

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRF

1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
1 GENERAL PROVISIONS		9.0 EARTHQUAKE LOADS	It is noted that the section is based on the 1997 NEHRP Provisions.	
		9.1 GENERAL PROVISIONS		
1.1 PURPOSE		9.1.1 Purpose	Essentially similar	Equivalent
1.2 SCOPE AND APPLICATION 1.2.1 Scope	<p>These <i>Provisions</i> shall apply to the design and construction of <i>structures</i> including <i>additions</i>, change of use, and <i>alterations</i> to resist the effects of earthquake motions. Every <i>structure</i>, and portion thereof, shall be designed and constructed to resist the effects of earthquake motions as prescribed by these <i>Provisions</i>.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. Detached one- and two-family dwellings located where S_{DS} is less than 0.4g are exempt from all requirements of these <i>Provisions</i>. 2. Detached one- and two-family wood frame dwellings located where S_{DS} is equal to or greater than 0.4g and that are designed and constructed in accordance with the conventional light frame construction provisions in Sec. 12.5 are exempt from all other requirements of these <i>Provisions</i>. 3. Agricultural storage <i>structures</i> intended only for incidental human occupancy are exempt from all requirements of these <i>Provisions</i>. 4. <i>Structures</i> located where S_1 is less than 	9.1.2 Scope and Application	<p>Essentially identical with the following changes:</p> <p>Exception 1: Same as Exception 4 of NEHRP.</p> <p>Exception 2: Applicable where $S_s < 0.4g$. In addition, it applies to dwellings in SDC A, B and C (i.e., where $S_{DS} \leq 0.50g$ and $S_{D1} \leq 0.20g$).</p> <p>Exception 3: Detached one- and two-family wood frame dwellings with no more than two stories above grade, that conform to the provisions of Section A9.12.10.</p> <p>Exception 4: Same as Exception 3 of NEHRP.</p>	<p>Equivalent</p> <p>ASCE Exception 2 is less restrictive than NEHRP Exception 1.</p> <p>Equivalent or slightly more restrictive.</p> <p>Equivalent</p>

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	or equal to 0.04g and S_5 is less than or equal to 0.15g shall only be required to comply with Sec. 5.2.6.1.			
1.2.2 Addition	An <i>addition</i> that is not structurally independent from an existing <i>structure</i> shall be designed and constructed such that the entire <i>structure</i> conforms to the seismic-force- resistance requirements for new <i>structures</i> unless all of the following conditions are satisfied: 1. The <i>addition</i> conforms with the requirements for new <i>structures</i> , and 2. The <i>addition</i> does not increase the <i>seismic forces</i> in any structural <i>element</i> of the existing <i>structure</i> by more than 5 percent, unless the capacity of the <i>element</i> subject to the increased forces is still in compliance with these <i>Provisions</i> , and 3. The <i>addition</i> does not decrease the seismic resistance of any structural <i>element</i> of the existing <i>structure</i> to less than that required for a new <i>structure</i> .	9.1.2.2 Additions to Existing Structures	Identical	Equivalent
1.2.3 Change of Use	When a change of use results in a <i>structure</i> being reclassified to a higher <i>Seismic Use Group</i> , the <i>structure</i> shall conform to the requirements of Section 1.2.1 for a new <i>structure</i> . Exception: When a change of use results in a <i>structure</i> being reclassified from <i>Seismic Use Group I</i> to <i>Seismic Use Group II</i> , compliance with these <i>Provisions</i> is not required if the <i>structure</i> is located where S_{DS} is less than 0.3.	9.1.2.3 Change of Use	Nearly identical; however the limit on S_{DS} in the exception was changed from 0.3 to 0.333.	Considered equivalent
1.2.4 Alterations	<i>Alterations</i> are permitted to be made to any <i>structure</i> without requiring the <i>structure</i> to comply with these <i>Provisions</i>		No corresponding provisions.	Equivalency cannot be judged

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	provided the <i>alterations</i> conform to that required for a new <i>structure</i> . <i>Alterations</i> shall not decrease the lateral-force resisting system strength or stiffness to less than that required by these <i>Provisions</i> . The <i>alteration</i> shall not cause the existing structural <i>elements</i> to be loaded beyond their capacity.			
	No corresponding provisions	9.1.2.4 Application of Provisions	The applicability of Chapter 9 is indicated.	Does not affect equivalency
	No corresponding provisions	9.1.2.4.1 New Buildings	The scope of Chapter 9 is outlined in more detail.	Does not affect equivalency
1.2.5 Alternate Materials and Means and Methods of Construction		9.1.2.5 Alternate Materials and Means and Methods of Construction	Essentially similar	Equivalent
1.3 SEISMIC USE GROUPS 1.3.1 Seismic Use Group III 1.3.2 Seismic Use Group II 1.3.3 Seismic Use Group I		9.1.3 Seismic use Groups	ASCE 7 defines these by means of a table in terms of Occupancy Categories which do not exist in the NEHRP Provisions. Substance is similar, although there are differences in detail.	Considered equivalent
1.3.4 Multiple Use		9.1.3.4 Multiple Use	Identical	Equivalent
1.3.5 Seismic Use Group III Structures Access Protection		9.1.3.1.1	Identical	Equivalent
	No corresponding provisions	9.1.3.1.2	Explicitly requires continued functionality of designated seismic systems in SUG III structures.	ASCE is more stringent
1.4 OCCUPANCY IMPORTANCE FACTOR		9.1.4 Occupancy Importance Factor	Identical	Equivalent

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1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
3 QUALITY ASSURANCE		9.4.3 Quality Assurance	Refers to Appendix A.9.3 for supplementary provisions.	
3.1 SCOPE		A.9.3 Quality Assurance	Identical	Equivalent
3.2 QUALITY ASSURANCE		A.9.3.1 Scope	Essentially identical. In addition, ASCE specifies some reference standards for inspection and testing.	Considered equivalent
3.2.1 Details of Quality Assurance Plan		A9.3.2 Quality Assurance Plan A9.3.2.1 Details of Quality Assurance Plan	Identical	Equivalent
3.2.2 Contractor Responsibility		A9.3.2.2 Contractor Responsibility	Identical	Equivalent
3.3 SPECIAL INSPECTION		A9.3.3 Special Inspection	Essentially identical	Equivalent
3.3.1 Piers, Piles, Caissons		A9.3.3.1 Foundations	Identical	Equivalent
3.3.2 Reinforcing Steel		A9.3.3.2 Reinforcing Steel A9.3.3.2.1 A9.3.3.2.2	Identical	Equivalent
3.3.3 Structural Concrete		A9.3.3.3 Structural Concrete	Identical	Equivalent
3.3.4 Prestressed Concrete		A9.3.3.4 Prestressed Concrete	Identical	Equivalent
3.3.5 Structural Masonry		A9.3.3.5 Structural Masonry A9.3.3.5.1 A9.3.3.5.2	Identical	Equivalent
3.3.6 Structural Steel 3.3.6.1 3.3.6.2		A9.3.3.6 Structural Steel A9.3.3.6.1 A9.3.3.6.2	Identical	Equivalent
3.3.7 Structural Wood		A9.3.3.7 Structural	Identical	Equivalent

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		Wood		
3.3.8 Cold-Formed Steel Framing		A9.3.3.8 Cold-Formed Steel Framing	Identical	Equivalent
3.3.9 Architectural Components		A9.3.3.9 Architectural Components	Identical	Equivalent
3.3.10 Mechanical and Electrical Components		A9.3.3.10 Mechanical and Electrical Components	Identical	Equivalent
3.3.11 Seismic Isolation System		A9.3.3.11 Seismic Isolation System	Identical	Equivalent
3.4 TESTING		A9.3.4 Testing	Identical	Equivalent
3.4.1 Reinforcing and Prestressing Steel		A9.3.4.1 Reinforcing and Prestressing Steel	Identical	Equivalent
3.4.2 Structural Concrete	Refers to ACI 318-95	A9.3.4.2 Structural Concrete	Refers to ACI 318-99	Essentially equivalent
3.4.3 Structural Masonry	Refers to ACI 530-95/ASCE 5-95/TMS 402-95	A9.3.4.3 Structural Masonry	Refers to ACI 530-99/ASCE 5-99/TMS 402-99	Essentially equivalent
3.4.4 Structural Steel 3.4.4.1 Base Metal Testing		A9.3.4.4 Structural Steel A9.3.4.4.1 Base Metal Testing	Identical	Equivalent
3.4.5 Mechanical and Electrical Equipment		A9.3.4.5 Mechanical and Electrical Equipment	Identical	Equivalent
3.4.6 Seismically Isolated Structures		A9.3.4.6 Seismically Isolated Structures	Identical	Equivalent
3.5 STRUCTURAL OBSERVATIONS		A9.3.5 Structural Observations	Identical	Equivalent
3.6 REPORTING AND COMPLIANCE PROCEDURES		A9.3.6 Reporting And Compliance Procedures	Identical	Equivalent

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1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
4 GROUND MOTION				
4.1 PROCEDURES FOR DETERMINING MAXIMUM CONSIDERED EARTHQUAKE AND DESIGN EARTHQUAKE GROUND MOTION ACCELERATIONS AND RESPONSE SPECTRA 4.1.1 Maximum Considered Earthquake Ground Motions		9.4.1 Procedures For Determining Maximum Considered Earthquake And Design Earthquake Ground Motion Accelerations And Response Spectra 9.4.1.1 Maximum Considered Earthquake Ground Motions	Identical	Equivalent
4.1.2 General Procedure for Determining Maximum Considered Earthquake and Design Spectral Response Accelerations		9.4.1.2 General Procedure for Determining Maximum Considered Earthquake and Design Spectral Response Accelerations	Essentially identical, except ASCE omits NEHRP paragraph stating that accelerations need not be determined where $S_s \leq 0.15g$ and $S_1 \leq 0.04g$.	Equivalent
4.1.2.1 Site Class Definitions		9.4.1.2.1 Site Class Definitions	Essentially identical. ASCE refers to certain standards, which is not done in NEHRP.	Equivalent
4.1.2.2 Steps for Classifying a Site		9.4.1.2.2 Steps for Classifying a Site	Essentially identical	Equivalent
4.1.2.3 Definition of Site Class Parameters		9.4.1.2.3 Definition of Site Class Parameters	Identical	Equivalent
4.1.2.4 Site Coefficients and Adjusted Maximum Considered		9.4.1.2.4 Site Coefficients and Adjusted Maximum Considered Earthquake	Identical	Equivalent

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Earthquake Spectral Response Acceleration Parameters		Spectral Response Acceleration Parameters		
4.1.2.5 Design Spectral Response Acceleration Parameters		9.4.1.2.5 Design Spectral Response Acceleration Parameters	Identical	Equivalent
4.1.2.6 General Procedure Response Spectrum		9.4.1.2.6 General Procedure Response Spectrum	Identical	Equivalent
4.1.3 Site-Specific Procedure for Determining Ground Motion Accelerations		9.4.1.3 Site-Specific Procedure for Determining Ground Motion Accelerations	Identical	Equivalent
4.1.3.1 Probabilistic Maximum Considered Earthquake		9.4.1.3.1 Probabilistic Maximum Considered Earthquake	Identical	Equivalent
4.1.3.2 Deterministic Limit on Maximum Considered Earthquake Ground Motion		9.4.1.3.2 Deterministic Limit on Maximum Considered Earthquake Ground Motion	Identical	Equivalent
4.1.3.3 Deterministic Maximum Considered Earthquake Ground Motion		9.4.1.3.3 Deterministic Maximum Considered Earthquake Ground Motion	Identical	Equivalent
4.1.3.4 (mis-printed as 4.1.3.5) Site-Specific Design Ground Motion		9.4.1.3.4 Site-Specific Design Ground Motion	Identical	Equivalent
4.2 SEISMIC DESIGN CATEGORY		9.4.2 SEISMIC DESIGN CATEGORY		
4.2.1 Determination of Seismic Design Category		9.4.2.1 Determination of Seismic Design Category	Identical	Equivalent
4.2.2 Site Limitation for Seismic Design Categories E and F		9.4.2.2 Site Limitation for Seismic Design Categories E and F	Identical	Equivalent

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1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
5 STRUCTURAL DESIGN CRITERIA		9.5 STRUCTURAL DESIGN CRITERIA, ANALYSIS & PROCEDURES		
5.1 REFERENCE DOCUMENT	Refers to ASCE 7-95 for loads other than earthquakes.		The ASCE is itself ASCE 7-98, i.e., an updated version of the document referenced by NEHRP.	Considered equivalent
5.2 DESIGN BASIS 5.2.1 General		9.5.2 Structural Design Requirements 9.5.2.1 Design Basis	Identical	Equivalent
5.2.2 Basic Seismic-Force-Resisting Systems		9.5.2.2 Basic Seismic-Force-Resisting Systems	Table 1617.6 has the following changes from Table 5.2.2 of NEHRP: (1) Detailed plain concrete shear walls (BW Systems) – building height changed from NL to NP in SDC C (2) Special Reinforced concrete shear walls (BW Systems) – building height limit changed from 100 to 160 ft. in SDC F (3) Special Reinforced masonry shear walls (BW Systems) – R changed from 3-1/2 to 5 (4) Intermediate Reinforced masonry shear walls (BW Systems) – R changed from 2-1/2 to 3-1/2 (5) Detailed plain masonry shear walls (BW Systems) – building height changed from 160 ft to NP in SDC C (6) Light frame walls with shear panels (BW Systems) : Wood structural panels – R changed from 6-1/2 to 6 (7) Ordinary Reinforced masonry shear walls (BW Systems) – building height changed from NP to 160 ft in SDC C (8) Light frame walls with shear panels (BW Systems): all other materials – Added (9) Detailed plain concrete shear walls (BF Systems) – building height changed from NL to NP in SDC C (10) Special Reinforced masonry shear walls (BF	Considered equivalent

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			<p>Systems) – R changed from 4-1/2 to 5-1/2</p> <p>(11) Intermediate Reinforced masonry shear walls (BF Systems) – R changed from 3 to 4</p> <p>(12) Intermediate Reinforced masonry shear walls (BF Systems) – C_d changed from 2-1/2 to 4</p> <p>(13) Intermediate Reinforced masonry shear walls (BF Systems) – building height changed from 160 ft, 160 ft, 100 ft to NP, NP, NP in SDCs D, E, and F, respectively.</p> <p>(14) Ordinary Reinforced masonry shear walls (BF Systems) – building height changed from NP to 160 ft in SDC C</p> <p>(15) Detailed plain masonry shear walls (BF Systems) – building height changed from 160 ft to NP in SDC C</p> <p>(16) Light frame walls with shear panels (BF Systems): Wood structural panels– R changed from 7 to 6-1/2; building height limit changed from 160 ft to 65 ft in SDC D, E and F.</p> <p>(17) Light frame walls with shear panels (BF Systems): all other materials – Added</p> <p>(18) Intermediate reinforced masonry shear walls (Dual Systems with Special Moment Frames) – building height changed from NL to NP in SDC D.</p> <p>(19) Intermediate reinforced masonry shear walls (Dual Systems with Intermediate Moment Frames) – building height changed from 160 ft to NP in SDC D.</p> <p>(20) Ordinary Composite Reinforced Concrete Shear Wall with steel elements (Dual Systems with Intermediate Moment Frames) – R and Ω_0 changed from 5-1/2 and 2-1/2 to 5 and 3, respectively.</p> <p>(21) Cantilevered Column Systems (in Inverted Pendulum System) - Added</p>	
5.2.2.1 Dual System		9.5.2.2.1 Dual System	Identical	Equivalent
5.2.2.2 Combinations		9.5.2.2.2	Identical	Equivalent

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of Framing Systems 5.2.2.2.1 R and Ω_o Factors 5.2.2.2.2 Combination Framing Detailing Requirements		Combinations of Framing Systems 9.5.2.2.2.1 R and Ω_o Factors 9.5.2.2.2.2 Combination Framing Detailing Requirements		
5.2.2.3 Seismic Design Categories B and C		9.5.2.2.3 Seismic Design Categories A, B and C	Identical except that the applicability is to SDCs A, B, C instead of B and C.	Considered equivalent
5.2.2.4 Seismic Design Categories D and E		9.5.2.2.4 Seismic Design Categories D and E	Identical	Equivalent
5.2.2.4.1 Limited Building Height		9.5.2.2.4.1 Limited Building Height	Identical	Equivalent
5.2.2.4.2 Interaction Effects		9.5.2.2.4.2 Interaction Effects	Identical	Equivalent
5.2.2.4.3 Deformational Compatibility	Every ... Exception: Beams and columns and their connections not designed as part of the lateral-force-resisting system but meeting the detailing requirements for either <i>intermediate moment frames</i> or <i>special moment frames</i> are permitted to be designed to be adequate for the vertical load- carrying capacity and the induced moments and shears resulting from the deformation of the <i>building</i> under the application of the design <i>seismic forces</i> .	9.5.2.2.4.3 Deformational Compatibility	Identical except for the following changes: (1) Exception changed to: Reinforced concrete frame members not designed as part of the seismic force resisting system shall comply with Section 21.9 of ACI 318.	ASCE is more stringent
5.2.2.4.4 Special Moment Frames		9.5.2.2.4.4 Special Moment Frames	Identical	Equivalent

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5.2.2.5 Seismic Design Category F		9.5.2.2.5 Seismic Design Category F	Identical	Equivalent
5.2.3 Structure Configuration		9.5.2.3 Structure Configuration	Identical	Equivalent
5.2.3.1 Diaphragm Flexibility	<i>Diaphragms</i> constructed of untopped steel decking, wood structural panels, or similar panelized construction shall be considered flexible in <i>structures</i> having concrete or masonry <i>shear walls</i> . <i>Diaphragms</i> constructed of wood structural panels shall be considered rigid in light-frame <i>structures</i> using structural panels for lateral load resistance. <i>Diaphragms</i> of other types shall be considered flexible when the maximum lateral <i>deformation</i> of the <i>diaphragm</i> is more than two times the average <i>story</i> drift of the associated <i>story</i> . The loadings used for this calculation shall be those prescribed by Sec. 5.3.	9.5.2.3.1 Diaphragm Flexibility	A diaphragm is flexible for the purpose of distribution of story shear and torsional moment when the lateral deformation of the diaphragm is more than two times the average story drift of the associated story.	ASCE gives the definition of diaphragm flexibility independent of the material of construction. ASCE is more stringent.
5.2.3.2 Plan Irregularity		9.5.2.3.2 Plan Irregularity	Identical	Equivalent
5.2.3.3 Vertical Irregularity		9.5.2.3.3 Vertical Irregularity	Identical with the following change: In case of Irregularity Type 4, SDCs in which it needs to be considered are B, C, D, E and F instead of D, E and F only.	ASCE is more stringent
5.2.4 Redundancy		9.5.2.4 Redundancy	Identical	Equivalent
5.2.4.1 Seismic Design Categories A, B, and C		9.5.2.4.1 Seismic Design Categories A, B, and C	Identical	Equivalent
5.2.4.2 Seismic Design Category D 5.2.4.3 Seismic Design Categories E and F		9.5.2.4.2 Seismic Design Category D 5.2.4.3 Seismic Design Categories E and F	Identical	Equivalent
5.2.5 Analysis	A structural analysis shall be made for all	9.5.2.5 Analysis	Identical except for the following change:	Considered

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Procedures	... permitted for any <i>structure</i> . The limitations on the <i>base shear</i> stated in Sec. 5.4 apply to dynamic modal analysis.	Procedures	The limitations on the <i>base shear</i> stated in Sec. 5.4 apply to any modal analysis procedure which is force-based.	equivalent
5.2.5.1 Seismic Design Category A		9.5.2.5.1 Seismic Design Category A	Identical	Equivalent
5.2.5.2 Seismic Design Categories B and C		9.5.2.5.2 Seismic Design Categories B and C	Identical	Equivalent
5.2.5.3 Seismic Design Categories D, E, and F	Follow Table 5.2.5.3 to determine the analysis procedure. The Table identifies 4 cases: 1. <i>Structures</i> designated as regular up to 240 feet (70 m) 2. <i>Structures</i> that have only vertical irregularities of Type 1a, 1b, 2, or 3 in Table 5.2.3.3 or plan irregularities of Type 1a or 1b of Table 5.2.3.2 and have a height exceeding 65 feet (20 m). 3. All other <i>structures</i> designated as having plan or vertical irregularities. 4. <i>Structures</i> in areas with S_{D1} of 0.2 and greater with a period greater than T_0 located on <i>Site Class F</i> or <i>Site Class E</i> soils	9.5.2.5.3 Seismic Design Categories D, E, and F	Identical except for the following addition to requirements for Item 4 of NEHRP Table: also, the modal seismic design coefficient, C_{sm} , shall not be limited per Section 9.5.4.5.	Considered equivalent
5.2.5.4 Diaphragms		9.5.2.5.4 Diaphragms	Identical	Equivalent
5.2.6 Design, Detailing Requirements, and Structural Component Load Effects		9.5.2.6 Design, Detailing Requirements, and Structural Component Load Effects	Identical	Equivalent
5.2.6.1 Seismic Design Category A		9.5.2.6.1 Seismic Design Category A	Identical	Equivalent
5.2.6.1.1.1 Component Load Effects		9.5.2.6.1.1.1 Component Load Effects	Identical	Equivalent
5.2.6.1.2 Connections	All parts of structure ... being connected.	9.5.2.6.1.2	Identical except for the following additions:	Considered

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	Any smaller portion of the structure shall be tied to the remainder of the structure with elements having a strength of 0.133 times S_{DS} times the weight of the smaller portion or 5% of the portion's weight, whichever is greater. A positive connection .. reaction.	Connections	All parts greater. This connection force does not apply to the overall design of the lateral force resisting system. Connection design forces need not exceed the maximum forces that the structural system can deliver to the connection where the maximum system capacity is computed with a Ω_o factor of 3. A positive connection .. reaction. One means to provide the strength is to use connecting elements such as slabs.	equivalent. ASCE additions are mostly clarifications.
5.2.6.1.3 Anchorage of Concrete and Masonry Walls		9.5.2.6.1.3 Anchorage of Concrete and Masonry Walls	Identical	Equivalent
5.2.6.2 Seismic Design Category B		9.5.2.6.2 Seismic Design Category B		
5.2.6.2.1 Second-Order Effects		9.5.2.6.2.1 Component load effects 9.5.2.6.2.3 Direction of seismic load	Essentially identical	Considered equivalent
5.2.6.2.2 Openings	Where openings occur in shear walls ... develop the force in the reinforcement.	9.5.2.6.2.2 Openings	Identical with the following addition: Where openings ... reinforcement. The extension must be sufficient in length to allow dissipation or transfer of the force without exceeding the shear and tension capacity of the diaphragm or the wall.	Considered equivalent
5.2.6.2.3 Discontinuities in Vertical System		9.5.2.6.2.4 Discontinuities in Vertical System	Identical	Equivalent
5.2.6.2.4 Nonredundant Systems		9.5.2.6.2.5 Nonredundant Systems	Identical	Equivalent
5.2.6.2.5 Collector Elements		9.5.2.6.2.6 Collector Elements	Identical	Equivalent
5.2.6.2.6 Diaphragms	The deflection ... the prescribed loads. Floor and roof diaphragms shall be designed to resist the following forces: A minimum force equal to 20 percent of the short period design spectral response acceleration S_{DS} times the weight of the	9.5.2.6.2.7 Diaphragms	Identical with the following changes: The sentence prescribing the minimum force is deleted. The following sentence is added instead: At diaphragm discontinuities, such as openings and re-entrant corners, the design shall assure that the dissipation or transfer of edge (chord) forces combined with other	ASCE less stringent

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	acceleration S_{DS} times the weight of the <i>diaphragm</i> and other <i>elements</i> of the <i>structure</i> attached thereto plus the portion of the seismic shear force at that level, V_x , required to be transferred to the <i>components</i> of the vertical <i>seismic-force-resisting system</i> because of offsets or changes in stiffness of the vertical <i>components</i> above and below the diaphragm. Diaphragms shall .. connections.		forces in the diaphragm is within shear and tension capacity of the diaphragm.	
5.2.6.2.7 Bearing Walls		9.5.2.6.2.7 Bearing Walls	Identical	Equivalent
5.2.6.2.8 Inverted Pendulum-Type Structures		9.5.2.6.2.8 Inverted Pendulum-Type Structures	Identical	Equivalent
5.2.6.2.9 Anchorage of Nonstructural Systems		9.5.2.6.2.9 Anchorage of Nonstructural Systems	Identical	Equivalent
5.2.6.2.10 Columns Supporting Discontinuous Walls or Frames		9.5.2.6.2.10 Columns Supporting Discontinuous Walls or Frames	Identical	Equivalent
5.2.6.3 Seismic Design Category C		9.5.2.6.3 Seismic Design Category C	Identical	Equivalent
5.2.6.3.1 Plan Irregularity		9.5.2.6.3.1 Direction of seismic load	Essentially identical	Equivalent
5.2.6.3.2 Collector Elements		9.5.2.6.3.2 Collector Elements	Identical	Equivalent
5.2.6.3.3 Anchorage of Concrete or Masonry Walls		9.5.2.6.3.3 Anchorage of Concrete or Masonry Walls	Identical	Equivalent
5.2.6.4 Seismic Design Category D		9.5.2.6.4 Seismic Design Category D	Identical	Equivalent
5.2.6.4.1 Orthogonal Load Effects		9.5.2.6.4.1 Direction of seismic load	Essentially identical	Equivalent

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5.2.6.4.2 Collector Elements		9.5.2.6.4.2 Collector Elements	Essentially identical	Equivalent
5.2.6.4.3 Plan or Vertical Irregularities		9.5.2.6.4.3 Plan or Vertical Irregularities	Identical	Equivalent
5.2.6.4.4 Vertical Seismic Forces		9.5.2.6.4.4 Vertical Seismic Forces	Identical	Equivalent
5.2.6.5 Seismic Design Categories E and F		9.5.2.6.5 Seismic Design Categories E and F	Identical	Equivalent
5.2.6.5.1 Plan or Vertical Irregularities		9.5.2.6.5.1 Plan or Vertical Irregularities	Identical	Equivalent
5.2.7 Combination of Load Effects	The effects on the structure and its components due to gravity loads and seismic forces shall be combined in accordance with the factored load combinations as presented in ASCE 7-95 except that the effect of seismic loads, E, shall be as defined herein. ...	9.5.2.7 Combination of Load Effects - Paragraph 1	Refers to ASCE 7-98; essentially identical as far as the earthquake effects are concerned.	Considered equivalent
5.2.7.1 Special Combination of Loads	When specifically required by these provisions, strengths.	9.5.2.7 Combination of Load Effects -Paragraph 2 to end	For columns supporting discontinuous lateral-force-resisting elements, the axial compression in the columns shall be computed using the special load combinations given in NEHRP.	Considered equivalent
5.2.8 Deflection and Drift Limits		9.5.2.8 Deflection and Drift Limits	Identical	Equivalent
5.3 EQUIVALENT LATERAL FORCE PROCEDURE 5.3.1 General		9.5.3 Equivalent Lateral Force Procedure 9.5.3.1 General	Identical	Equivalent
5.3.2 Seismic Base Shear		9.5.3.2 Seismic Base Shear	Identical	Equivalent
5.3.2.1 Calculation of Seismic Response Coefficient	In addition to three equations to compute <i>seismic response coefficient</i> , C_s , it is stated that C_s shall not be taken less than: $C_s = 0.1 S_{D1} I$	9.5.3.2.1 Calculation of Seismic Response Coefficient	Identical except that C_s shall not be less than: $C_s = 0.044 S_{DS} I$ instead of $0.1 S_{D1} I$ in NEHRP.	ASCE is less stringent at locations where $S_{DS} < 2.273 S_{D1}$
5.3.3 Period Determination		9.5.3.3 Period Determination	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

5.3.3.1 Approximate Fundamental Period		9.5.3.3.1 Approximate Fundamental Period	Identical	Equivalent
5.3.4 Vertical Distribution of Seismic Forces		9.5.3.4 Vertical Distribution of Seismic Forces	Identical	Equivalent
5.3.5 Horizontal Shear Distribution		9.5.3.5 Horizontal Shear Distribution and Torsion 9.5.3.5.1 Direct shear	Identical	Equivalent
5.3.5.1 Torsion 5.3.5.2 Accidental Torsion 5.3.5.3 Dynamic Amplification of Torsion		9.5.3.5.2 Torsion	Identical	Equivalent
5.3.6 Overturning		9.5.3.6 Overturning	Identical	Equivalent
5.3.7 Drift Determination and P-Delta Effects		9.5.3.7 Drift Determination and P-Delta Effects	Identical	Equivalent
5.3.7.1 Story Drift Determination		9.5.3.7.1 Story Drift Determination	Identical	Equivalent
5.3.7.2 P-Delta Effects		9.5.3.7.2 P-Delta Effects	Identical with the following addition: When P-delta effect is included in an automated analysis, Eq. 9.5.3.7.2-2 must still be satisfied, however, the value of θ computed from Eq. 9.5.3.7.2-1 using the results of the P-delta analysis may be divided by $(1 + \theta)$ before checking Eq. 9.5.3.7.2-2.	Considered equivalent
	No corresponding provisions in NEHRP	9.3.8 Simplified Analysis Procedure for Seismic Design of Buildings 9.3.8.1 Seismic Base Shear 9.3.8.2 Vertical distribution		ASCE has incorporated procedure from 1997 UBC that is not in 1997 NEHRP. Equivalency is not affected.
5.4 MODAL ANALYSIS		9.5.4 Modal Analysis Procedure	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

PROCEDURE 5.4.1 General		9.5.4.1 General		
5.4.2 Modeling		9.5.4.2 Modeling	Identical	Equivalent
5.4.3 Modes		9.5.4.3 Modes	Identical	Equivalent
5.4.4 Modal Properties		9.5.4.4 Periods	Identical	Equivalent
5.4.5 Modal Base Shear		9.5.4.5 Modal Base Shear	Identical except that NEHRP Exception 1 has been deleted.	Considered equivalent
5.4.6 Modal Forces, Deflections, and Drifts		9.5.4.6 Modal Forces, Deflections, and Drifts	Identical	Equivalent
5.4.7 Modal Story Shears and Moments		9.5.4.7 Modal Story Shears and Moments	Identical	Equivalent
5.4.8 Design Values		9.5.4.8 Design Values	Identical	Equivalent
5.4.9 Horizontal Shear Distribution		9.5.4.9 Horizontal Shear Distribution	Identical	Equivalent
5.4.10 Foundation Overturning		9.5.4.10 Foundation Overturning	Identical	Equivalent
5.4.11 P-Delta Effects		9.5.4.11 P-Delta Effects	Identical	Equivalent
5.5 SOIL-STRUCTURE INTERACTION EFFECTS		9.5.5 Soil Structure Interaction	Identical	Equivalent
5.5.1 General		9.5.5.1 General	Identical	Equivalent
5.5.2 Equivalent Lateral Force Procedure		9.5.5.2 Equivalent Lateral Force Procedure	Identical	Equivalent
5.5.2.1 Base Shear		9.5.5.2.1 Base Shear	Identical	Equivalent
5.5.2.1.1 Effective Building Period		5.5.2.1.1 Effective Building Period	Identical	Equivalent
5.5.2.1.2 Effective Damping	The effective damping The values of β_0 corresponding to $A_v = 0.15$	9.5.5.2.1.2 Effective Damping	Identical except that the term A_v was replaced by $0.4 S_{DS}$, correcting an editorial error in the NEHRP Provisions.	Equivalent
5.5.2.2 Vertical Distribution of Seismic Forces		9.5.5.2.2 Vertical Distribution of Seismic Forces	Identical	Equivalent
5.5.2.3 Other Effects		9.5.5.2.3 Other Effects	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

5.5.3 Modal Analysis Procedure		9.5.5.3 Modal Analysis Procedure		
5.5.3.1 Modal Base Shears		9.5.5.3.1 Modal Base Shears	Identical	Equivalent
5.5.3.2 Other Modal Effects		9.5.5.3.2 Other Modal Effects	Identical	Equivalent
5.5.3.3 Design Values		9.5.5.3.3 Design Values	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
6 ARCHITECTURE, MECHANICAL, AND ELECTRICAL DESIGN REQUIREMENTS		9.6 ARCHITECTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND SYSTEMS		
6.1 GENERAL		9.6.1 GENERAL	Identical	Equivalent
6.1.1 References and Standards 6.1.1.1 Consensus Standards 6.1.1.2 Accepted Standards		9.6.1.1 References Standards 9.6.1.1.1 Consensus Standards 9.6.1.1.2 Accepted Standards	Identical	Equivalent
6.1.2 Component Force Transfer		9.6.1.2 Component Force Transfer	Identical	Equivalent
6.1.3 Seismic Forces		9.6.1.3 Seismic Forces	Identical	Equivalent
6.1.4 Seismic Relative Displacements		9.6.1.4 Seismic Relative Displacements	Identical	Equivalent
6.1.5 Component Importance Factor		9.6.1.5 Component Importance Factor	Identical	Equivalent
6.1.6 Component Anchorage 6.1.6.1 6.1.6.2 6.1.6.3 6.1.6.4 6.1.6.5 6.1.6.6	Components shall be anchored in accordance with the following provisions. 6.1.6.1: The force in the connected part shall be determined based on the prescribed forces for the component specified in Sec. 6.1.3. Where component anchorage is provided by expansion anchors, shallow chemical anchors or shallow (low deformability) cast-in-place anchors, a value of $R_p = 1.5$ shall be used in Sec. 6.1.3 to determine the forces in the connected part.	9.6.1.6 Component Anchorage 9.6.1.6.1 9.6.1.6.2 9.6.1.6.3 9.6.1.6.4 9.6.1.6.5 9.6.1.6.6	Identical to NEHRP except for the deletion of second sentence in 6.1.6.1.	Considered equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

6.1.6.7	For additional requirements for anchors to steel, see Chapter 10		No specific corresponding provisions in Chapter 9.6	Does not affect equivalency
6.1.6.8	For additional requirements for anchors to masonry, see Chapter 11			
6.1.6.9	For additional requirements for anchors to wood, see Chapter 12			
6.1.7 Construction Documents	Construction documents shall be prepared by a registered design professional in a manner consistent with the requirements of these <i>Provisions</i> , as indicated in Table 6.1.7, in sufficient detail for use by the <i>owner</i> , building officials, contractors, and inspectors.	9.6.1.7 Construction Documents	Essentially identical; the word "registered professional" is not specifically used.	Equivalent
6.2 ARCHITECTURAL COMPONENT DESIGN		9.6.2 Architectural Component Design		
6.2.1 General		9.6.2.1 General	Identical	Equivalent
6.2.2 Architectural Component Forces and Displacements		9.6.2.2 Architectural Component Forces and Displacements	Identical	Equivalent
6.2.3 Architectural Component Deformation		9.6.2.3 Architectural Component Deformation	Identical	Equivalent
6.2.4 Exterior Nonstructural Wall Elements and Connections		9.6.2.4 Exterior Nonstructural Wall Elements and Connections	Identical	Equivalent
6.2.5 Out-of-Plane Bending		9.6.2.5 Out-of-Plane Bending	Identical	Equivalent
6.2.6 Suspended Ceilings		9.6.2.6 Suspended Ceilings	Identical	Equivalent
6.2.6.1 Seismic Forces		9.6.2.6.1 Seismic Forces	Identical	Equivalent
6.2.6.2 Industry Standard Construction		9.6.2.6.2 Industry Standard Construction	Identical	Equivalent
6.2.6.2.1 Seismic Design Category C		9.6.2.6.2.1 Seismic Design Category C	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

6.2.6.2.2 Seismic Design Categories D, E, and F		9.6.2.6.2.2 Seismic Design Categories D, E, and F	Identical	Equivalent
6.2.6.3 Integral ceiling/sprinkler construction		9.6.2.6.3 Integral ceiling/sprinkler construction	Identical	Equivalent
6.2.7 Access Floors		9.6.2.7 Access Floors	Identical	Equivalent
6.2.7.1 General		9.6.2.7.1 General	Identical	Equivalent
6.2.7.2 Special Access Floors		9.6.2.7.2 Special Access Floors	Identical	Equivalent
6.2.8 Partitions		9.6.2.8 Partitions	Identical	Equivalent
6.2.9 Steel Storage Racks	Steel <i>storage racks</i> shall be designed to meet the force requirements of Chapter 14.	9.6.2.9 Steel Storage Racks	Steel storage racks supported at the base of the structure shall be designed to meet the force requirements of Section 9.14. Steel Storage Racks supported above the base of the structure shall be designed to meet the force requirements of Sections 9.6.1 and 9.6.2.	Considered equivalent
6.3 MECHANICAL AND ELECTRICAL COMPONENT DESIGN 6.3.1 General		9.6.3 Mechanical and Electrical Component Design 9.6.3.1 General	Identical	Equivalent
6.3.2 Mechanical and Electrical Component Forces and Displacements	Mechanical and electrical components shall meet the force and seismic relative displacement requirements of Sec. 6.1.3, Sec. 6.1.4, and Table 6.3.2. Some complex equipment	9.6.3.2 Mechanical and Electrical Component Forces and Displacements	ASCE identical to NEHRP, except for the following changes: The a_p and R_p factors in Table 9.6.3.2 have been changed from 1.0 and 3.5 for General Electrical distribution systems (bus ducts, conduit, cable tray) to 2.5 and 5.0, respectively.	ASCE provisions are slightly more stringent
6.3.3 Mechanical and Electrical Component Period		9.6.3.3 Mechanical and Electrical Component Period	Identical	Equivalent
6.3.4 Mechanical and Electrical Component Attachments		9.6.3.4 Mechanical and Electrical Component Attachments	Identical	Equivalent
6.3.5 Component Supports		9.6.3.5 Component Supports	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

6.3.6 Component Certification		9.6.3.6 Component Certification	Identical	Equivalent
6.3.7 Utility and Service Lines at Structure Interfaces		9.6.3.7 Utility and Service Lines at Structure Interfaces	Identical	Equivalent
6.3.8 Site-Specific Considerations		9.6.3.8 Site-Specific Considerations	Identical	Equivalent
6.3.9 Storage Tanks		9.6.3.9 Storage Tanks	Identical	Equivalent
6.3.10 HVAC Ductwork	Attachments and supports for HVAC ... of this section. In addition to their attachments and supports, ductwork systems designated as having an $I_p > 1.0$ shall be designed to meet the force and displacement requirements of Sec. 6.1.3 and 6.1.4 and the additional requirements of this section. Where HVAC ductwork runs between <i>structures</i> that could displace relative to one another and for isolated <i>structures</i> where the HVAC ductwork crosses the isolation interface, the HVAC ductwork shall be designed to accommodate the seismic relative displacements specified in Sec. 6.1.4. Seismic restraints are ... requirements of Sec. 6.1.3. Appurtenances such as dampers, louvers, and diffusers shall be positively attached with mechanical fasteners. Unbraced piping attached to in-line equipment shall be provided with adequate flexibility to accommodate differential displacements.	9.6.3.10 HVAC Ductwork	Identical, except for the following changes: $I_p > 1.0$ has been changed to $I_p = 1.5$ in ASCE. The two sentences "Where HVAC ... Sec. 6.1.4." and "Appurtenances ... displacements." Were deleted in ASCE.	ASCE slightly less stringent
6.3.11 Piping Systems	Attachments and supports for piping systems shall be designed to meet the force and displacement requirements of Sec. 6.1.3 and 6.1.4 and the additional requirements of this section. In addition to their attachments and supports, piping	9.6.3.11 Piping Systems	Identical, except for the following changes: 1. $I_p > 1.0$ has been changed to $I_p = 1.5$ in ASCE. 2. The sentence "When piping ... Sec. 6.1.4" has been dropped in ASCE.	ASCE slightly less stringent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

	systems designated as having I_p greater than 1.0 themselves shall be designed to meet the force and displacement provisions of Sec. 6.1.3 and 6.1.4 and the additional requirements of this section. When piping systems are attached to <i>structures</i> that could displace relative to one another and for isolated <i>structures</i> , including foundations, where the piping system crosses the isolation interface, the piping system shall be designed to accommodate the seismic relative displacements specified in Sec. 6.1.4.			
	No corresponding provision	9.6.3.11.1 Pressure Piping Systems	Deemed-to-comply provision	Does not affect equivalency
6.3.11.1 Fire Protection Sprinkler Systems	Fire protection sprinkler systems designed and constructed in accordance with Ref. 6-12 shall be deemed to meet the force, displacement, and other requirements of this section provided that the seismic design force and displacement calculated in accordance with Ref. 6-12, multiplied by a factor of 1.4, is not less than that determined using these <i>Provisions</i> .	9.6.3.11.2 Fire Protection Sprinkler Systems	"provided that ... using <i>these Provisions</i> ." has been replaced with "except the force and displacement requirements of Sections 9.6.1.3 and 9.6.1.4 shall be satisfied."	Considered equivalent
6.3.11.2 Other Piping Systems	The following documents have been adopted ... comparable to those determined using these <i>Provisions</i> . Exception: Piping systems designated as having an I_p greater than 1.0 shall not be designed using the simplified analysis procedures of Ref. 6-9 (Sec. 919.4.1(a)). The following requirements shall also be met for piping systems designated as having an I_p greater than 1.0	9.6.3.11.3 Other Piping Systems	The term $I_p > 1.0$ has been replaced by $I_p = 1.5$ in ASCE. In addition, ASCE specifies more requirements for designing other piping systems.	ASCE is more stringent.

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

6.3.11.2.1 Supports and Attachments for Other Piping		9.6.3.11.4 Supports and Attachments for Other Piping	Essentially identical, except for the following changes: <ol style="list-style-type: none"> 1. The term $I_p > 1.0$ has been replaced by $I_p = 1.5$ in ASCE. 2. The term "high deformability" of NEHRP has been replaced by "ductile" in ASCE. 3. In addition, ASCE specifies that seismic supports are not required for ductile piping in SDCs A, B, or C designated as having an $I_p = 1.0$ and a nominal pipe size of 6 in. or less. 	Considered equivalent
6.3.12 Boilers and Pressure Vessels		9.6.3.12 Boilers and Pressure Vessels	Identical	Equivalent
6.3.12.1 ASME Boilers and Pressure Vessels		9.6.3.12.1 ASME Boilers and Pressure Vessels	Identical	Equivalent
6.3.12.2 Other Boilers and Pressure Vessels		9.6.3.12.2 Other Boilers and Pressure Vessels	Identical	Equivalent
6.3.12.3 Supports and Attachments for Boilers and Pressure Vessels		9.6.3.12.3 Supports and Attachments for Other Boilers and Pressure Vessels	Identical	Equivalent
6.3.13 Mechanical Equipment, Attachments, and Supports		9.6.3.13 Mechanical Equipment, Attachments, and Supports	Identical, except that the term " $I_p > 1.0$ " of NEHRP has been replaced by " $I_p = 1.5$ " in ASCE.	Equivalent
6.3.13.1 Mechanical Equipment		9.6.3.13.1 Mechanical Equipment	Essentially identical except that the term " $I_p > 1.0$ " of NEHRP has been replaced by " $I_p = 1.5$ " in ASCE.	Equivalent
6.3.13.2 Attachments and Supports for Mechanical Equipment		9.6.3.13.2 Attachments and Supports for Mechanical Equipment	Essentially identical, except that one more requirement is specified in ASCE as given below: Drilled and grouted-in-place anchors for tensile load applications shall use either expansive cement or expansive epoxy grout.	ASCE slightly more stringent
6.13.14 Electrical Equipment, Attachments, and Supports	Attachments and supports for electrical equipment shall be designed to meet the force and displacement requirements of Sec. 6.1.3 and 6.1.4 and the additional requirements of this section. In addition,	9.6.13.14 Electrical Equipment, Attachments, and Supports	Identical except for the following changes: <ol style="list-style-type: none"> 1. The term "$I_p > 1.0$" of NEHRP has been replaced by "$I_p = 1.5$" in ASCE. 2. The last sentence "When conduit, cable ... Sec. 6.1.4." of NEHRP has been deleted in 	ASCE slightly more stringent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

	<p>electrical equipment designated as having I_p greater than 1.0 shall itself be designed to meet the force and displacement requirements of Sec. 6.1.3 and 6.1.4 and the additional requirements of this section.</p> <p>Seismic effects that shall be considered in the design of other electrical equipment include the dynamic effects of the equipment, its contents, and when appropriate its supports. The interaction between the equipment and the supporting <i>structures</i>, including other mechanical and electrical equipment, shall also be considered. When conduit, cable trays, or similar electrical distribution components are attached to <i>structures</i> that could displace relative to one another and for isolated <i>structures</i> where the conduit or cable trays cross the isolation interface, the conduit or cable trays shall be designed to accommodate the seismic relative displacements specified in Sec. 6.1.4.</p>		ASCE.	
6.3.14.1 Electrical Equipment	<p>Electrical equipment designated as having an I_p greater than 1.0 shall meet the following requirements:</p> <ol style="list-style-type: none"> a. Provisions shall be made to eliminate seismic impact between the equipment and other components. b. 	9.6.3.14.1 Electrical Equipment	<p>Identical, except for the following changes:</p> <ol style="list-style-type: none"> 1. The term "$I_p > 1.0$" of NEHRP has been replaced by "$I_p = 1.5$" in ASCE. 2. The sub-section "a" of NEHRP has been replaced by two new sub-sections. 	ASCE is more stringent
6.3.14.2 Attachments and Supports for Electrical Equipment		9.6.3.14.2 Attachments and Supports for Electrical Equipment	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

6.3.15 Alternative Seismic Qualification Methods		9.6.3.15 Alternative Seismic Qualification Methods	Identical	Equivalent
6.3.16 Elevator Design Requirements		9.6.3.16 Elevator Design Requirements 9.6.3.16.1 Reference documents	Identical	Equivalent
6.3.16.1 Elevators and Hoistway Structural System		9.6.3.16.2 Elevators and Hoistway Structural System	Identical	Equivalent
6.3.16.2 Elevator Machinery and Controller Supports and Attachments		9.6.3.16.3 Elevator Machinery and Controller Supports and Attachments	Identical	Equivalent
6.3.16.3 Seismic Controls		9.6.3.16.4 Seismic Controls	Identical	Equivalent
6.3.16.4 Retainer Plates		9.6.3.16.5 Retainer Plates	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
7 FOUNDATION DESIGN REQUIREMENTS		9.7 FOUNDATION DESIGN REQUIREMENTS		
7.1 GENERAL		9.7.1 General	Identical	Equivalent
7.2 STRENGTH OF COMPONENTS AND FOUNDATIONS		9.7.3 SDC B		
7.2.1 Structural Materials		9.7.3.1 Structural Components	Identical	Equivalent
7.2.2 Soil Capacities		9.7.3.2 Soil Capacities	Identical	Equivalent
7.3 SEISMIC DESIGN CATEGORIES A AND B	Any construction meeting the requirements of Sec. 7.1 and 7.2 is permitted to be used for <i>structures</i> assigned to <i>Seismic Design Category A</i> or B.	9.7.2 Seismic Design Category A 9.7.3 Seismic Design Category B	There are no special requirements for the foundations of structures assigned to Category A The determination of site coefficient (Section 9.4.1.2.4) shall be documented and the resisting capacities of the foundations, subjected to the prescribed seismic forces of sections 9.1 through 9.9, shall meet the following requirements (i.e., 9.7.3.1 and 9.7.3.2)	ASCE less stringent for SDC A Considered equivalent for SDC B
7.4 SEISMIC DESIGN CATEGORY C		9.7.4 SEISMIC DESIGN CATEGORY C	Identical	Equivalent
7.4.1 Investigation		9.7.4.1 Investigation	Identical	Equivalent
7.4.2 Pole-Type Structures		9.7.4.2 Pole-Type Structures	Identical	Equivalent
7.4.3 Foundation Ties	Individual pile caps, drilled piers, or caissons shall be interconnected by ties. All ties shall be capable of carrying, in tension or compression, a force equal to the product of the larger pile cap or column load times S_{DS} divided by 4 unless it can be demonstrated that equivalent restraint can be provided by <i>reinforced concrete</i> beams within slabs on grade or <i>reinforced concrete</i> slabs on grade or	9.7.4.3 Foundation Ties	Identical, except that minimum tie strength is larger pile cap or column load times $S_{DS}/10$, rather than $S_{DS}/4$, as in NEHRP. Although this would appear to be less conservative, it is in fact a correction of error. $C_a/4$ of 1994 NEHRP should have translated into $S_{DS}/10$, rather than $S_{DS}/4$.	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

	confinement by competent rock, hard cohesive soils, very dense granular soils, or other approved means.			
7.4.4 Special Pile Requirements		A9.7.4.4 Special Pile Requirements for Category C	Identical	Equivalent
7.4.4.1 Uncased Concrete Piles		A9.7.4.4.1 Uncased Concrete Piles	Identical	Equivalent
7.4.4.2 Metal-Cased Concrete Piles		A9.7.4.4.2 Metal-Cased Concrete Piles	Identical	Equivalent
7.4.4.3 Concrete-Filled Pipe		A9.7.4.4.3 Concrete-Filled Pipe	Identical	Equivalent
7.4.4.4 Precast Concrete Piles		A9.7.4.4.4 Precast Concrete Piles	Identical	Equivalent
7.4.4.5 Precast-Prestressed Piles	The upper 2 ft (0.6 m) of the pile shall have No. 3 ties minimum at not over 4-in. (102 mm) spacing or equivalent spirals. The pile cap connection is permitted to be by means of dowels as required in Sec. 7.4.4.. Pile cap connection is permitted to be by means of developing pile reinforcing strand if a ductile connection is provided.	A9.7.4.4.5 Precast-Prestressed Piles	ASCE deleted the sentence "The upper ... spirals". The ASCE requires a minimum volumetric ratio of spiral reinforcement in the ductile region.	Considered equivalent
7.5 Seismic Design Categories D, E, and F		9.7.5 Seismic Design Categories D, E, and F	Identical	Equivalent
7.5.1 Investigation		9.7.5.1 Investigation	Identical	Equivalent
7.5.2 Foundation Ties		9.7.5.2 Foundation Ties	Identical	Equivalent
7.5.3 Liquefaction Potential and Soil Strength Loss		9.7.5.3 Liquefaction Potential and Soil Strength Loss	Identical; in addition specifies that "Where deemed appropriate by the authority having jurisdiction, a site specific geotechnical report is not required when prior evaluations of nearby sites with similar soil conditions provide sufficient direction relative to the proposed construction."	Considered equivalent
7.5.4 Special Pile Requirements		9.7.5.4 Special Pile Requirements	Identical	Equivalent
7.5.4.1 Uncased		A9.7.5.4.1 Uncased	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

Concrete Piles		Concrete Piles		
7.5.4.2 Metal-Cased Concrete Piles		A9.7.5.4.2 Metal-Cased Concrete Piles	Identical	Equivalent
7.5.4.3 Precast Concrete Piles		A9.7.5.4.3 Precast Concrete Piles	Identical	Equivalent
7.5.4.4 Precast-Prestressed Piles	For the body of fully embedded foundation piling subjected to vertical loads only, or where the design bending moment does not exceed $0.20M_{nb}$, spiral reinforcing shall be provided such that $\rho_s \geq 0.006$. Pile cap connection shall not be made by developing exposed strand.	A9.7.5.4.4 Precast-Prestressed Piles	The provisions of NEHRP deleted. Instead, ASCE gives more elaborate and specific provisions.	ASCE is more stringent
7.5.4.5 Steel Piles		A9.7.5.4.5 Steel Piles	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
8. STEEL STRUCTURE DESIGN REQUIREMENTS		9.8. STEEL		
8.1 REFERENCE DOCUMENTS		9.8.1 Reference Documents	Identical except that Supplement I dated 1999 to NEHRP Ref. 8-3 (AISC Seismic) have been adopted into the ASCE.	ASCE is more up-to-date, equivalent
	No corresponding provisions	A.9.8.1 General A.9.8.1.1 Structural Steel by Strength Design A.9.8.1.2 Allowable Stress Design A.9.8.1.3 Structural Steel Seismic Requirements		Does not affect equivalency
8.2 SEISMIC REQUIREMENTS FOR STEEL STRUCTURES		A.9.8.2 Seismic Requirements For Steel Structures	Essentially identical	Equivalent
8.3 SEISMIC DESIGN CATEGORIES A, B, and C		A.9.8.3 Seismic Design Categories A, B, And C	Identical	Equivalent
8.4 SEISMIC DESIGN CATEGORIES D, E, and F		A.9.8.4 Seismic Design Categories D, E, And F	Identical	Equivalent
8.5 COLD-FORMED STEEL SEISMIC REQUIREMENTS		A.9.8.5 Cold-Formed Steel Seismic Requirements	Identical	Equivalent
8.5.1 Modifications to Ref. 8-4		A.9.8.5.1 Modifications To Ref. 9.8-4	Identical	Equivalent
8.5.2 Modifications Ref. 8-5		A.9.8.5.2 Modifications Ref. 9.8-5	Identical	Equivalent
8.6 LIGHT-FRAMED WALLS		A.9.8.6 Light-Framed Walls	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

8.6.1 Boundary Members		A.9.8.6.1 Boundary Members	Identical	Equivalent
8.6.2 Connections		A.9.8.6.2 Connections	Identical	Equivalent
8.6.3 Braced Bay Members		A.9.8.6.3 Braced Bay Members	Identical	Equivalent
8.6.4 Diagonal Braces		A.9.8.6.4 Diagonal Braces	Identical	Equivalent
8.6.5 Shear Walls		A.9.8.6.5 Shear Walls	Identical	Equivalent
8.7 SEISMIC REQUIREMENTS FOR STEEL DECK DIAPHRAGMS		A.9.8.7 Seismic Requirements For Steel Deck Diaphragms	Identical	Equivalent
8.8 STEEL CABLES		A.9.8.8 Steel Cables	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
9 CONCRETE STRUCTURE DESIGN REQUIREMENTS		9.9 STRUCTURAL CONCRETE		
9.1 REFERENCE DOCUMENTS	ACI 318-95, excluding Appendix A, is adopted by reference, subject to modifications made in this chapter.	9.9.1 Reference Documents	ACI 318-99, excluding Appendix A, is adopted by reference, subject to modifications made in this chapter.	ASCE is up-dated. Considered equivalent.
9.1.1 Modifications to Ref. 9-1		A.9.9.1.1 Modifications to Ref. 9.9-1		
	No corresponding provision	A.9.9.1.1 Modifications to ACI Sec. 8.1.2	Permits use of Alternate Design Method for non-seismic design of nonprestressed reinforced concrete members.	Has no appreciable effect on equivalency
9.1.1.1 Modifications to ACI Sec. 9.2.3		A.9.9.1.2 Modifications to ACI Sec. 9.2.3	Identical	Equivalent
9.1.1.2 Modifications to ACI Sec. 21.0		A.9.9.1.3 Modifications to ACI Sec. 21.0	Adds fewer notations to ACI 318-99 (as most are already part of ACI 318-99)	Equivalent
9.1.1.3 Modifications to ACI Sec. 21.1		A.9.9.1.4 Modifications to ACI Sec. 21.1	Essentially identical	Equivalent
9.1.1.4 Modifications to ACI Sec. 21.2.1.3 and 21.2.1.4	Replace Sec. 21.2.1.3 and 21.2.1.4 with the requirements of Sec. 9.4 through 9.7.		No such modifications in ASCE. Have become unnecessary in view of changes made in ACI 318-99.	Does not affect equivalency
9.1.1.5 Additions to ACI Sec. 21.2.1.6 and 21.2.1.7		A.9.9.1.5 Additions to ACI Sec. 21.2.1.6 and 21.2.1.7	Essentially identical	Equivalent
9.1.1.6 Additions to ACI Sec. 21.2.2.5, 21.2.2.6 and 21.2.2.7		A.9.9.1.6 Additions to ACI Sec. 21.2.2.5, 21.2.2.6 and 21.2.2.7	Essentially identical	Equivalent
9.1.1.7 Modifications to ACI Sec. 21.2.5.1		A.9.9.1.7 Modifications to ACI Sec. 21.2.5.1	Essentially identical	Equivalent
9.1.1.8 Modifications to ACI Sec. 21.2.6.1	Makes modifications to splicing requirements of Section 21.2.6.1 of ACI 318-95.		Sections 21.2.6 and 21.2.7 of ACI 318-99 have new provisions for mechanical and welded splices, respectively, which make this modification unnecessary.	ASCE is more stringent
9.1.1.9 Additions to ACI Sec. 21.2		A.9.9.1.8 Additions to ACI Sec. 21.2	Essentially identical	Equivalent
9.1.1.10 Additions to	Makes a modification to the design axial		This modification was considered and found to be	Does not affect

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

ACI Sec. 21.4.5.3	strength requirement for columns of Section 21.4.5.3 of ACI 318-95 - a modification taken from the 1997 UBC		unnecessary and unwarranted by ACI 318. So it was not included in ACI 318-99.	equivalency
9.1.1.11 Change in ACI Sec. 21.6.3	Requires use of strength design load combinations of ASCE 7-95 in seismic design of concrete structures.		Requires use of strength design load combinations of ASCE 7-98 in seismic design of concrete structures.	ASCE has updated requirements, equivalent
9.1.1.12 Modifications to ACI Sec. 21.6.4.1	Makes modifications to diaphragm design requirements of Section 21.6.4 of ACI 318-95		This provision is not needed since Section 21.7 of ACI 318-99 includes updated diaphragm design provisions.	ASCE is more stringent
9.1.1.13 Modifications to ACI Sec. 21.6.6	Design of shear walls for flexure and axial loads is changed from the procedure of ACI 318-95 to essentially that of 1997 UBC		Section 21.6 of ACI 318-99 has updated shearwall design provisions which make this modification unnecessary.	Equivalent
9.1.1.14 Additions to ACI Sec. 21.6.7	Adds design requirements for coupling beams to ACI 318-95.		Coupling beam design requirements have been added to Section 21.6 of ACI 318-99, making this modification unnecessary.	Equivalent
9.1.1.15 Modifications to ACI Sec. 21.7.1	Modifies the requirements of ACI 318-95 Section 21.7 for frame members assumed not to contribute to lateral resistance.		The NEHRP modifications are now unnecessary, in view of changes made in Section 21.9 of ACI 318-99.	Equivalent
9.1.1.16 Modifications to ACI Sec. 21.8	Change the title of Sec. 21.8 to read: "Requirements for Intermediate Moment Frames."		Section 21.10 of ACI 318-99 is titled: "Requirements for Intermediate Moment Frames," meaning this modification unnecessary.	Equivalent
	No corresponding requirement	A.9.9.1.9 Additions to ACI Sec. 21.6	Gives design requirements for wall piers and wall segments that are taken from UBC 1997 and are not part of ACI 318-99.	ASCE is more restrictive
	No corresponding requirement	A.9.9.1.10 Modifications to ACI Sec. 21.9.2.2	Lap splices in gravity columns are not required to be restricted to the middle half of the column height.	ASCE is slightly less restrictive, but justifiably so.
9.2 BOLTS AND HEADED STUD ANCHORS IN CONCRETE	Gives strength design provisions for headed bolts and headed stud anchors cast in concrete	A.9.9.6 Bolts and Headed Stud Anchors in Concrete	Contains completely different provisions, based on what would have been Appendix D to ACI 318-99. These provisions are part of ASCE 7-98.	Equivalency cannot be judged without comparative designs.
9.3 CLASSIFICATION OF SEISMIC-FORCE-RESISTING SYSTEMS		1910 SEISMIC DESIGN PROVISIONS 1910.2 Classification of seismic force	Identical, except that Sections 9.3.1.1.1 and 9.3.1.1.2, modifying definition of ordinary moment frame, are part of 1910.3 (Seismic Design Category B)	ASCE is slightly less restrictive

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

		resisting systems		
9.3.1 Classification of Moment Frames		A.9.9.3 SDC B		
9.3.1.1 Ordinary Moment Frames		A.9.9.3.1 Ordinary Moment Frames	Identical	Equivalent
9.3.1.2 Intermediate Moment Frames			No explicit provisions, unnecessary	Does not affect equivalency
9.3.1.2 Special Moment Frames			No explicit provisions, unnecessary	Does not affect equivalency
9.3.2 Classification of Shear Walls		A.9.9.2 Classification of Shear Walls		
9.3.2.1 Ordinary Plain Concrete Shear Walls		A.9.9.2.1 Ordinary Plain Concrete Shear Walls	Essentially identical	Equivalent
9.3.2.2 Detailed Plain Concrete Shear Walls		A.9.9.2.2 Detailed Plain Concrete Shear Walls	Essentially identical except that the provision of maximum spacing of 4 ft. for vertical reinforcement in NEHRP has been dropped.	ASCE less stringent
9.3.2.3 Ordinary Reinforced Concrete Shear Walls		A.9.9.2.3 Ordinary Reinforced Concrete Shear Walls	Essentially identical	Equivalent
9.3.2.4 Special Reinforced Concrete Shear Walls		A.9.9.2.4 Special Reinforced Concrete Shear Walls	Essentially identical	Equivalent
9.4 SEISMIC DESIGN CATEGORY A			No explicit provision for SDC A	Does not affect equivalency
9.5 SEISMIC DESIGN CATEGORY B		A.9.9.3 Seismic Design Category B	Identical	Equivalent
9.5.1 Moment Frames			No such provision, unnecessary	Equivalent
9.6 SEISMIC DESIGN CATEGORY C		A.9.9.4 Seismic Design Category C	Identical	Equivalent
9.6.1 Seismic-Force-Resisting Systems		A.9.9.4.1 Seismic-Force-Resisting Systems	Detailed plain concrete walls are not allowed as part of seismic force resisting system, while NEHRP allows such usage.	ASCE is more restrictive
9.6.1.1 Moment Frames				
9.6.1.2 Shear Walls				
9.6.2 Discontinuous		A.9.9.4.2	Essentially identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

Members		Discontinuous Members		
9.6.3 Plain Concrete		A9.9.4.4 Plain Concrete	Essentially identical	Equivalent
9.6.3.1 Walls		A9.9.4.4.1 Walls	Structural plain concrete walls (which are permitted in NEHRP) are not permitted in structures assigned to SDC C, but for certain exceptions.	ASCE is more restrictive
9.6.3.2 Footings		A9.9.4.4.2 Footings	Identical with following differences: 1. Addition of Exception 2 to Paragraph 2. 2. Addition of requirements for footing which exceeds 8 in. in thickness.	ASCE is slightly more stringent
9.6.3.3 Pedestals		A9.9.4.4.3 Pedestals	Identical	Equivalent
9.7 SEISMIC DESIGN CATEGORIES D, E, OR F		A.9.9.5 Seismic Design Categories D, E, or F	Essentially identical	Equivalent
9.7.1 Seismic-Force-Resisting Systems 9.7.1.1 Moment Frames 9.7.1.2 Shear Walls		A.9.9.5.1 Seismic-Force-Resisting Systems	Essentially identical	Equivalent
9.7.2 Frame members Not Proportioned to Resist Forces Induced by Earthquake Motions		9.7.2 Frame members Not Proportioned to Resist Forces Induced by Earthquake Motions	Essentially identical	Equivalent
9.7.3 Plain Concrete			No corresponding provision, unnecessary, already part of ACI 318-99.	Equivalent
Appendix to Chapter 9 REINFORCED CONCRETE STRUCTURAL SYSTEMS COMPOSED FROM INTERCONNECT-ED PRECAST ELEMENTS			The provisions of this appendix are not included in the ASCE.	Equivalency cannot be judged

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
Chapter 10 COMPOSITE STEEL AND CONCRETE STRUCTURE DESIGN REQUIREMENTS 10.1 REFERENCE DOCUMENTS 10.2 REQUIREMENTS			No corresponding provisions	Equivalency cannot be judged

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
11 MASONRY STRUCTURE DESIGN REQUIREMENTS		9.11 MASONRY		
11.1 GENERAL				
11.1.1 Scope		9.11.1 Reference Documents	Essentially similar	Considered equivalent
11.1.2 Reference Documents	ACI 530-95 and ACI 530.1-95 are the primary reference documents.	9.11.1 Reference Documents	Primary reference documents updated to ACI 530-99, ACI 530.1-99.	Equivalent. ASCE is more up-to-date
11.1.3 Definitions		*1.6 Definitions	Essentially similar	Considered equivalent
11.1.4 Notations		*1.5 Definitions	Essentially similar	Considered equivalent
11.2 CONSTRUCTION REQUIREMENTS				
11.2.1 General	Per the requirements of ACI 530.1-95.		Per the requirements of ACI 530.1-99.	Considered equivalent
11.2.2 Quality Assurance		*1.14 Quality Assurance	Essentially similar; ASCE is more detailed.	Considered equivalent
11.3 GENERAL REQUIREMENTS		*1.1 Scope		
11.3.1 Scope	Masonry structures and components shall comply with requirements of reinforced masonry design, plain (unreinforced) masonry design, empirical design, design for architectural components of masonry, design of glass unit masonry and masonry veneer.	*1.1 Scope *1.1.3	Masonry structures and their component members shall be designed in ... this Chapter and one of the following: (a) Allowable stress design (b) Limit states design (under development) (c) Prestressed masonry design (d) Empirical design method (e) Veneers (f) Glass unit masonry Limit states design and prestressed masonry design are not part of NEHRP.	Equivalency cannot be judged.
11.3.2 Empirical Masonry Design	The requirements of Chapter 9 of ACI 530-95 shall apply to the empirical design of masonry.	*Chapter 5 Empirical Design of Masonry	Identical	Equivalent

* indicates the Section No. in ACI 530-99

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

11.3.3 Plain (Unreinforced) Masonry Design		*2.2 Unreinforced masonry	Contains detailed provisions that are not in NEHRP.	Equivalency difficult to judge
11.3.4 Reinforced Masonry Design		*2.3 Reinforced Masonry	Essentially similar	Considered equivalent
11.3.5 Seismic Design Category A		*1.13.3 Seismic Design Category A	Same requirements as in NEHRP; Prestressed masonry design is additionally allowed.	ASCE less stringent
11.3.6 Seismic Design Category B	Lateral-force-resisting system shall comply with Sec. 11.3.3 (plain masonry design) or Sec. 11.3.4 (reinforced masonry design)	*1.13.4 Seismic Design Category B	Prestressed masonry design is additionally allowed.	ASCE less stringent
11.3.7 Seismic Design Category C		*1.13.5 Seismic Design Category C	Prestressed masonry design is allowed.	ASCE less stringent
11.3.7.1 Material Requirements	Structural clay load-bearing wall tile shall not be used as part of the basic structural system.		No corresponding provision	ASCE less stringent
	No corresponding provision	*1.13.5.2 Design of Elements that are not part of the Lateral Force-Resisting System		ASCE is more stringent
	No corresponding provision	*1.13.5.3 Design of Elements that are Part of the Lateral Force-Resisting System		ASCE more stringent
	No corresponding provision	*1.13.5.3.1 Connections to Masonry Shear Walls		ASCE is more stringent
11.3.7.2 Masonry Shear Walls	Masonry <i>shear walls</i> shall comply with the requirements for <i>detailed plain masonry shear walls</i> (Sec. 11.11.2), <i>intermediate reinforced masonry shear walls</i> (Sec. 11.11.4), or <i>special reinforced masonry shear walls</i> (Sec. 11.11.5).		The corresponding requirements are mentioned in different sections in ASCE.	Does not affect equivalency
11.3.7.3 Minimum Wall Reinforcement	Vertical reinforcement of at least 0.20 in. ² (129 mm ²) in cross-sectional area shall be provided continuously from support to	*1.13.5.3.3 Minimum Reinforcement Requirements for	Vertical reinforcement of at least 0.20 in. ² (129 mm ²) in cross-sectional area shall be provided at corners, within 16 in. (406 mm) of each side of openings, within 8 in.	ASCE is less stringent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

	<p>support at each corner, at each side of each opening, at the ends of walls and at a maximum spacing of 4 feet (1219 mm) apart horizontally throughout the walls. Horizontal reinforcement not less than 0.20 in.² (129 mm²) in cross section shall be provided as follows:</p> <ol style="list-style-type: none"> At the bottom and top of wall openings extending not less than 24 in. (610 mm) nor less than 40 bar diameters past the opening, Continuously at structurally connected roof and floor levels and at the top of walls, At the bottom of load-bearing walls or in the top of foundations when doweled to the wall, At maximum spacing of 120 in. (3048 mm) unless uniformly distributed joint reinforcement is provided. <p>Reinforcement at the top and bottom of openings, when used in determining the maximum spacing specified in Item d above, shall be continuous in the wall.</p>	Masonry Shear Walls	<p>(203 mm) of each side of movement joints, within 8 in. (203 mm) of the ends of walls, and at a maximum spacing of 10 ft (3048 mm). Horizontal joint reinforcement shall consist of at least two wires of W1.7 spaced not more than 16 in. (406 mm); or bond beam reinforcement shall be provided of at least 0.2 in.² (129 mm²) in cross-sectional area spaced not more than 10 ft (3048 mm). Horizontal reinforcement shall also be provided at the bottom and top of the wall openings and shall exceed not less than 24 in. (610 mm) nor less than 40 bar diameters past the openings; continuously at structurally connected roof and floor levels; within 16 in. (406 mm) of the top of the walls.</p> <p>The big difference is 10 ft maximum spacing of vertical reinforcement in the ASCE versus 4 ft maximum spacing in NEHRP.</p>	
11.3.7.4 Stack Bond Construction			No corresponding provision	Equivalency cannot be judged
11.3.7.5 Multiple Wythe Walls Not Acting Compositely			No corresponding provision	Equivalency cannot be judged
11.3.7.6 Walls Separated from the Basic Structural System			No corresponding provision	Equivalency cannot be judged
11.3.7.7 Connections to Masonry Columns		*1.13.5.3.2 Connections to Masonry Columns	Identical, except ASCE invokes Sec. 2.1.6 of ACI 530.	Equivalent
11.3.8 Seismic Design		*1.13.6 Seismic	Prestressed masonry design is allowed.	ASCE is less

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

Category D		Design Category D		stringent
11.3.8.1 Material Requirements	Prohibits use of Type N mortar and masonry cement in basic structural system	*1.13.6.6 Material Requirements	Prohibits use of Type N mortar and masonry cement in lateral-force-resisting system	ASCE is less restrictive
11.3.8.2 Masonry Shear Walls			The corresponding requirements are mentioned in different sections in ASCE.	Does not affect equivalency
11.3.8.3 Minimum Wall Reinforcement	All walls 48 in. (1219 mm). Except for joint reinforcement, the bar size shall not be less than a No. 3 (10-mm diameter). Reinforcement shall be continuous around wall corners and through intersections, unless the intersecting walls are separated. Only horizontal reinforcement that is continuous in the wall or element shall be included in computing the area of horizontal reinforcement. Reinforcement spliced in accordance with Sec. 11.4.5.6 shall be considered as continuous reinforcement. Architectural components of masonry shall be exempt from this reinforcement requirement.	*1.13.6.3 Minimum Reinforcement Requirements for Masonry Walls	The NEHRP text reproduced is not part of ASCE.	ASCE is less stringent
11.3.8.4 Stack Bond Construction	Where masonry is laid in stack bond, the minimum amount of horizontal reinforcement shall be 0.0015 times the gross cross-sectional area of the wall. If open-end units are used and grouted solid, the minimum amount of horizontal reinforcement shall be 0.0007 times the gross cross-sectional area of the wall. The maximum spacing of horizontal reinforcement shall not exceed 24 in. (610 mm). Architectural components of masonry shall be exempt from these requirements.	*1.13.6.3 Minimum Reinforcement Requirements for Masonry Walls	Wythes of stack bond masonry shall be constructed of fully grouted hollow open-end units, fully grouted hollow units laid with full head joints or solid units. Maximum spacing of reinforcement for walls with stack bond masonry shall be 24 in. (610 mm).	ASCE is less stringent
11.3.8.5 Minimum Wall Thickness			No corresponding provision	Equivalency cannot be judged
11.3.8.6 Minimum		*1.13.6.5 Minimum	Essentially identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

Column Reinforcement		Reinforcement for Masonry Columns		
11.3.8.7 Minimum Column Dimension			No corresponding provision	Equivalency cannot be judged
11.3.8.8 Separation Joints			No corresponding provision	Equivalency cannot be judged
11.3.9 Seismic Design Categories E and F		*1.13.7 Seismic Design Category E and F	Prestressed masonry design is allowed.	ASCE is less restrictive
11.3.9.1 Material Requirements			No corresponding provision	Equivalency cannot be judged
11.3.9.2 Masonry Shear Walls			The corresponding requirements are mentioned in different sections in ASCE.	Does not affect equivalency
11.3.9.3 Stack Bond Construction	11.3.9.3.1 11.3.9.3.2 Reinforced hollow unit construction shall be grouted solid and all <i>head joints</i> shall be made solid by the use of open end units.	*1.13.7.2 Design of Elements that are not Part of the Lateral Force-Resisting System *1.13.7.3 Design of Elements that are Part of the Lateral Force-Resisting System	Essentially the text of NEHRP Sec. 11.3.9.3.1, plus: These elements shall be solidly grouted and shall be constructed of hollow open units or two wythes of solid units.	Equivalent
11.3.10 Properties of Materials		*1.8 Material properties		
11.3.10.1 Steel Reinforcement Modulus of Elasticity		*1.8.2.1 Elastic Modulus of steel reinforcement	Identical	Equivalent
11.3.10.2 Masonry Modulus of Elasticity	The modulus of elasticity of masonry (E_m) shall be determined in accordance with Eq. 11.3.10.2 or shall be based on the modulus of elasticity determined by prism test and taken between 0.05 and 0.33 times the masonry prism strength: $E_m = 750 f_m'$ (11.3.10.2)	*1.8.2.2 Elastic Modulus of Clay and concrete masonry	The Eqn. 11.3.10.2 has been modified as follows: $E_m = 700 f_m'$ for clay masonry $E_m = 900 f_m'$ for concrete masonry	Considered equivalent
11.3.10.3 Modulus of Rigidity of Masonry		*1.8.2.2.2	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

11.3.10.4 Masonry Compressive Strength			No corresponding provision	ASCE is less stringent
11.3.10.5 Modulus of Rupture		*2.2.3.2	Allowable stress due to flexure is specified in Table instead of modulus of rupture specified in Table of NEHRP. The values of allowable tension stress are taken as half the values of MOR (with one exception).	Equivalent
11.3.10.5.1 Out-of-Plane Bending			No corresponding provision	Equivalency cannot be judged
11.3.10.5.2 In-Plane Bending			No corresponding provision	Equivalency cannot be judged
11.3.10.6 Reinforcement strength			No corresponding provision	Equivalency cannot be judged
11.3.11 Section Properties 11.3.11.1 11.3.11.2		*1.9 *1.9.1	Essentially identical	Considered equivalent
11.3.12 Headed and Bent-Bar Anchor Bolts	All bolts shall be grouted in place with at least 1-inch grout between the bolt and masonry, except that ...	*2.1.2.2 Plate, Headed, and bent-bar anchor bolts *2.1.2.2.1	The minimum effective embedment length shall be 4 bolt diameters, but not less than 2 in.	ASCE more stringent
11.3.12.1	The design axial strength for headed anchor bolts...	*2.1.2.2.2	The allowable load in tension shall be lesser of that given by Eq. (2-1) or Eq. (2-2). $B_a = 0.5 A_p f_m^{0.5}$ (2-1) { = $2.0 A_p f_m^{0.5}$ in NEHRP} $B_a = 0.2 A_b f_y$ (2-2) { = $0.9 A_p f_y$ in NEHRP} Other requirements are essentially similar ASCE is based on allowable compared to strength design in NEHRP.	Considered equivalent
11.3.12.2	The design axial strength for bent-up anchor bolts In addition to the equations for headed anchor bolts, another equation is specified.	*2.1.2.2.2	The allowable load in tension shall be lesser of that given by Eq. (2-1) or Eq. (2-2). $B_a = 0.5 A_p \sqrt{f_m'}$ (2-1) { = $2.0 A_p \sqrt{f_m'}$ in NEHRP} $B_a = 0.2 A_b f_y$ (2-2) { = $0.9 A_p f_y$ in NEHRP} The third equation of NEHRP dropped in ASCE. Other requirements are essentially similar. ASCE is based on allowable compared to strength design in NEHRP.	Considered equivalent
11.3.12.3	The design shear strength is given by	*2.1.2.2.3	Modified in ASCE as:	Considered

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

	with a minimum cover of 1/2 in. (13 mm) when exposed to earth or weather and 3/8 in. (10 mm) when not exposed to earth or weather.			
11.4.4.4		*1.12.4.3	Identical	Equivalent
11.4.5 Development of Reinforcement 11.4.5.1 General		*2.1.8 Development of reinforcement embedded in grout *2.1.8.1 General	Essentially identical	Equivalent
11.4.5.2 Embedment of Reinforcing Bars and Wires in Tension		*2.1.8.2 Embedment of Bars and Wires in Tension	Different equation to calculate development length.	Equivalency cannot be judged.
11.4.5.3 Standard Hooks		*1.12.5 Standard hooks *2.1.8.4 Hooks	Essentially identical, except for the following changes: 1. The option of 135-degree turn plus 6 bar diameter is dropped in ASCE. 2. For stirrup and tie anchorage only, the provision of 180-degree turn has been replaced by 90-degree turn. 3. The equivalent embedment length in tension has been changed from 13d _b in NEHRP to 11.225 d _b in ASCE.	ASCE less stringent
11.4.5.4 Minimum Bend Diameter for Reinforcing Bars		*1.12.6 Minimum bend diameter for reinforcing bars	Identical	Equivalent
11.4.5.5 Development of Shear Reinforcement 11.4.5.5.1 11.4.5.5.2 11.4.5.5.3	Except at wall intersections, the end of a reinforcing bar ...	*2.1.8.5 Development of shear reinforcement	Essentially identical. No corresponding provisions	Equivalent ASCE is less stringent
11.4.5.6 Splices of Reinforcement		*2.1.8.6 Splices of reinforcement		
11.4.5.6.1 Lap Splices	Lap splices shall not be used in plastic hinge zones. The length of the plastic hinge zone shall be taken as at least 0.15 times the distance between the point of		No corresponding provision	ASCE is less stringent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

	zero moment and the point of maximum moment.			
11.4.5.6.1.1	The minimum length of lap, l_{d1} , for bars in tension or compression shall be equal to the development length, l_{d1} , as determined by Eq. 11.4.5.2 but shall not be less than 12 in. (305 mm) for bars and 6 in. (152 mm) for wire.	*2.1.8.6.1.1	Identical except that the equation for development length has been changed.	Equivalency cannot be judged
11.4.5.6.1.2		*2.1.8.6.1.2	Identical	Equivalent
11.4.5.6.2 Welded Splices		*2.1.8.6.2 Welded splices	Identical	Equivalent
11.4.5.6.3 Mechanical Connections		*2.1.8.6.3 Mechanical Connections	Identical	Equivalent
11.4.5.6.4 End Bearing Splices		*2.1.8.6.4 End-Bearing Splices	Identical	Equivalent
11.5 STRENGTH AND DEFORMATION REQUIREMENTS		*2.1.1.2 Design strength		
11.5.1 General		*2.1.1.2.3 Strength requirements	Essentially similar	Considered equivalent
11.5.2 Required strength		*2.1.1.2.3.1 Required strength	Essentially similar	Considered equivalent
11.5.3 Design Strength		*2.1.1.2.3.3 Design strength	Different strength reduction factors, mainly because ASCE gives allowable stress design whereas NEHRP provisions are for strength design.	Equivalency cannot be judged
11.5.4 Deformation Requirements	Masonry structures shall be designed so the design story drift does not exceed the allowable story drift given in Table 5.2.8 (The table shows drift 0.007 to 0.013 story height depending on SUGs and lateral resisting systems)	*1.13.2.2	The calculated story drift ... shall not exceed 0.007 times the story height.	ASCE is equivalent to more stringent.
11.6 FLEXURE AND AXIAL LOADS				
11.6.1 Scope				
11.6.2 Design Requirements for		*2.3 Reinforced masonry		

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

Reinforced Masonry Members				
11.6.2.1			No corresponding provisions	Does not affect equivalency
11.6.2.2		A.9.11.4 Maximum Reinforcement Percentages A.9.11.4.1 Method A A.9.11.4.2 Method B	Method A of ASCE is essentially identical to NEHRP provisions except for the following change: It is applicable when the story drift $\leq 0.01h_{sx}$ and when extreme compressive fiber strains are below certain specific values. In addition, Method B has been added for the case when the story drift $\leq 0.013h_{sx}$	ASCE is somewhat more restrictive
11.6.2.3		*2.1.1.2.3.1 Required strength	Essentially similar	Considered equivalent
11.6.3 Design of Plain (Unreinforced) Masonry Members		*2.2 Unreinforced Masonry		
11.6.3.1 11.6.3.2 11.6.3.3 11.6.3.4			No corresponding provisions	Does not affect equivalency
11.6.3.5	Design axial strength shall be ...	*2.2.3 Axial compression and flexure	Identical, except ϕ is different, as noted earlier.	Equivalency difficult to judge
11.7 SHEAR	Uses strength design method	*2.2.5 Shear (Unreinforced masonry) *2.3.5 Shear (reinforced masonry)	Uses allowable stress design method	Equivalency cannot be judged
11.8 SPECIAL REQUIREMENTS FOR BEAMS		*2.3.3.4 Beams		
11.8.1		*2.3.3.4.4	Essentially identical	Equivalent
11.8.2			No corresponding provisions	Equivalency cannot be judged
11.8.3			No corresponding provisions	Equivalency cannot be judged
11.8.4 Deep Flexural Members			No corresponding provision	Equivalency cannot be judged

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

11.9 SPECIAL REQUIREMENTS FOR COLUMNS		*2.1.4 Columns		
11.9.1	Area of longitudinal reinforcement for <i>columns</i> shall be not less than 0.005 nor more than 0.04 times cross-sectional area of the <i>column</i> .	*2.1.4.4	Identical, except that the lower limit on reinforcement ratio has been changed from 0.005 to 0.0025 times the cross-sectional area of the column.	ASCE is less stringent
11.9.2	There shall be a minimum of four longitudinal bars in <i>columns</i> .	*2.1.4.4	Identical	Equivalent
11.9.3	Lateral ties shall be provided to resist shear and shall comply with the following: ...	*2.1.4.6 Lateral ties	Identical	Equivalent
11.10 SPECIAL REQUIREMENTS FOR WALLS 11.10.1	The nominal flexural strength of the <i>wall</i> for out-of-plane flexure shall be at least equal to 1.3 times the cracking moment strength of the <i>wall</i> .		ASCE has no corresponding provision.	ASCE is less stringent
11.11 SPECIAL REQUIREMENTS FOR SHEAR WALLS				
11.11.1 Ordinary Plain masonry Shear Walls	To be designed per Sections 11.3.2 or 11.3.3.	*Chapter 5 Empirical Design of Masonry *2.2 Unreinforced masonry	Identical Not the same	Equivalent Equivalency difficult to judge
11.11.2 Detailed Plain Masonry Shear Walls	To be designed per Sections 11.3.3. Reinforcement details per Sections 11.3.7.3 and 11.3.7.4.	*2.2 Unreinforced masonry *1.13.5.3.3 Minimum Reinforcement Requirements for Masonry Shear Walls	Not the same Similar with some differences explained earlier	Equivalency difficult to judge ASCE is less stringent
11.11.3 Ordinary Reinforced Masonry Shear Walls	To be designed per Sections 11.3.4.	*2.3 Reinforced Masonry	Essentially similar	Considered equivalent
11.11.4 Intermediate Reinforced Masonry Shear Walls	To be designed per Sections 11.3.3. Reinforcement details per Sections 11.3.7.3 and 11.3.7.4.	*2.2 Unreinforced masonry *1.13.5.3.3 Minimum Reinforcement Requirements for	Not the same Similar, with some differences explained earlier	Equivalency difficult to judge ASCE is less stringent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

		Masonry Shear Walls		
11.11.5 Special Reinforced Masonry Shear Walls	To be designed per Sections 11.3.3. Reinforcement details per Sections 11.3.7.3 and 11.3.7.4. In addition, there are more requirements as given below:	*2.2 Unreinforced masonry *1.13.5.3.3 Minimum Reinforcement Requirements for Masonry Shear Walls	Not the same Similar, with some differences explained earlier	Equivalency difficult to judge ASCE is less stringent
11.11.5.1 Vertical Reinforcement 11.11.5.2 Horizontal Reinforcement		*1.13.6.4 Shear wall reinforcement requirements	Essentially identical	Equivalent
11.11.5.3 Shear Keys			No corresponding provisions	Equivalency cannot be judged
11.11.6 Flanged Shear Walls			No corresponding provisions	Equivalency cannot be judged
11.11.7 Coupled Shear Walls 11.11.7.1 Design of Coupled Shear Walls			No corresponding provision	Equivalency cannot be judged
11.11.7.2 Shear Strength of Coupling Beams			No corresponding provision	Equivalency cannot be judged
11.12 SPECIAL MOMENT FRAMES OF MASONRY			No corresponding provision	Equivalency cannot be judged
11.13 GLASS-UNIT MASONRY AND MASONRY VENEER				
11.13.1 Design Lateral Forces and Displacements			No corresponding provision	Does not affect equivalency
11.13.2 Glass-Unit Masonry Design	Refers to Chapter 11 of ACI 530-95.	*CHAPTER 7 GLASS UNIT MASONRY	Essentially similar provisions	Considered equivalent
11.13.3 Masonry Veneer Design	Refers to Chapter 12 of ACI 530-95.	*CHAPTER 6 VENEERS	Basically the same, refers to Chapter 6 of ACI 530-99.	Considered equivalent
Appendix to Chapter 11 ALTERNATIVE		A.9.11 SUPPLEMENTARY	Essentially similar	Considered equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

PROVISIONS FOR THE DESIGN OF MASONRY STRUCTURES		PROVISIONS FOR MASONRY		

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
Chapter 12 WOOD STRUCTURE DESIGN REQUIREMENTS		9.12 WOOD		
12.1 General 12.1.1 Scope	Limited to seismic design only.	9.12.1 Reference Documents	Essentially similar	Considered equivalent
12.1.2 Reference Documents 12.1.2.1 Engineered Wood Construction 12.1.2.1 Conventional Light-Frame Construction 12.1.2.3 Materials Standards		9.12.1 Reference Documents	Essentially similar	Considered equivalent
12.1.3 Notations			No corresponding provisions	Equivalency is not affected
12.2 DESIGN METHODS	LRFD and Conventional Construction only.		No corresponding provisions	Equivalency is not affected
12.3 ENGINEERED WOOD CONSTRUCTION			No corresponding provisions	Equivalency difficult to judge
12.4 DIAPHRAGMS AND SHEAR WALLS			No corresponding provisions	Equivalency difficult to judge
12.5 CONVENTIONAL LIGHT-FRAME CONSTRUCTION				
12.5.1 Scope	In addition to other requirements and exceptions the Tables in Reference 12-5 have been modified to Table 12.5.1-1.	A.9.12. Supplementary provisions for wood (modifications in conventional light-frame construction)	Table A.9.12.10.1-1a is essentially the same as Table 12.5.1-1 of NEHRP except for the following changes: Braced wall requirements in SDC C are the same as in SDC B for detached one- and two-family dwellings. It is specifically mentioned that a cripple wall which exceeds 14 in. in height is considered to be above grade. Table A.9.12.10.1-1b of ASCE is essentially similar to	Considered equivalent ASCE is less

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

			Table 12.5.2-1 of NEHRP. However, ASCE allows conventional construction where $S_{DS} \geq 1.0$, while NEHRP does not.	stringent
12.5.2 Braced Walls			No corresponding provisions	Equivalency cannot be judged
12.5.3 Detailing Requirements			No corresponding provisions	Equivalency cannot be judged
12.6 SEISMIC DESIGN CATEGORY A			No corresponding provisions	Equivalency cannot be judged
12.7 SEISMIC DESIGN CATEGORY B, C, AND D			No corresponding provisions	Equivalency cannot be judged
12.8 SEISMIC DESIGN CATEGORY E AND F			No corresponding provisions	Equivalency cannot be judged

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
CHAPTER 13 SEISMICALLY ISOLATED STRUCTURES DESIGN REQUIREMENTS		9. 13 PROVISIONS FOR SEISMICALLY ISOLATED STRUCTURES		
13.1 General		9.13.1 General	Identical	Equivalent
13.2 CRITERIA SELECTION		9.13.2 Criteria Selection		
13.2.1 Basis for Design		9.13.2.1 Basis for Design	Identical	Equivalent
13.2.2 Stability of the Isolation System		9.13.2.2 Stability of the Isolation System	Identical	Equivalent
13.2.3 Seismic Use Group		9.13.2.3 Seismic Use Group	Identical	Equivalent
13.2.4 Configuration Requirements		9.13.2.4 Configuration Requirements	Identical	Equivalent
13.2.5 Selection of Lateral Response Procedure		9.13.2.5 Selection of Lateral Response Procedure	Identical	Equivalent
13.2.5.1 General		9.13.2.5.1 General		
13.2.5.2 Equivalent Lateral Force Procedure		9.13.2.5.2 Equivalent Lateral Force Procedure	Identical	Equivalent
13.2.5.3 Dynamic Analysis		9.13.2.5.3 Dynamic Analysis	Essentially identical	Equivalent
13.2.5.3.1 Response- Spectrum Analysis		9.13.2.5.3.1 Response-Spectrum Analysis	Identical	Equivalent
13.2.5.3.2 Time- History Analysis		9.13.2.5.3.2 Time- History Analysis	Identical	Equivalent
13.2.5.3.3 Site-Specific Design Spectra		9.13.2.5.3.3 Site- Specific Design Spectra	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

13.3 EQUIVALENT LATERAL FORCE PROCEDURE 13.3.1 General		9.13.3 Equivalent Lateral Force Procedure 9.13.3.1 General	Identical	Equivalent
13.3.2 Deformation Characteristics of the Isolation System		9.13.3.2 Deformation Characteristics of the Isolation System	Identical	Equivalent
13.3.3 Minimum Lateral Displacements		9.13.3.3 Minimum Lateral Displacements		
13.3.3.1 Design Displacement		9.13.3.3.1 Design Displacement	Identical	Equivalent
13.3.3.2 Effective Period		9.13.3.3.2 Effective Period at Design Displacement	Identical	Equivalent
13.3.3.3 Maximum Displacement		9.13.3.3.3 Maximum Displacement	Identical	Equivalent
13.3.3.4 Effective Period at maximum Displacement		9.13.3.3.4 Effective Period at maximum Displacement	Identical	Equivalent
13.3.3.5 Total Displacement		9.13.3.3.5 Total Lateral Displacement	Identical	Equivalent
13.3.4 Minimum Lateral Forces		9.13.3.4 Minimum Lateral Forces		
13.3.4.1 Isolation System and Structural Elements At or Below the Isolation System		9.13.3.4.1 Isolation System and Structural Elements At or Below the Isolation System	Identical	Equivalent
13.3.4.2 Structural Elements Above the Isolation System		9.13.3.4.2 Structural Elements Above the Isolation System	Identical	Equivalent
13.3.4.3 Limits on V_s		9.13.3.4.3 Limits on V_s	Identical	Equivalent
13.3.5 Vertical Distribution of Force		9.13.3.5 Vertical Distribution of Force	Identical	Equivalent
13.3.6 Drift Limits		9.13.3.6 Drift Limits	Identical	Equivalent
13.4 DYNAMIC LATERAL RESPONSE		9.13.4 Dynamic Lateral Response	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

PROCEDURE 13.4.1 General		Procedure 9.13.4.1 General		
13.4.2 Isolation System and Structural Elements Below the Isolation System		9.13.4.2 Isolation System and Structural Elements Below the Isolation System	Identical	Equivalent
13.4.3 Structural Elements Above the Isolation System		9.13.4.3 Structural Elements Above the Isolation System	Identical	Equivalent
13.4.4 Ground Motion		9.13.4.4 Ground Motion		
13.4.4.1 Design Spectra		9.13.4.4.1 Design Spectra	Identical	Equivalent
13.4.4.2 Time Histories		9.13.4.4.2 Time Histories	Identical	Equivalent
13.4.5 Mathematical Model 13.4.5.1 General		9.13.4.5 Mathematical Model 9.13.4.5.1 General	Identical	Equivalent
13.4.5.2 Isolation System		9.13.4.5.2 Isolation System	Identical	Equivalent
13.4.5.3 Isolated Building		9.13.4.5.3 Isolated Building		
13.4.5.3.1 Displacement		9.13.4.5.3.1 Displacement	Identical	Equivalent
13.4.5.3.2 Forces and Displacements in Elements of the Lateral-Force-Resisting System		9.13.4.5.3.2 Forces and Displacements in Key Elements	Essentially similar	Equivalent
13.4.6 Description of Analysis Procedures 13.4.6.1 General		9.13.4.6 Description of Analysis Procedures 9.13.4.6.1 General	Identical	Equivalent
13.4.6.2 Input Earthquake		9.13.4.6.2 Input Earthquake	Identical	Equivalent
13.4.6.3 Response-Spectrum Analysis		9.13.4.6.3 Response-Spectrum Analysis	Essentially similar	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

13.4.6.4 Time-History Analysis		9.13.4.6.4 Time-History Analysis	Identical	Equivalent
13.4.7 Design Lateral Force		9.13.4.7 Design Lateral Force	Identical	Equivalent
13.4.7.1 Isolation System and Structural Elements At or Below the Isolation System		9.13.4.7.1 Isolation System and Structural Elements At or Below the Isolation System	Identical	Equivalent
13.4.7.2 Structural Elements Above the Isolation System		9.13.4.7.2 Structural Elements Above the Isolation System	Identical	Equivalent
13.4.7.3 Scaling of Results		9.13.4.7.3 Scaling of Results	Identical	Equivalent
13.4.7.4 Drift Limits		9.13.4.7.4 Drift Limits	Identical	Equivalent
13.5 LATERAL LOAD ON ELEMENTS OF STRUCTURES AND NONSTRUCTURAL COMPONENTS SUPPORTED BY BUILDINGS 13.5.1 General		9.13.5 Lateral Load On Elements Of Structures And Nonstructural Components Supported By Buildings 9.13.5.1 General	Identical	Equivalent
13.5.2 Forces and Displacements		9.13.5.2 Forces and Displacements		
13.5.2.1 Components At or Above the Isolation Interface		9.13.5.2.1 Components At or Above the Isolation Interface	Identical	Equivalent
13.5.2.2 Components Crossing the Isolation Interface		9.13.5.2.2 Components Crossing the Isolation Interface	Identical	Equivalent
13.5.2.3 Components Below the Isolation Interface		9.13.5.2.3 Components Below the Isolation Interface	Identical	Equivalent
13.6 DETAILED SYSTEM REQUIREMENTS		9.13.6 Detailed System Requirements 9.13.6.1 General	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

13.6.1 General				
13.6.2 Isolation System		9.13.6.2 Isolation System		
13.6.2.1 Environmental Conditions		9.13.6.2.1 Environmental Conditions	Identical	Equivalent
13.6.2.2 Wind Forces		9.13.6.2.2 Wind Forces	Identical	Equivalent
13.6.2.3 Fire Resistance		9.13.6.2.3 Fire Resistance	Identical	Equivalent
13.6.2.4 Lateral-Restoring Force		9.13.6.2.4 Lateral-Restoring Force	Identical	Equivalent
13.6.2.5 Displacement Restraint		9.13.6.2.5 Displacement Restraint	Identical	Equivalent
13.6.2.6 Vertical-Load Stability		9.13.6.2.6 Vertical-Load Stability	The load combinations in ASCE are different from those in NEHRP.	ASCE is less stringent
13.6.2.7 Overturning		9.13.6.2.7 Overturning	Identical	Equivalent
13.6.2.8 Inspection and Replacement		9.13.6.2.8 Inspection and Replacement	Identical	Equivalent
13.6.2.9 Quality Control		9.13.6.2.9 Quality Control	Identical	Equivalent
13.6.3 Structural System		9.13.6.3 Structural System		
13.6.3.1 Horizontal Distribution of Force		9.13.6.3.1 Horizontal Distribution of Force	Identical	Equivalent
13.6.3.2 Building Separations		9.13.6.3.2 Building Separations	Identical	Equivalent
13.6.3.3 Nonbuilding Structures		9.13.6.3.3 Nonbuilding Structures	Identical	Equivalent
13.7 FOUNDATIONS		9.13.7 Foundations	Identical	Equivalent
13.8 DESIGN AND CONSTRUCTION REVIEW		9.13.8 Design And Construction Review	Identical	Equivalent
13.8.1 General		9.13.8.1 General		
13.8.2 Isolation		9.13.8.2 Isolation System		

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

System				
13.9 REQUIRED TESTS OF THE ISOLATION SYSTEM 13.9.1 General		9.13.9 Required Tests Of The Isolation System 9.13.9.1 General	Identical	Equivalent
13.9.2 Prototype Tests 13.9.2.1 General		9.13.9.2 Prototype Tests 9.13.9.2.1 General	Identical	Equivalent
13.9.2.2 Record		9.13.9.2.2 Record	Identical	Equivalent
13.9.2.3 Sequence and Cycles:	The following sequence of tests shall be performed for the prescribed number of cycles at a vertical load equal to the average <i>dead load</i> plus one-half the effects due to <i>live load</i> on all <i>isolator units</i> of a common type and size: 1. 2. 3. and 4. $30S_{D1}B_D/S_{DS}$, but not less than ten, fully reversed cycles of loading at 1 <i>total design displacement</i> , $1.0D_{TD}$	9.13.9.2.3 Sequence and Cycles:	ASCE identical to NEHRP except for the following change: Item 4 of NEHRP was changed from $30S_{D1}B_D/S_{DS}$ to $15S_{D1}B_D/S_{DS}$	ASCE slightly less stringent
13.9.2.4 Units Dependent on Loading Rates		9.13.9.2.4 Units Dependent on Loading Rates	Identical	Equivalent
13.9.2.5 Units Dependent on Bilateral Load		9.13.9.2.5 Units Dependent on Bilateral Load	Identical	Equivalent
13.9.2.6 Maximum and Minimum Vertical Load		9.13.9.2.6 Maximum and Minimum Vertical Load	The load combinations in ASCE are different from NEHRP.	ASCE is less stringent
13.9.2.7 Sacrificial-Wind-Restraint Systems		9.13.9.2.7 Sacrificial-Wind-Restraint Systems	Identical	Equivalent
13.9.2.8 Testing Similar Units		9.13.9.2.8 Testing Similar Units	Identical	Equivalent
13.9.3 Determination		9.13.9.3 Determination	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

of Force-Deflection Characteristics		of Force-Deflection Characteristics		
13.9.4 Test Specimen Adequacy		9.13.9.4 Test Specimen Adequacy	Identical	Equivalent
13.9.5 Design Properties of the Isolation System		9.13.9.5 Design Properties of the Isolation System		
13.9.5.1 Maximum and Minimum Effective Stiffness		9.13.9.5.1 Maximum and Minimum Effective Stiffness	Identical	Equivalent
13.9.5.2 Effective Damping		9.13.9.5.2 Effective Damping	Identical	Equivalent
Appendix to Chapter 13 PASSIVE ENERGY DISSIPATION SYSTEMS			No corresponding provisions	Equivalency cannot be judged

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

1997 NEHRP		1998 ASCE 7		Comments
Section	Provision	Section	Provision	
Chapter 14 NONBUILDING STRUCTURE DESIGN REQUIREMENTS 14.1 GENERAL 14.1.1 Scope		Section 9.14 NONBUILDING STRUCTURE 9.14.1 General 9.14.1.1 9.14.1.2	Essentially identical	Equivalent
14.1.2 Nonbuilding Structures Supported by Other Structures			No corresponding provisions	Equivalency cannot be judged
14.1.3 Architectural, Mechanical, and Electrical Components		9.14.1.3	Identical	Equivalent
14.1.4 Loads		9.14.1.4	Identical	Equivalent
14.1.5 Fundamental Period		9.14.1.5	Identical	Equivalent
14.1.6 Drift Limitations		9.14.1.6	Identical	Equivalent
14.1.7 Materials Requirements	The requirements regarding specific materials in Chapters 8, 9, 10, 11, and 12 shall be applicable unless specifically exempted in this chapter.		No corresponding provisions	Does not affect equivalency
14.2 STRUCTURAL DESIGN REQUIREMENTS 14.2.1 Design Basis 14.2.1.1 Seismic Factors	<i>Nonbuilding structures</i> with the following additions and exceptions:	9.14.2 Nonbuilding Structures Similar to Building 9.14.2.1 Design Basis	Essentially identical with the following exception: Intermediate moment frames of reinforced concrete shall not be used at sites where the seismic coefficient S_{DS} is greater than or equal to 0.50 unless that both of the following conditions are met: 1. The nonbuilding structure is less than 50 feet (15 240 mm) in height. 2. $R \leq 3.0$ is used for design. Seems like there are printing errors such as: (1) 9.14.2 should probably be titled structural design requirements, (2) 9.14.2.1.1 is missing. (3) It may be noted that 9.14.2 has similar heading as 9.14.3.	Considered equivalent to less stringent
14.2.1.2 Importance Factors and Seismic		9.14.2.1.2	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

Use Group Classifications				
14.2.2 Rigid Nonbuilding Structures		9.14.2.2 Rigid Nonbuilding Structures	Identical	Equivalent
14.2.3 Deflection Limits and Structure Separation		9.14.2.3 Deflection Limits and Structure Separation	Identical	Equivalent
14.2 NONBUILDING STRUCTURES SIMILAR TO BUILDINGS 14.3.1 General		9.14.3 Nonbuilding Structures Similar To Buildings 9.14.3.1	Identical	Equivalent
14.3.2 Pipe Racks 14.3.2.1 Design Basis		9.14.3.2 Pipe Racks 9.14.3.2.1 Design Basis	Identical	Equivalent
14.3.3 Steel Storage Racks		9.14.3.3 Steel Storage Racks	Essentially identical	Equivalent
14.3.3.1 General Requirements		9.14.3.3.1 General Requirements	Essentially identical	Equivalent
14.3.3.2 Operating Weight		9.14.3.3.2 Operating Weight	Identical	Equivalent
14.3.3.3 Vertical Distribution of Seismic Forces		9.14.3.3.3 Vertical Distribution of Seismic Forces	Identical	Equivalent
14.3.3.4 Seismic Displacements		9.14.3.3.4 Seismic Displacements	Essentially identical	Equivalent
14.3.4 Electrical Power Generating Facilities 14.3.4.1 General 14.3.4.2 Design Basis		9.14.3.4 Electrical Power Generating Facilities 9.14.3.4.1 General 9.14.3.4.2 Design Basis	Identical	Equivalent
14.3.5 Structural Towers for Tanks and Vessels 14.3.5.1 General		9.14.3.5 Structural Towers for Tanks and Vessels 9.14.3.5.1 General	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

14.3.6 Piers and Wharves 14.3.6.1 General 14.3.6.2 Design Basis		9.14.3.6 Piers and Wharves 9.14.3.6.1 General 9.14.3.6.2 Design Basis	Identical	Equivalent
14.4 NONBUILDING STRUCTURES NOT SIMILAR TO BUILDINGS 14.4.1 General		9.14.4 Nonbuilding Structures Not Similar To Buildings 9.14.4.1 General	Identical	Equivalent
14.4.2 Earth Retaining Structures 14.4.2.1 General		9.14.4.2 Earth Retaining Structures 9.14.4.2.1 General	Identical	Equivalent
14.4.3 Tanks and Vessels 14.4.3.1 General 14.4.3.2 Design Basis		9.14.4.3 Tanks and Vessels 9.14.4.3.1 General 9.14.4.3.2 Design Basis	Identical	Equivalent
14.4.3.3 Additional Requirements		9.14.4.3.3 Additional Requirements	Identical	Equivalent
14.4.4 Electrical Transmission, Substation, and Distribution Structures 14.4.4.1 General 14.4.4.2 Design Basis		9.14.4.4 Electrical Transmission, Substation, and Distribution Structures 9.14.4.4.1 General 9.14.4.4.2 Design Basis	Identical	Equivalent
14.4.5 Telecommunication Towers 14.4.5.1 General 14.4.5.2 Design Basis		9.14.4.5 Telecommunication Towers 9.14.4.5.1 General 9.14.4.5.2 Design Basis	Identical	Equivalent
14.4.6 Stacks and Chimneys 14.4.6.1 General 14.4.6.2 Design Basis		9.14.4.6 Stacks and Chimneys 9.14.4.6.1 General 9.14.4.6.2 Design	Identical	Equivalent

Table 2. Detailed Comparison of Structural Provisions of 1998 ASCE 7 to 1997 NEHRP (continued)

		Basis		
14.4.7 Amusement Structures 14.4.7.1 General 14.4.7.2 Design Basis		9.14.4.7 Amusement Structures 9.14.4.7.1 General 9.14.4.7.2 Design Basis	Identical	Equivalent
14.4.8 Special Hydraulic Structures 14.4.8.1 General 14.4.8.2 Design Basis		9.14.4.8 Special Hydraulic Structures 9.14.4.8.1 General 9.14.4.8.2 Design Basis	Identical	Equivalent
14.4.9 Buried Structures 14.4.9.1 General 14.4.9.2 Design Basis		9.14.4.9 Buried Structures 9.14.4.9.1 General 9.14.4.9.2 Design Basis	Identical	Equivalent
14.4.10 Inverted Pendulums		9.14.4.10 Inverted Pendulums	Identical	Equivalent
Appendix to Chapter 14			No corresponding provisions	Does not affect equivalency