CR04C - CHAPTER 4 —STRUCTURAL SYSTEM REQUIREMENTS COMMENTARY

**Background:** Chapter 4 was originally proposed both (a) as an aid (roadmap) to identify applicable Code sections in the reorganized Code and (b) to introduce structural system requirements (for example, past codes have not included any explicit requirements for structural diaphragms other than for structures assigned to Seismic Design Category D, E, or F). ACI 318 reaffirmed its intent to incorporate this chapter in the reorganized code. Responsibility for development of the chapter was assigned to Sub H.

Chapter 4 was balloted by Full 318 Committee in four instances (LB10-01, LB11-02, LB11-04, and LB11-06) and was approved as part of reorganized ACI 318-14 on October 19, 2011 during the 318 Committee Cincinnati meeting. Code is shown in Arial font (as is this paragraph). Code text was not a part of the ensuing ballots, but was provided to help understand the context of the Commentary. Ballot comments on the Code were, in general, considered not relevant.

Chapter 4 Commentary was balloted by Subcommittee H in LB12H-04. Ballot results were Y-6, C-6, N-6, and A-1. Negative votes and comments were discussed and solved during the Sub H meeting at San Antonio where Sub H approved the corrected Commentary to be sent for letter ballot by the Full 318 Committee.

The Commentary of Chapter 4 was balloted by Full 318 Committee in LB13-01. The Ballot results were Y = 11, N = 14, C= 11, A = 2, for a total of 38 votes and 3 not returned votes. During Sub H meeting at Minneapolis changes introduced to address No and Comment votes were discussed and approved by Sub H.

The Commentary of Chapter 4 was balloted for a second time by Full 318 Committee in LB13-03. The Ballot results were Y = 15, N = 8, C= 15, A = 2, for a total of 40 votes. During Sub H meeting at San Antonio changes introduced to address No and Comment votes were discussed and approved by Sub H. The response by Sub H was presented to Full 318 Committee on July 24 at San Antonio. All negatives were addressed and withdrawn with the exception of negatives by Wyllie (not present at meeting). Changes were made in response to all of Wyllie’s negatives thus solving his concerns. All approved changes by Full 318 Committee are included here and highlighted in yellow. Changes needed to the Code text as pointed out by the voters are highlighted in green to serve as a reminder. Update of new Chapter numbering as worked by Staff is included both in Code and Commentary and marked in light blue color.
CHAPTER 2 — NOTATION AND TERMINOLOGY

<<The Code text was not part of LB13-01 and LB13-03 ballots, but was provided only for context. Votes taken into account referred to the Commentary only. Marking in green refer to suggested changes by voters >>

[Add new definitions related to Chapter 4]

1. **durability** —ability of a structure or structural member to resist deterioration that impairs performance or limits service life of the structure in the relevant environment considered in design.

2. **load path** —sequence of structural members and connections designed to transfer the factored loads and forces in such combinations as are stipulated in this Code, from the point of application or origination through the structure to the final support location or the foundation.

3. **one-way construction** —members designed to be capable of supporting all loads through bending in a single direction. Joists, beams, girders, and some slabs and foundations are considered one-way construction. (See two-way construction)

4. **structural integrity** —ability of a structure through strength, redundancy, ductility, and detailing of reinforcement to redistribute stresses and maintain overall stability when localized damage or significant over-stress occurs.

5. **structural system** —interconnected structural members designed to meet a performance requirement.

6. **two-way construction** —members designed to be capable of supporting loads through bending in two directions. Some slabs and foundations are considered two-way construction. (See one-way construction)
CHAPTER 4 — STRUCTURAL SYSTEM REQUIREMENTS

4.1- Scope

4.1.1 - The provisions of this chapter shall apply for design and construction of structural concrete in structures or portions of structures defined in Chapter 1.

R4.1 — Scope

This chapter was added to the 2014 Code to include as an aid to help identify applicable Code sections in the reorganized code and to introduce structural system requirements. Requirements more stringent than the Code provisions may be desirable for unusual construction or construction where enhanced performance is desired. The Code and Commentary must be supplemented with sound engineering knowledge, experience, and judgment.

4.2- Materials

R4.2 — Materials

Chapter 3 identifies the material standards that relate to concrete components and reinforcement. Chapters 5 and 6 establish the design properties for the two main components of structural concrete: concrete and steel reinforcement respectively. Chapter 3 identifies the referenced standards permitted for design. Chapters 19 and 20 establish properties of the concrete and steel reinforcement permitted for design. The individual member chapters identify reinforcement details applicable to those members. Chapter 26 prescribes reinforcement details that are common across many member types. Chapter 26 presents construction requirements for concrete materials, proportioning, and acceptance of concrete.

4.2.1 - Design properties of concrete shall satisfy requirements of Chapter 19.

4.2.2 - Design properties of reinforcement shall satisfy requirements of Chapter 20.

4.3- Design Loads

R4.3 — Design Loads

The provisions in Chapter 5 of the Code are based on “Minimum Design Loads for Buildings and Other Structures” (ASCE/SEI 7). They design loads include, but are not limited to, dead loads, live loads, snow loads, wind loads, earthquake loads effects.
prestressing effects, crane loads, vibration, impact, shrinkage, temperature changes, creep, expansion of shrinkage-compensating concrete, and predicted unequal settlement of supports. Other project specific loads may be specified by the licensed design professional, whether or not they are specifically mentioned in the Code or ASCE 7.

4.3.1 - Loads and load combinations considered in design shall be as required by Chapter 5. <~>

4.4- Structural system and load paths

4.4.1 - The structural system shall include the following structural members, as applicable:

(a) Columns and structural walls; (make structural walls an independent item, and adjust the order to match the new outline)
(b) Beams and joists;
(c) Other members of the floor construction and roof construction, including one-way and two-way slabs;
(d) Structural diaphragms and collectors;
(e) Foundations or and other supporting elements; and
(f) Joints, connections, and other anchorages as required to transmit forces from one component to another.

R4.4.1 —Structural concrete design has evolved from an emphasis on emphasizing the design of individual members to the design of the structure as a whole system. A structural system consists of structural members, each performing a specific role or function. A structural member may belong to one or more structural systems, serving different roles in each system and having to meet all the detailing requirements of the structural systems of which they are a part. Throughout this Chapter, “members” can be interpreted to mean “members and connections.”

The Code is written considering that a building structural system comprises these members, but many alternative arrangements are possible because not all structural members types are used in all building structural systems. The selection of the types of members to use in a specific project and the role or roles these members types-play is made by the Licensed Design Professional complying with the requirements of the Code.

4.4.2 - Design and construction of structural members identified in 4.4.1 shall be in accordance with Chapters 7 through 18 as applicable.

R4.4.2 —Structural concrete member requirements are divided and presented by type in the following chapters:

- Chapter 9 – One-way slabs
- Chapter 10 – Two-way slabs
In the chapter for each type of structural member, the requirements follow the same general sequence and scope, including general requirements, limits for design, required strength, design strength, reinforcement limits, and reinforcement detailing.

**4.4.3 -** It shall be permitted to design a structural system comprising structural members not complying with 4.4.1 and 4.4.2, provided the structural system is approved in accordance with 1.10.1.

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**R4.4.3** — Some materials, structural members, or systems that may not be specifically recognized in the prescriptive provisions of the Code may still be acceptable if they meet the intent of the Code. Section 1.10.1 outlines the procedures for obtaining approval of alternative materials and systems.

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**4.4.4 -** The structural system shall be designed and constructed to support the factored loads in load combinations required in 4.3 without exceeding the appropriate member design strengths, considering one or more continuous load paths from the point of load application or origination to the final point of resistance. <11.2.1, IPS-1, IBC 1604.2>

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**R4.4.4** — The design should be based on members and connections that provide design strengths not less than the strengths required to transfer the loads along the studied load path. The Licensed Design Professional may need to study several one or more alternative paths to identify weak links along the sequence of elements that constitute each studied load path.

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**4.4.5 -** Structural systems shall be designed to accommodate anticipated volume change and differential settlement. <8.2.4, 9.2.3>

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**R4.4.5** — The effects of column and wall creep and shrinkage, restraint of creep and shrinkage in long roof and floor systems, creep caused by prestress forces, volume changes caused by temperature variation, as well as potential damage to supporting members caused by these volume changes should be considered in design. Specific details for reinforcement, closure strips, or expansion joints are common ways of accommodating these effects. Minimum shrinkage and temperature reinforcement.
controls cracking to an acceptable level in many concrete structures of ordinary proportions and exposures.

Explicit consideration of differential settlement or heave is ordinarily considered in design only when specific criteria are provided by the geotechnical engineer or when existing soil conditions dictate their consideration. Geotechnical recommendations to allow for nominal values of differential settlement and heave are not normally included in design load combinations for ordinary building structures.

4.4.6 - Seismic-force-resisting system

4.4.6.1 - Every structure shall be assigned to a Seismic Design Category in accordance with the General Building Code or as determined by the authority having jurisdiction in areas without a legally adopted building code. <1.1.9.1>

R4.4.6.1 — Design requirements in the Code are based on the Seismic Design Category to which the structure is assigned. In general, the Seismic Design Category relates to seismic risk level, soil type, occupancy, and use of the building. Assignment of a building to a Seismic Design Category is under the jurisdiction of a general building code rather than ACI 318. In the absence of a general building code, refer to ASCE/SEI 7 for provides the assignment of a building to a Seismic Design Category.

4.4.6.2 - Structural systems designated as part of the seismic-force-resisting system shall be restricted to those systems designated by the General Building Code or as determined by the authority having jurisdiction in areas without a legally adopted building code. <21.1.1.7>

R4.4.6.2 — The general building code prescribes through ASCE/SEI 7 the types of structural systems permitted as part of the seismic-force-resisting system based on considerations such as Seismic Design Category and building height. The seismic design requirements for systems assigned to Seismic Design Categories B through F are prescribed in Chapter 18. Other systems can be used if approved by the building official.

4.4.6.3 - Structural systems assigned to Seismic Design Category A shall satisfy the applicable requirements of this Code. Structures assigned to Seismic Design Category A are not required to be designed in accordance with Chapter 18. <21.1.1.7>

R4.4.6.3 — Structures assigned to Seismic Design Category A are subject to the lowest seismic hazard. Chapter 18 does not apply, and have the least stringent seismic design requirements. Provisions of Chapters I through 19 and Chapters 21 through 24 are considered to provide sufficient toughness for these structures without additional requirements for earthquake-resistant design.

4.4.6.4 - Structural systems assigned to Seismic Design Category B, C, D, E, or F shall satisfy the requirements of Chapter 18 in addition to applicable requirements of other chapters of this Code. <~>
R4.4.6.4 — Chapter 18 contains sections provisions that are applicable depending on the Seismic Design Category and on the seismic-force-resisting system used. Not all structural member types have specific requirements in all Seismic Design Categories. For example, Chapter 18 does not include requirements for structural walls in Seismic Design Categories B and C, but does include them special provisions for Seismic Design Categories D, E, and F.

4.4.6.5 - In structures assigned to Seismic Design Category B, C, D, E, or F, structural members assumed not to be part of the seismic-force-resisting system shall be permitted provided their effect on the response of the system is considered and accommodated in the structural design. Consequences of damage to structural and nonstructural members that are not a part of the seismic-force-resisting system shall be considered.

4.4.6.5 — In Seismic Design Categories D, E, and F, structural members not considered part of the seismic-force-resisting system must be designed to accommodate drifts and forces that occur as the building responds to an earthquake. Interaction of non-structural elements with the structural system—for example, the "captive column", or "short-column effect"—has led to failure of structural members and even the collapse of some structures during earthquakes in the past. Although design of non-structural elements for earthquake effects is not included in the scope of ACI 318, the potential negative effects of nonstructural elements on the structure structural behavior need to be considered in Seismic Design Categories B, C, D, E, and F.

4.4.7 - Structural diaphragms and collectors

R4.4.7 — Structural diaphragms and collectors

Floor and roof slabs play a dual role by simultaneously supporting gravity loads and transmitting lateral forces in their own plane as a diaphragm. General requirements for diaphragms are provided in Chapter 12, while the roles of the diaphragm are described in the Commentary to that chapter. Additional requirements for design of diaphragms in structures assigned to Seismic Design Category D, E, and F are prescribed in Chapter 18.

4.4.7.1 - Structural diaphragms, such as floor or roof slabs, shall be designed to resist simultaneously both out-of-plane gravity loads and in-plane lateral forces in load combinations required in 4.3. <~>

4.4.7.2 - Structural diaphragms and their connections to framing members shall be designed to transfer forces between the diaphragm and framing members. <~>

4.4.7.3 - Structural diaphragms and their connections shall be designed to provide lateral support to vertical, horizontal, and inclined elements. <~>

4.4.7.4 - Structural diaphragms shall be designed to resist applicable lateral loads from soil and hydrostatic pressure and other loads assigned to the diaphragm by structural analysis. <~>
4.4.7.5 - Structural diaphragms that are part of the seismic-force-resisting system shall be designed for the applied forces. In structures assigned to Seismic Design Category D, E, and F, the diaphragm design shall comply with the requirements of Chapter 18. \[\text{18}\]

4.5- Structural analysis

R4.5 — Structural analysis

The role of analysis is to estimate the internal forces and deformations of the structural system and to establish compliance with the strength, serviceability, and stability requirements of the Code. The use of computers in structural engineering has made it feasible to perform analysis of complex structures. This Code only requires that the analytical procedure used meets the fundamental principles of equilibrium and compatibility of deformations, permitting a number of analytical techniques, including the strut-and-tie method required for discontinuity regions, as provided in Chapter 6.

4.5.1 - Analytical procedures shall comply with compatibility of deformations and equilibrium of forces. \[\text{18}\]

4.5.2 - The methods of analyses set forth in Chapter 6 shall be permitted. \[\text{18}\]

4.6- Strength

R4.6 — Strength

The basic requirement for strength design may be expressed as follows:

\[
\text{Design Strength} \geq \text{Required Strength}
\]

\[
\phi S_n \geq U
\]

In the strength design procedure, the level of safety is provided by a combination of factors applied to the loads and strength reduction factors \(\phi\) applied to the nominal strengths.

The strength of a member or cross section, calculated using standard assumptions and strength equations, along with nominal values of material strengths and dimensions is referred to as “nominal strength.” and is generally designated \(S_n\). “Design strength” or usable strength of a member or cross section is the nominal strength reduced by the applicable strength reduction factor \(\phi\). The purpose of the strength reduction factor is to account for the probability of under-strength due to variations of in-place material strengths and dimensions, the effect of simplifying assumptions in the design equations, the degree of ductility, potential failure mode of the member, the required reliability, and significance of failure and existence of alternate load paths for the member in the structure.
This Code, or the general building code, prescribes “design load combinations,” also known as “factored load combinations,” which define the way different types of loads are multiplied (factored) by individual load factors and then combined to obtain a “factored load,” $U$. The individual load factors and additive combination reflect the variability in magnitude of the individual load effect, the probability of simultaneous occurrence of various load effects, and the assumptions and approximations made in the structural analysis when determining required design strengths.

A typical design approach, when linear analysis is applicable, is to analyze the structure for individual unfactored load cases, and then combine the individual unfactored load cases in a factored load combination to determine the design load effects. Where effects of loads are nonlinear, for example in foundation uplift, the factored loads generally must be applied simultaneously to determine the nonlinear, factored load effect. The load effect includes moments, shears, axial forces, torsions, and bearing forces. “Required strength” or strengths are the maximum absolute values of negative and positive factored load effects as applicable. Sometimes design displacements are determined for factored load effects.

In the course of applying these principles, the Licensed Design Professional should be aware that providing more strength than required does not necessarily lead to a safer structure because doing so may change the potential failure mode. For instance, increasing longitudinal reinforcement area beyond that required for moment strength as derived from analysis without increasing transverse reinforcement could increase the probability of a shear failure rather than occurring prior to a flexural failure.

4.6.1 - Structures and structural members shall have design strength at all sections greater than or equal to the required strength, $U$, calculated for the factored loads and forces in such combinations as required by this Code or the General Building Code. <9.1.1>

4.6.2 - Design strength of a member and its joints and connections, in terms of flexure moment, axial load force, shear, torsion, and bearing, shall be taken as the nominal strength multiplied by the applicable strength reduction factor.

4.7- Serviceability

Serviceability refers to the ability of the structural system or structural member to provide appropriate behavior and functionality under the considered actions affecting the system. Serviceability requirements address, among others, issues such as deflections and cracking, among others.

Except as stated in Chapter 24, service-level load combinations are not defined in ACI 318, but they are discussed in Appendix C – Serviceability considerations, of ASCE/SEI...
Unlike ACI 318, however, appendices to ASCE/SEI 7 are not considered to be mandatory parts of the standard.

Structures, structural members, and their connections shall be designed for serviceability by complying with the provisions of the applicable member chapters. <~>

Evaluation of performance at service load conditions shall consider reactions, moments, shears, and axial forces induced by prestressing, creep, shrinkage, temperature change, axial deformation, restraint of attached structural members, and foundation settlement. <18.10.2>

The requirements of 4.7.1 for members and their connections shall be permitted to be satisfied by complying with the requirements of the applicable member chapter. <~>

**4.8- Durability**

Concrete mixtures shall be designed in compliance with the requirements of 19.5.2 and 26.4.2 with due consideration of applicable environmental exposure to provide required durability. <~>

Reinforcement shall be protected from corrosion by complying with the specified minimum concrete cover stipulated in 6.10.5 provisions for durability in 19.5. <~>

**4.9- Sustainability**

The Code provisions for strength, serviceability, and durability are minimum requirements to achieve a safe, durable, and resilient concrete structure. These
provisions do not include any exceptions where a sustainability consideration would override the fundamental goals of the minimum requirements. The Code permits the owner or the licensed design professional to specify requirements higher than the minimums mandated in the Code. Such optional requirements can include higher strengths, more restrictive deflection limits, enhanced durability, enhanced resilience, and sustainable provisions.

4.9.1 - The licensed design professional shall be permitted to specify sustainability requirements in addition to the strength, serviceability, and durability requirements of this Code.

4.9.2 - The strength, serviceability, and durability requirements of this Code shall take precedence over sustainability considerations.

4.10 - Structural integrity

R4.10 — Structural integrity

It is the intent of the structural integrity requirements to improve redundancy and ductility through detailing of reinforcement and connections so that in the event of damage to a major supporting element or an abnormal loading, the resulting damage will be confined and the structure will have a better chance of maintaining overall stability.

Integrity requirements for selected structural member types are included in the corresponding member chapter in the sections noted.

4.10.1 - General

4.10.1.1 - Reinforcement and connections shall be detailed to tie the structure together effectively and to improve overall structural integrity.

4.10.2 - Minimum requirements for structural integrity

4.10.2.1 - Structural members and their connections shall comply with structural integrity requirements listed in Table 4.10.2.

Table 4.10.2 — Minimum requirements for structural integrity

<table>
<thead>
<tr>
<th>Member type</th>
<th>Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-way joist construction</td>
<td>9.81.6</td>
</tr>
<tr>
<td>Nonprestressed two-way slabs</td>
<td>12.7.4.3</td>
</tr>
<tr>
<td>Prestressed two-way slabs</td>
<td>8.7.5.6</td>
</tr>
<tr>
<td>Two-way joist construction</td>
<td>8.8.1.7</td>
</tr>
</tbody>
</table>
4.11 - Fire resistance

Additional guidance on fire resistance of structural concrete is provided by ACI 216.1-07, Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies.

4.11.1 - Structural concrete members shall satisfy the fire protection requirements of the General Building Code. <~>

4.11.2 - Where the General Building Code requires a thickness of concrete cover for fire protection greater than the concrete cover specified in 20.8.1, such greater thickness shall govern. <7.7.8>

4.12 - Requirements for specific types of construction

This section contains requirements that are related to different specific types of construction. Additional requirements that are specific to member types appear in the corresponding member chapters.

4.12.1 - Precast concrete systems

All requirements in the Code apply to precast systems and members unless specifically excluded. In addition, some requirements apply specifically to precast concrete. This section contains general specific requirements for precast systems. Other sections of this Code general requirements, such as concrete cover, also address provide specific requirements, such as required concrete cover, that are specific for precast systems.

Precast systems differ from monolithic systems in that the type of restraint at supports, the location of supports, and the induced stresses in the body of the member vary during the fabrication, storage, transportation, erection, and the final interconnected configuration. Consequently, the member design forces to be considered may differ in magnitude and direction with varying critical sections at various stages of construction. For example, a precast flexural member may be simply supported for dead load effects before continuity at the supporting connections is established and may be a continuous
4.12.1.1 - Design of precast concrete members and connections shall include loading and restraint conditions from initial fabrication to end use in the structure, including form removal, storage, transportation, and erection. <16.2.1> <22.9.1> <16.9.1>

4.12.1.2 - Design, fabrication, and construction of precast members and their connections shall include the effects of tolerances. <16.2.3>

4.12.1.3 - When precast members are incorporated into a structural system, the forces and deformations occurring in and adjacent to connections shall be included in the design. <16.2.2>

4.12.1.4 - Where system behavior requires in-plane loads to be transferred between the members of a precast floor or wall system, (a) and (b) shall apply: <16.3.2>

(a) in-plane load paths shall be continuous through both connections and members; <16.3.2.1>

(b) where tension loads occur, a load path of steel or steel reinforcement, with or without splices, shall be provided. <16.3.2.2>

4.12.1.5 - Distribution of forces that act perpendicular to the plane of precast members shall be established by analysis or test. <16.3.1>

4.12.2 - Prestressed concrete systems

R4.12.2 — Prestressed concrete systems

Prestressing, as used in the Code, may apply to pretensioning, bonded post-tensioning, or unbonded post-tensioning. All requirements in the Code apply to prestressed systems and members unless specifically excluded. This section contains general specific requirements for prestressed concrete systems. The general requirements Other sections of this Code — such as concrete cover — also address provide specific requirements that are specific, such as required concrete cover, for prestressed systems.

Creep and shrinkage effects may be greater in prestressed than in non-prestressed concrete structures because of the prestressing forces and because prestressed structures typically have less bonded reinforcement. Effects of movements due to creep and shrinkage may require more attention than is normally required for non-prestressed concrete.

Design of externally post-tensioned construction should consider aspects of corrosion protection and fire resistance that are applicable to this structural system.
**4.12.2.1** Design of prestressed members and systems shall be based on strength and on behavior at service conditions at all stages that will be critical during the life of the structure from the time prestress is first applied. <18.2.2 and 18.10.1>

**4.12.2.2** Provisions shall be made for effects on adjoining construction of elastic and plastic deformations, deflections, changes in length, and rotations due to prestressing. Effects of temperature change, restraint of attached structural members, foundation settlement, creep, and shrinkage shall also be considered. <18.2.4>

**4.12.2.3** Stress concentrations due to prestressing shall be considered in design. <18.2.3>

**4.12.2.4** Effect of loss of area due to open ducts shall be considered in computing section properties before grout in post-tensioning ducts has attained design strength. <18.2.6>

**4.12.2.5** Post-tensioning tendons shall be permitted to be external to any concrete section of a member. Strength and serviceability design requirements of this Code shall be used in evaluating the effects of external tendon forces on the concrete structure. <18.22.1>

**4.12.3** Composite concrete flexural members

This section addresses structural concrete members, either precast or cast-in-place, prestressed or nonprestressed, consisting of concrete cast at different times intended to act as a single unit composite member when loaded. All requirements in the Code apply to these members unless specifically excluded. In addition, some requirements apply specifically to composite concrete flexural members. This section contains general requirements that are specific to these elements and are not covered in the applicable member chapters.

**4.12.3.1** Provisions of this Code shall apply to composite concrete flexural members as defined in Chapter 2. <17.1.1>

**4.12.3.2** Individual members shall be investigated for all critical stages of loading. <17.2.2>

**4.12.3.3** Members shall be designed to support all loads introduced prior to full development of design strength of composite members. <17.2.5>

**4.12.3.4** Reinforcement shall be provided as required to minimize cracking and to prevent separation of individual components of composite members. <17.2.6>

**4.12.4** Composite steel and concrete construction

This section addresses composite steel and concrete construction.
This Code only addresses composite steel and concrete columns within its scope. The requirements for this type of member are included in Chapter 14.

4.12.4.1 - Composite compression members shall include all such members reinforced longitudinally with structural steel shapes, pipe, or tubing with or without longitudinal bars. <10.13.1>

4.12.4.2 - Composite compression members shall be designed in accordance with the applicable provisions of Chapter 10. <~>

4.12.5 - Structural plain concrete systems

4.12.5.1 - Requirements of Chapter 14 shall apply for design and construction of structural plain concrete members, both cast-in-place and precast. <~>

4.13 - Quality assurance, construction and inspection

Chapter 23 has been organized to collect into one chapter location the design information, compliance requirements, and inspection provisions that must be specified in the construction documents, for the benefit of the owner, contractor, inspector, or building official.

4.13.1 - Quality assurance and construction execution shall meet the requirements of Chapter 26. <~>

4.13.2 - Inspection during construction shall be in accordance with the requirements of Chapter 26 and the General Building Code. <~>

4.14 - Strength evaluation of existing structures

Requirements in Chapter 27 for strength evaluation of existing structures by physical load test address the evaluation of structures subjected to gravity loads only. Chapter 24 also covers strength evaluation of existing structures by analytical evaluation, which may be used for gravity as well as other loadings such as earthquake or wind.

4.14.1 - Strength evaluation of existing structures shall meet the requirements of Chapter 27. <~>