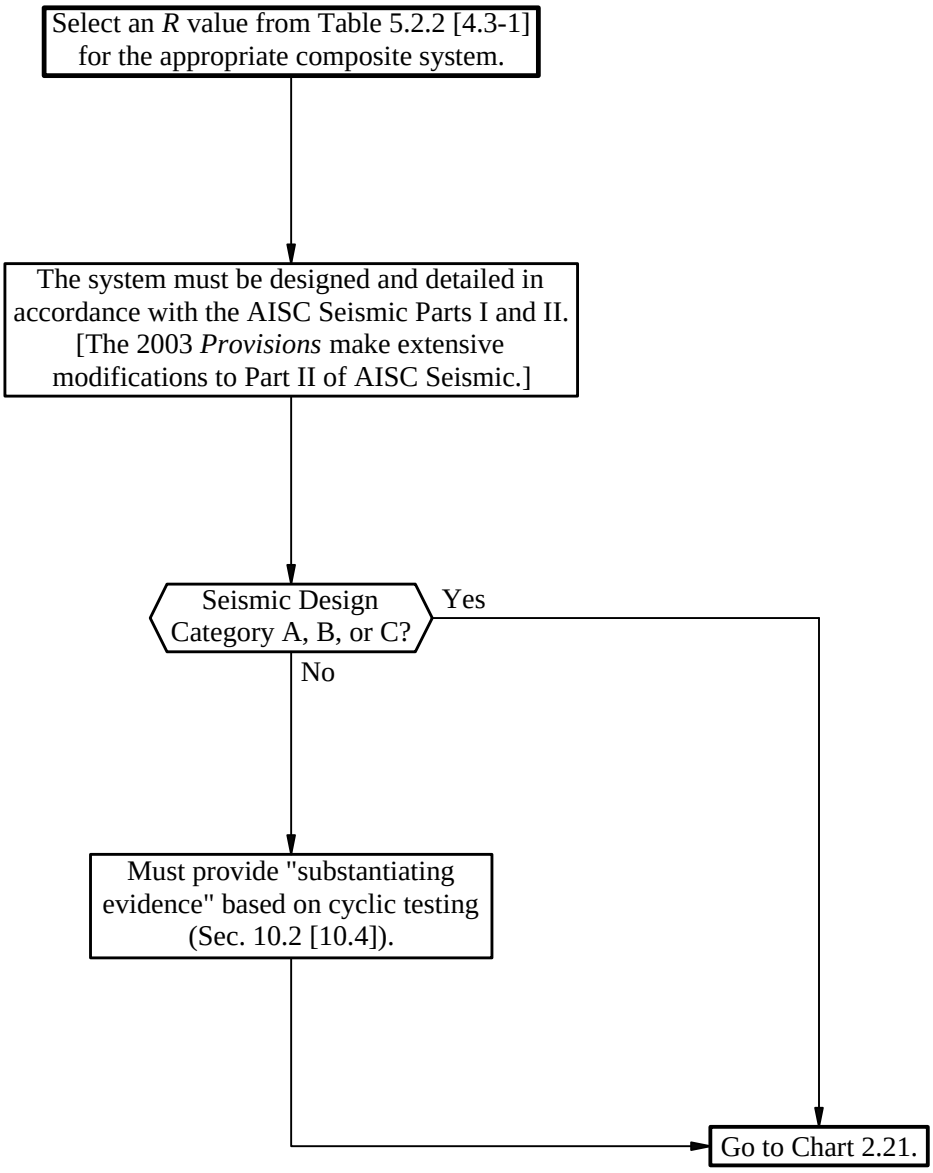


Chart 2.18
Masonry Structures

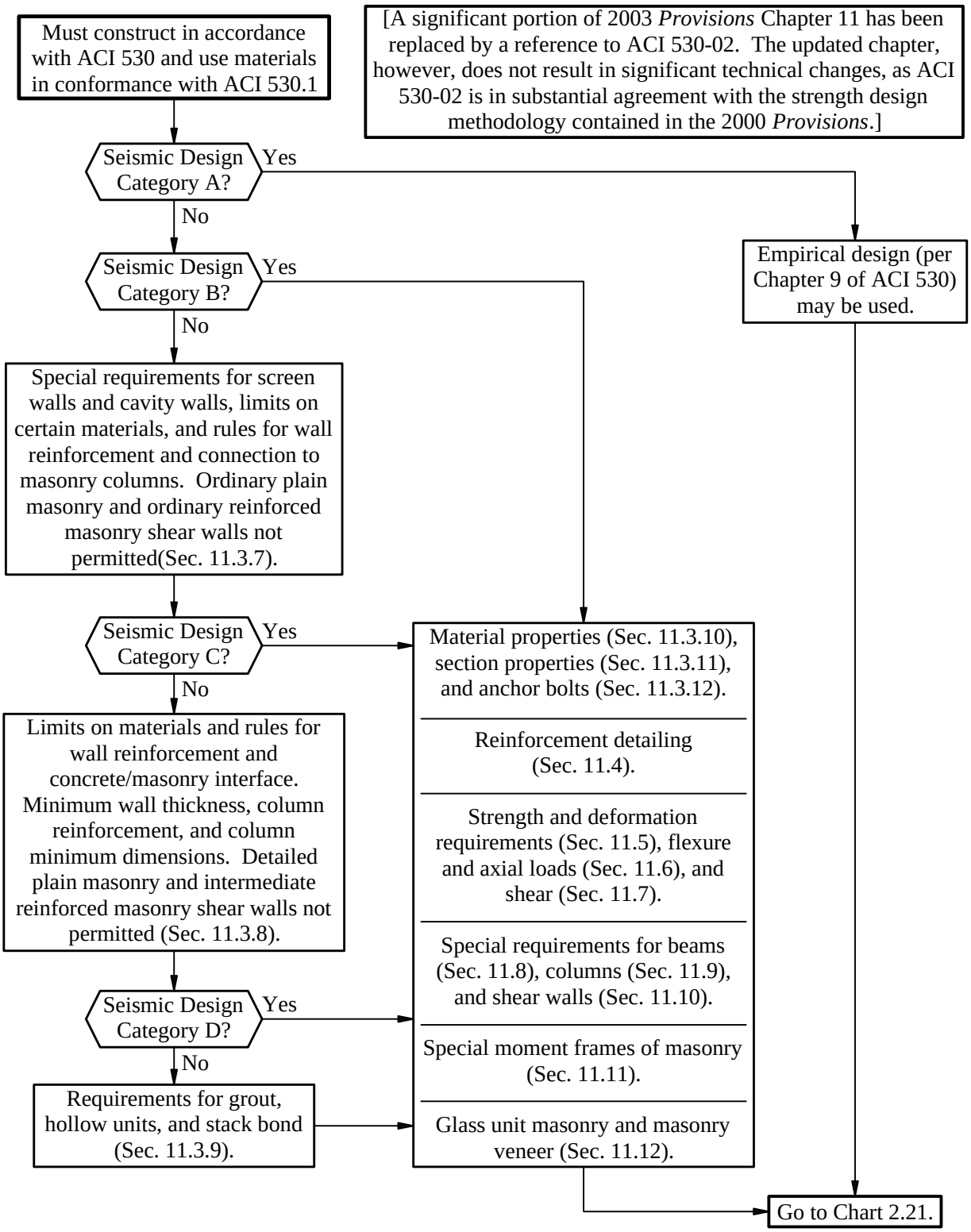


Chart 2.19
Wood Structures

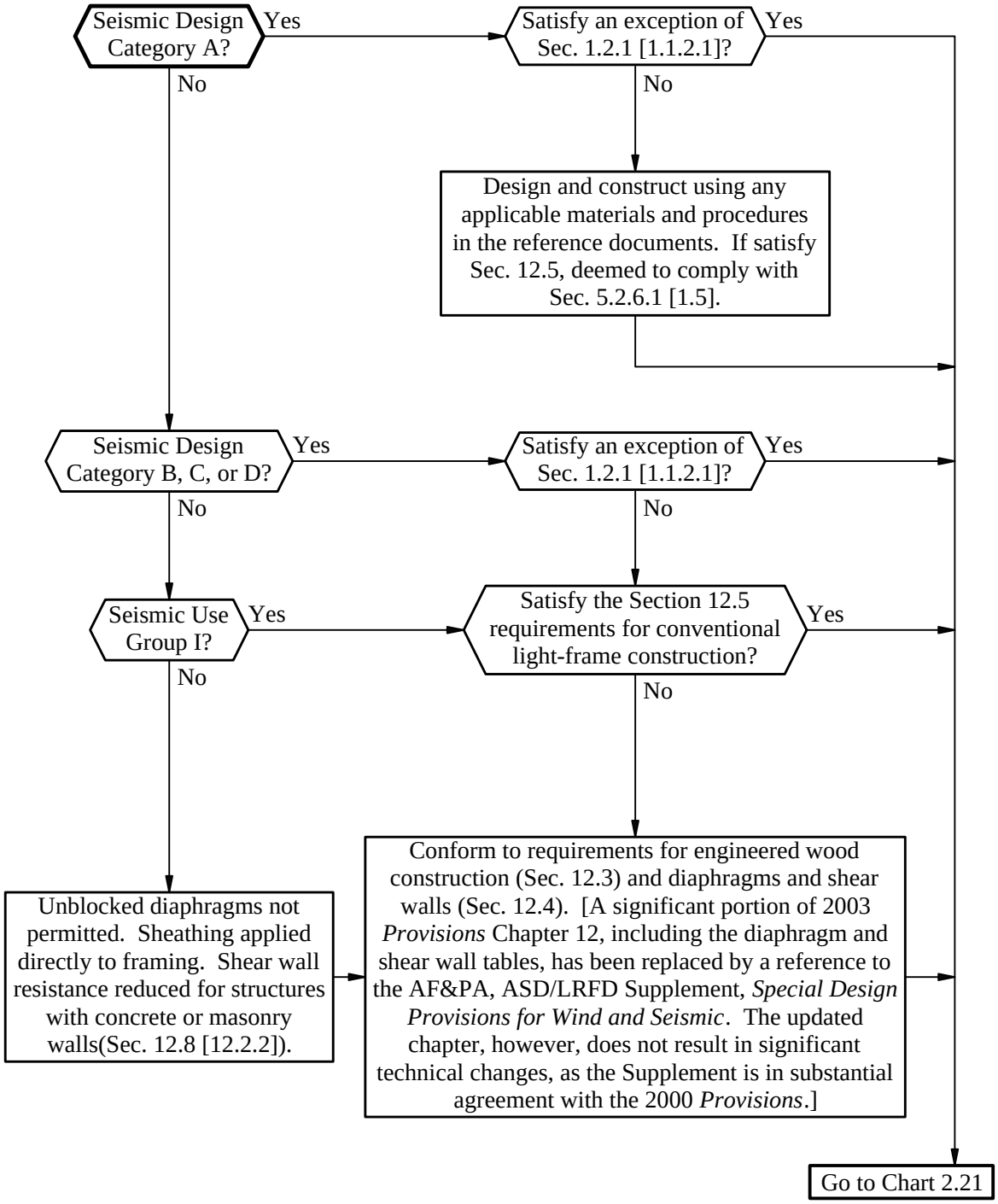


Chart 2.20
Nonbuilding Structures

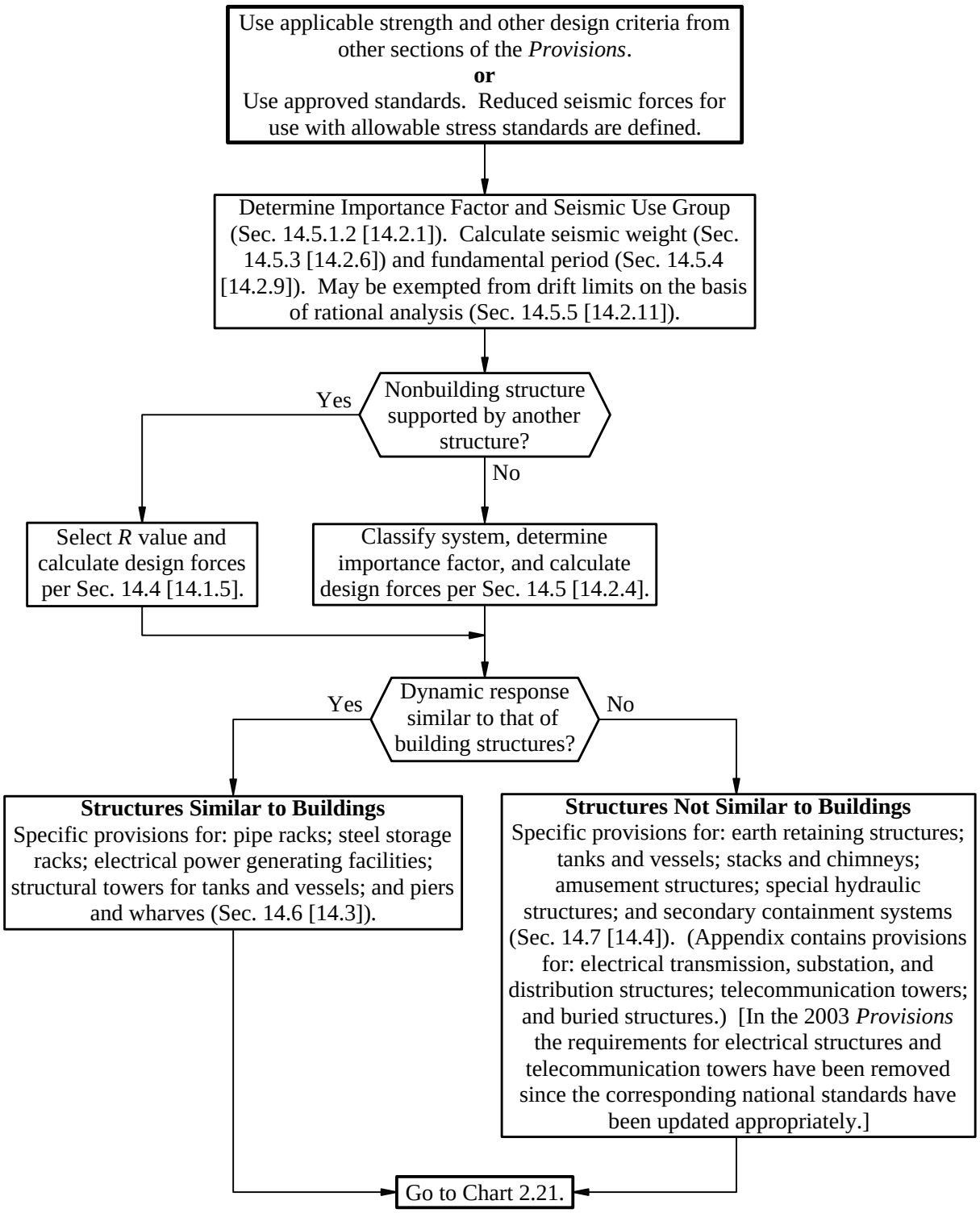


Chart 2.21
Foundations

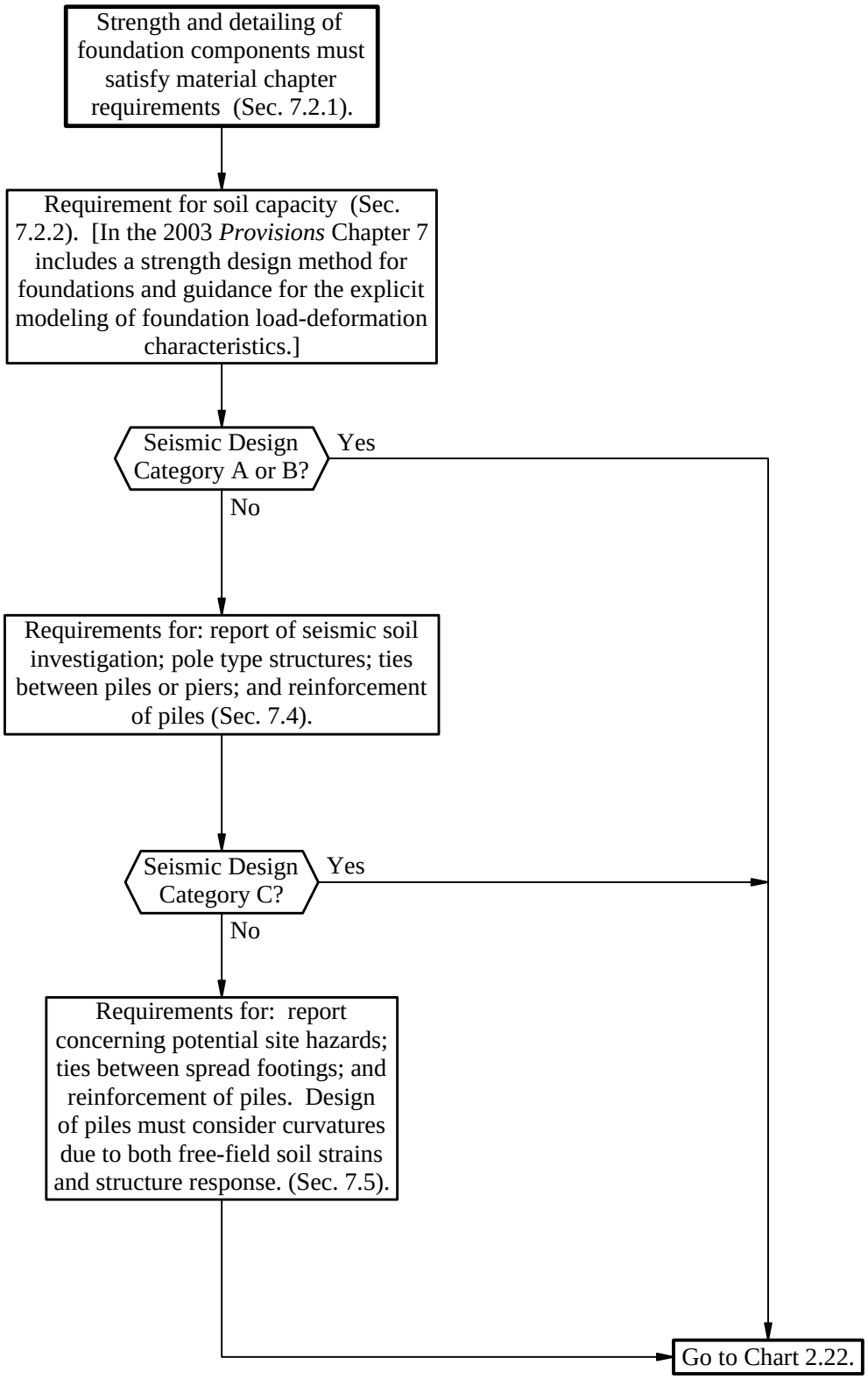


Chart 2.22
Architectural, Mechanical, and Electrical Components

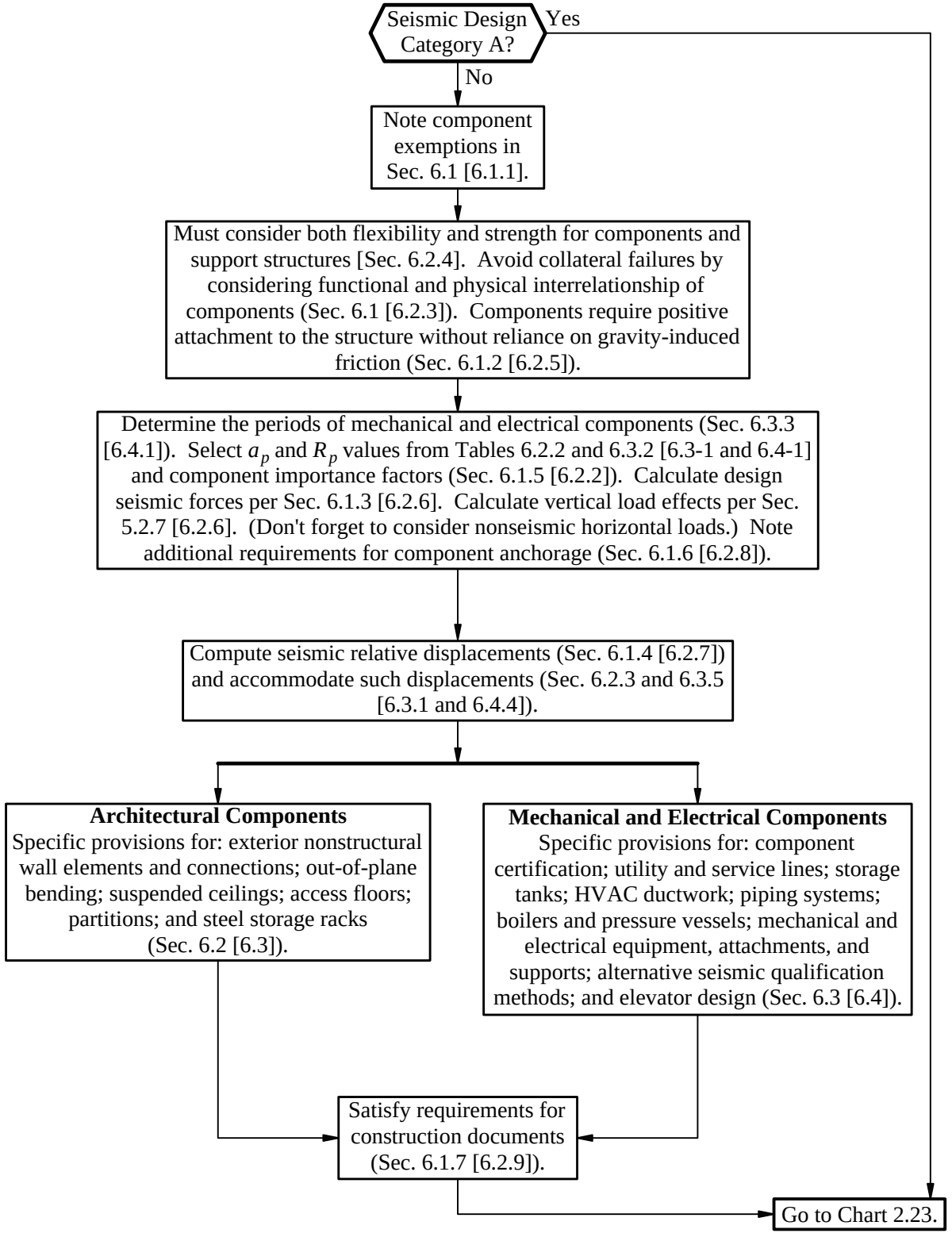


Chart 2.23
Quality Assurance

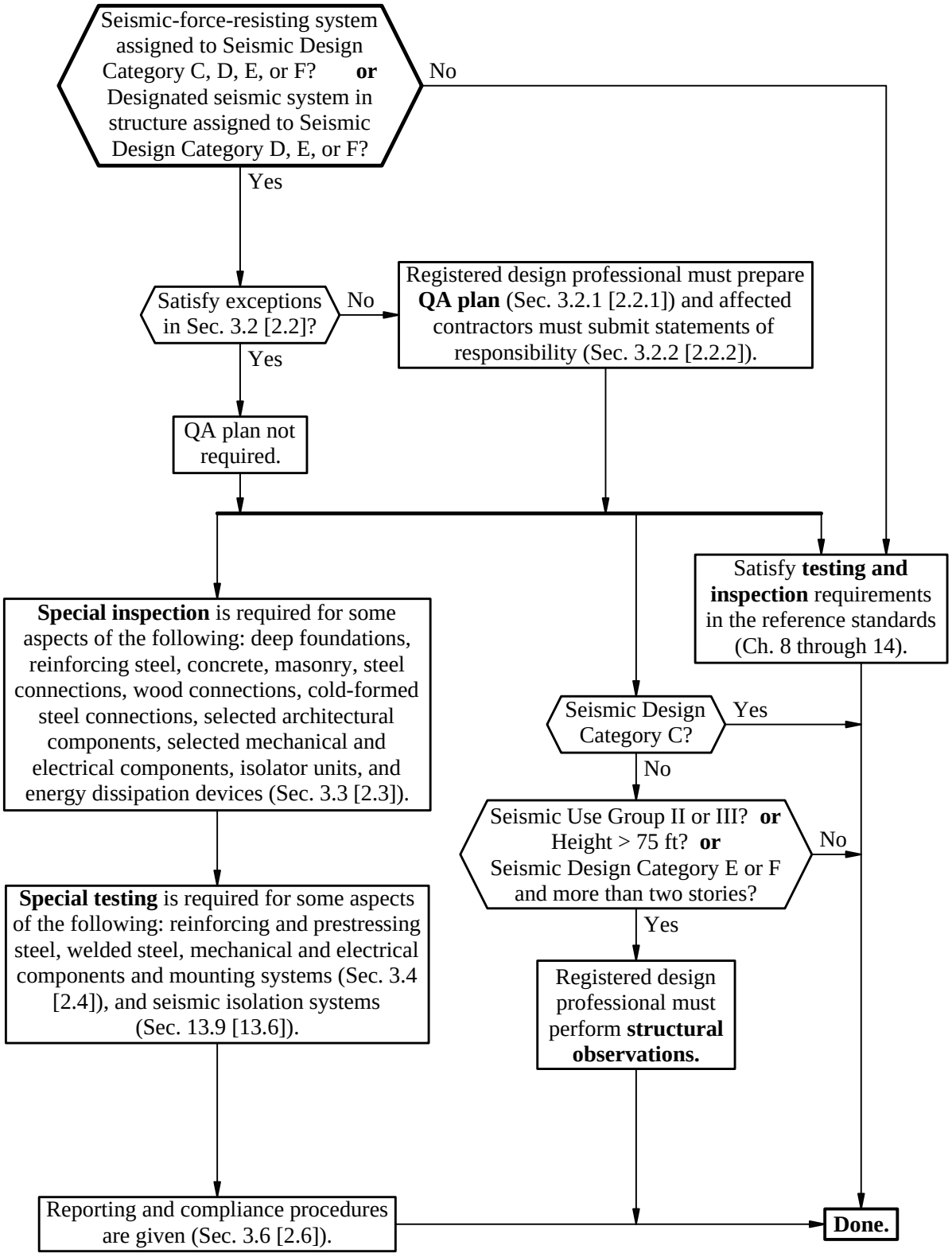


Table 2-1 Navigating Among the 2000 and 2003 *NEHRP Recommended Provisions* and ASCE 7

ASCE 7 Section	NEHRP 2000 Section	NEHRP 2003 Section	Topic
Chapter 11			SEISMIC DESIGN CRITERIA
11.1	1.1, 1.2	1.1	General
11.2	2.1	1.1.4	Definitions
11.3	2.2	1.1.5	Notation
11.4	4.1	3.3	Seismic Ground Motion Values
11.5	1.3, 1.4	1.2, 1.3	Importance Factor and Occupancy Category
11.6	4.2	1.4	Seismic Design Category
11.7	5.2.6.1	1.5	Design Requirements for Seismic Design Category A
11.8	4.2, 7.4, 7.5	1.4.2, 7.4, 7.5	Geologic hazards and Geotechnical Investigation
Chapter 12	5	4, 5	SEISMIC DESIGN REQUIREMENTS FOR BUILDING STRUCTURES
12.1	5.2	4.2.1	Structural Design Basis
12.2	5.2.2	4.3.1	Structural System Selection
12.3	5.2.3, 5.2.6, 5.2.4	4.3.2	Diaphragm Flexibility, Configuration Irregularities and Redundancy
12.4	5.2.7, 5.2.6	4.2.2	Seismic Load Effects and Combinations
12.5	5.2.5	4.4.2	Direction of Loading
12.6	5.2.5	4.4.1	Analysis Procedure Selection
12.7	5.2, 5.6.2		Modeling Criteria
12.8	5.5	5.2	Equivalent Lateral Force Procedures
12.9	5.6	5.3	Modal Response Spectrum Analysis
12.10	5.2.6	4.6	Diaphragms, Chords and Collectors
12.11	5.2.6	4.6	Structural Walls and Their Anchorage
12.12	5.2.8	4.5	Drift and Deformation
12.13	7	7	Foundation Design
12.14	5.4	4 Alt.	Simplified Alternative Structural Design Criteria for Simple Bearing Wall of Building Frame System
Chapter 13			SEISMIC REQUIREMENTS FOR NONSTRUCTURAL COMPONENTS
13.1	6.1	6.1	General
13.2	6.1	6.2	General Design Requirements
13.3	6.1.3, 6.1.4	6.2	Seismic Demands on Nonstructural Components
13.4	6.1.2	6.2	Nonstructural Component Anchorage
13.5	6.2	6.3	Architectural Components
13.6	6.3	6.4	Mechanical and Electrical Components
Chapter 14			MATERIAL SPECIFIC SEISMIC DESIGN AND DETAILING REQUIREMENTS
14			Scope
14.1	8	8	Steel
14.2	9	9	Concrete
14.3	10	10	Composite Steel and Concrete Structures
14.4	11	11	Masonry
14.5	12	12	Wood

Chapter 15	14	14	SEISMIC DESIGN REQUIREMENTS FOR NONBUILDING STRUCTURES
15.1	14.1	14.1	General
15.2	14.2,14.3	14.1.2	Reference Documents
15.3	14.4	14.1.5	Nonbuilding Structures Supported by Other Structures
15.4	14.5	14.2	Structural Design Requirements
15.5	14.6	14.3	Nonbuilding Structures Similar to Buildings
15.6	14.7	14.4	General Requirements for Nonbuilding Structures Not Similar to Buildings
15.7	14.7.3	14.4.7	Tanks and Vessels
Chapter 16			SEISMIC RESPONSE HISTORY PROCEDURES
16.1	5.7	5.4	Linear Response History Analysis
16.2	5.8	5.5	Nonlinear Response History Procedure
Chapter 17	13	13	SEISMIC DESDIGN REQUIREMENTS FOR SEISMICALLY ISOLATED STRUCTURES
17.1	13.1	13.1	General
17.2	13.5, 13.6	13.2	General design Requirements
17.3	13.4.4	13.2.3	Ground Motion for Isolated Systems
17.4	13.2.5	13.2.4	Analysis Procedure Selection
17.5	13.3	13.3	Equivalent Lateral Force Procedure
17.6	13.4	13.4	Dynamic Analysis Procedures
17.7	13.8	13.5	Design Review
17.8	13.9	13.6	Testing
Chapter 18	13A	15	SEISMIC DESIGN REQUIREMENTS FOR STRUCTURES WITH DAMPING SYSTEMS
18.1	13A.1	15.1	General
18.2	13A.2, 13A.8	15.2	General Design Requirements
18.3	13A.6	15.3	Nonlinear Procedures
18.4	13A.5	15.4	Response Spectrum Procedure
18.5	13A.4	15.5	Equivalent Lateral Force Procedure
18.6	13A.3	15.6	Damped Response Modification
18.7	13A.7	15.7	Seismic Load Conditions and Acceptance
18.8	13A.9	15.8	Design Review
18.9	13A.10	15.9	Testing
Chapter 19			SOIL STRUCTURE INTERACTION FOR SEISMIC DESIGN
19.1	5.8.1	5.6.1	General
19.2	5.8.2	5.6.2	Equivalent Lateral Force Procedure
19.3	5.8.3	5.6.3	Modal Analysis Procedure
Chapter 20			SITE CLASSIFICATION PROCEDURE FOR SEISMIC DESIGN
20.1	4.1	3.5	Site Classification
20.2	4.1	3.5	Site Response Analysis for Site Class F Soil
20.3	4.1	3.5	Site Class Definitions
20.4	4.1	3.5	Definitions of Site Class Parameters

Chapter 21			SITE-SPECIFIC GROUND MOTION PROCEDURES FOR SEISMIC DESIGN
21.1	4.1	3.4	Site Response Analysis
21.2	4.1	3.4	Ground Motion Hazard Analysis
21.3	4.1	3.4	Design Response Spectrum
21.4	4.1	3.4	Design Acceleration Parameters
Chapter 22	4.1	3.3	SEISMIC GROUND MOTION AND LONG PERIOD TRANSITION MAPS
Chapter 23			SEISMIC DESIGN REFERENCE DOCUMENTS
23.1			Consensus Standards and Other Reference Documents
11A	3	2	QUALITY ASSURANCE PROVISIONS
11A.1	3.1, 3.2, 3.3	2.1, 2.2, 2.3	Quality Assurance
11A.2	3.4	2.4	Testing
11A.3	3.5	2.5	Structural Observations
11A.4	3.6	2.6	Reporting and Compliance Procedures
11B			EXISTING BUILDING PROVISIONS
11B.1	1.2.1	1.1.2	Scope
11B.2	1.2.2.1	1.1.2.2	Structurally Independent Additions
11B.3	1.2.2.2	1.1.2.2	Structurally Dependent Additions
11B.4	1.2.4	1.1.2.4	Alterations
11B.5	1.2.3	1.1.2.3	Change of Use