APPENDIX A—DESIGN VERIFICATION USING NONLINEAR RESPONSE HISTORY ANALYSIS

CODE

A.1—Notation and terminology

A.1.1 *Notation*

B = bias factor to adjust nominal strength to seismic target reliabilities
D_u = ultimate deformation capacity; the largest deformation at which the hysteresis model is deemed valid given available laboratory data or other substantiating evidence
f_{ce}' = expected compressive strength of concrete, MPa
f_{ue} = expected tensile strength for nonprestressed reinforcement, MPa
f_{ye} = expected yield strength for nonprestressed reinforcement, MPa
ℓ_p = plastic-hinge length for analysis purposes, mm
R_{ne} = expected yield strength
V_{ne} = expected shear strength, N
θ_y = yield rotation, radians
ϕ_s = seismic resistance factor for force-controlled actions

A.1.2 *Terminology*

distributed plasticity (fiber) model—component model consisting of discrete fibers explicitly representing nonlinear stress-strain or force-deformation responses.

structural wall panel zone—portion of a structural wall common to intersecting wall segments where forces from adjacent wall segments are resolved.

The following actions shall be as defined by ASCE/SEI 7 Chapter 16:

action, deformation-controlled
action, force-controlled
action, force-controlled critical
action, force-controlled ordinary
action, force-controlled noncritical

A.2—Scope

A.2.1 This appendix shall supplement the requirements of Chapter 16 of ASCE/SEI 7 when performing nonlinear response history analysis to determine the design of earthquake-resistant concrete structures.

A.2.2 The provisions of Appendix A shall be in addition to the provisions of Chapters 1 through 26.

A.2.3 This appendix shall be used in conjunction with Chapter 16 of ASCE/SEI 7 for additional general requirements, ground motions, load combinations, modeling, and analysis for design of new reinforced concrete structures, including:

(a) Structural systems designated as part of the seismic force-resisting system, including diaphragms, moment-resisting frames, structural walls, and foundations.
(b) Members not designated as part of the seismic force-resisting system but required to support other loads while

COMMENTARY

RA.1—Notation and terminology

RA.1.2 *Terminology*

Force-controlled and deformation-controlled actions are classified in A.7 for design using nonlinear analysis of concrete structures.

RA.2—Scope

RA.2.3 This appendix is intended to complement documents such as Chapter 16 of ASCE/SEI 7, TBI (2017), and LATBSDC (2017). This appendix provides requirements specific to nonlinear response history analysis and design of concrete members. For additional analysis and modeling requirements that are not specific to concrete members, refer to Chapter 16 of ASCE/SEI 7, TBI (2017), and LATBSDC (2017).