The following is the logic flow for seismic design based on the following documents:

IBC 2003
ASCE 7-02
AISC Seismic Design Provisions 341-02

ASCE 7-02

This document provides the basis for calculating the base shear value in the design.

Section 9.5.2.6 indicates that for SDC A and B, no special collector requirements such as overstrength factors are required.

Section A.9.8.3 requires R=3 unless AISC's Seismic Design Procedures are followed.

Section A.9.8.7 requires phi factors to be applied to the metal deck diaphragm's nominal strengths for seismic forces.

IBC 2003

Since this is the governing applicable building code, it refers to ASCE 7 and AISC 341, and its provisions control over them.

1. Per calculations – SDC B
2. Load effect E is based on ASCE 7, section 9.5.2.7 (not using the simplified procedure of 1617.5)
3. Ordinary Concentric Braced Frame (OCBF) with R = 5 and $\Omega = 2.0$.
4. Per section 2205.1, the IBC states: *"Where required, the seismic design of steel structures shall be in accordance with the additional provisions of 2205.2".*
5. Section 2205.2.1 states that, for SDC B, the steel system must be designed based upon AISC 341-02 unless R = 3.
6. Since R = 5, we must meet AISC 341.

AISC 341-02

1. Table I-4-1 indicates overstrength factors, Ωo

TABLE I-4-1 System Overstrength Factor, Ω_o	
Seismic Load Resisting System	Ω_o
All moment-frame systems meeting Part I requirements	3
Eccentrically Braced Frames (EBF) meeting Part I requirements	$2^1/_2$
All other systems meeting Part I requirements	2

2. Section 4.1 states: *"The loads and load combinations shall be as stipulated by the Applicable Building Code (see Glossary). Where Amplified Seismic Loads are required by these provisions, the horizontal earthquake load E (as defined in the Applicable Building Code) shall be multiplied by the overstrength factor Ωo prescribed by the Applicable Building Code. In the absence of a specific definition of Ωo, the value for Ωo shall be as listed in Table I-4-1."*
3. So AISC 341 essentially states that you use the IBC code load combinations BUT you apply the Ωo factor to E only where the "amplified seismic loads" are required by 341 directly.
4. Section 14.2 states: *"The Required Strength of the members and connections,* ***other than brace connections****, in OCBFs shall be determined using the load combinations stipulated by the Applicable Building Code, including the Amplified Seismic Load."*
5. So this requires "all members and connections" that are <u>not</u> brace connections to use the overstrength factor in determining E.
6. So the question is, what constitutes "all members and connections"? Section 1 of 341 states: *"All members and connections in the Seismic Load Resisting System shall have a Design Strength as required in the LRFD Specification, and shall also meet all of the additional requirements in these Provisions."*
7. In the glossary of AISC 341, the following is provided: *Seismic Load Resisting System. The assembly of structural elements in the building that resists seismic loads, including struts, collectors, chords, diaphragms and trusses.*
8. Based on the above, the collectors are a part of the Seismic Load Resisting System, and are therefore part of the "all members and connections" that Section 14.2 refers to. They then must be designed for the overstrength factor of 2.0.