ATC-51-2

Recommended U.S.-Italy Collaborative Guidelines for Bracing and Anchoring Nonstructural Components in Italian Hospitals

by

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Prepared for the

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2004

Preface

In 2002, the Servizio Sismico Nazionale of Italy (Italian National Seismic Survey, NSS[1]) awarded a contract to the Applied Technology Council (ATC) of the United States to develop guidelines for bracing and anchoring nonstructural components in Italian hospitals. The project, conducted as the third phase of a larger cooperative program conducted by NSS and ATC to develop recommendations to improve hospital seismic safety in Italy, was denoted ATC-51-2. The program's collaborative recommendations are based on the perspectives, experience, and knowledge of specialists from both countries in earthquake engineering, hospital seismic safety, and hospital regulation.

Under the first phase of the program, ATC and NSS developed a series of overarching recommendations for the program. The recommendations from the first phase are documented in the ATC-51 report, *U.S.-Italy Collaborative Recommendations for Improving the Seismic Safety of Hospitals in Italy* (ATC, 2000).

The second phase of the program, otherwise known as the ATC-51-1 project, addressed one of the short-term recommendations made in the first phase — planning for emergency response and postearthquake inspection. The Phase 2 recommendations are documented in the ATC-51-1 report, *Recommended U.S.-Italy Collaborative Procedures for Earthquake Emergency Response Planning for Hospitals in Italy* (ATC, 2002). The recommended procedures can be implemented through the use of a Postearthquake Inspection Notebook, included as an appendix in the ATC-51-1 report. The report demonstrates application of the procedures on two representative Italian hospital facilities.

The third phase of the program, documented in this ATC-51-2 report, focused on developing guidelines for bracing and anchoring nonstructural components in Italian hospitals. Phase 3 project activities included: (1) a visit by U.S. specialists to Italy to inspect bracing of nonstructural components in representative hospital facilities, (2) a review by the advisory Project Engineering Panel (PEP) of information provided by NSS on the performance of nonstructural components in recent Italian earthquakes and on regulations pertaining to the anchorage and bracing of nonstructural components, (3) development of recommendations during a project meeting in California in June 2003, and (4) a visit by project participants from Italy to hospital sites in the San Francisco Bay area to observe methods for anchoring and bracing nonstructural components in representative California hospital facilities.

This report contains: (1) technical background information, including an overview of nonstructural component damage in prior earthquakes; (2) generalized recommendations for assessment of nonstructural components and recommended performance objectives and requirements; (3) specific recommendations pertaining to twenty-seven different types of nonstructural components; (4) design examples that illustrate in detail how a structural engineer evaluates and designs the retrofit of a nonstructural component; (5) additional seismic design considerations for nonstructural components; and (6) guidance pertaining to the design and selection of devices for seismic anchorage.

ATC gratefully acknowledges the project participants who developed this report: technical consultant Joseph R. Maffei, who served as the principal report author; Italian PEP members Romano Alberto Basso, Vittorio Bearzi, Adriano De Sortis, Giacomo Di Pasquale (lead NSS representative), Fabrizio Gatti, and Alessandro Martini; U.S. PEP members John Gillengerten, William T. Holmes, Patrick J. Lama, Arthur E. Ross, and William E. Staehlin (ATC Board representative); Peter N. Mork and Michelle Schwartzbach, who provided report production services; and Tito Sanò, who cooperated in reviewing the report. The affiliations of these individuals are provided in the list of project participants.

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[1]NSS is one of the offices of the Department of Civil Protection of the Office of the Prime Minister of Italy

Contents

Preface iii

List of Figures ix

List of Tables xvii

1. Introduction 1
   - 1.1 Background and Purpose 1
   - 1.2 Organization of Report 2

2. Technical Background 3
   - 2.1 Summary of Italian Seismicity 3
   - 2.2 Nonstructural Damage in Past Italian Earthquakes 6
   - 2.3 Earthquake Damage to Nonstructural Systems in U.S. Hospitals 7
   - 2.4 Performance Levels, Objectives and Limit States 21
     - 2.4.1 Structural Performance Levels 21
     - 2.4.2 Nonstructural Performance Levels 23
     - 2.4.3 Combination of Structural and Nonstructural Performance Levels 23
   - 2.5 Key References, Standards, and Guidelines 24

3. General Recommendations 27
   - 3.1 Recommendations on which Nonstructural Items Require Seismic Evaluation or Anchoring 27
     - 3.1.1 Recommendations for Existing Components or Systems 27
     - 3.1.2 Recommendations for New Components or Systems 27
     - 3.1.3 Basis of the Recommendations 27
     - 3.1.4 Assessment of Vulnerability 32
   - 3.2 Recommended Performance Objectives 32
     - 3.2.1 New Hospitals 32
     - 3.2.2 Existing Hospitals 32
   - 3.3 Design Criteria and Lateral Forces 32
   - 3.4 Options for Design Responsibility 35
     - 3.4.1 Design by the Architect/Engineer 36
     - 3.4.2 Design by the Builder using Prescriptive Standards 36
     - 3.4.3 Complete Design by the Builder 36
     - 3.4.4 Recommended Design Responsibility by Component Type 37
   - 3.5 Design and Construction Review 37
   - 3.6 Cost of Providing Nonstructural Seismic Protection 37
     - 3.6.1 Installations in New Hospitals 39
     - 3.6.2 Nonstructural Retrofit in Existing Hospitals 40
     - 3.6.3 Retrofit Investment by Seismic Zone 42
   - 3.7 Postearthquake Inspection of Nonstructural Systems 43

4. Seismic Attributes and Recommendations for Example Components 47

5. Detailed Design Examples 79
   - 5.1 Example A: Fixed Floor Mounted Component—Rooftop Chiller 79
     - 5.1.1 Objective 79
     - 5.1.2 Attributes Important for Seismic Design 80

5.1.3 Seismic Calculations and Design ... 80
5.2 Example B: Evaluation and Retrofit of Elevator System ... 83
5.2.1 Information Needed for Seismic Evaluation ... 83
5.2.2 Seismic Calculations ... 85
5.2.3 Retrofit of Elevator Guide Rail 1 ... 88
5.2.4 Retrofit of Elevator Guide Rail 2 and Counterweight Rails ... 89
5.2.5 Additional Requirements ... 93
5.3 Example C: Example Prescriptive Requirements for Layout of Seismic Braces ... 94
5.3.1 Notes on Seismic Bracing ... 94
5.3.2 Maximum Brace Spacing ... 95
5.3.3 Procedure for Layout of Braces ... 95

6. Nonstructural Component Types and Design Considerations ... 101
6.1 Categories of Nonstructural Components and Systems ... 101
6.2 General Design Considerations ... 101
6.2.1 Connection to Component ... 101
6.2.2 Connection to Structure ... 102
6.2.3 Seismic Weight ... 102
6.2.4 Seismic Force Path ... 102
6.2.5 Deformation Compatibility ... 102
6.2.6 Serviceability ... 102
6.2.7 Constructability ... 102
6.2.8 Existing Conditions ... 103
6.3 Type A: Fixed, Floor Mounted Components ... 103
6.3.1 Typical Components ... 103
6.3.2 Typical Unprotected Seismic Behavior ... 103
6.3.3 Seismic Protection Strategies and Considerations ... 104
6.4 Type B: Fixed, Suspended Components ... 104
6.4.1 Typical Components ... 104
6.4.2 Typical Unprotected Seismic Behavior ... 104
6.4.3 Seismic Protection Strategies and Considerations ... 104
6.5 Type C: Fixed Components on Raised Access Floors ... 105
6.5.1 Typical Components ... 105
6.5.2 Typical Unprotected Seismic Behavior ... 105
6.5.3 Seismic Protection Strategies and Considerations ... 105
6.6 Type D: Vibration Isolated Floor Mounted Components ... 107
6.6.1 Typical Components ... 107
6.6.2 Typical Unprotected Seismic Behavior ... 107
6.6.3 Seismic Protection Strategies and Considerations ... 107
6.7 Type E: Vibration-Isolated Suspended Components ... 108
6.7.1 Typical Components ... 108
6.7.2 Typical Unprotected Seismic Behavior ... 108
6.7.3 Seismic Protection Strategies and Considerations ... 108
6.7.4 Commentary ... 110
6.8 Type F: Piping Systems ... 110
6.8.1 Typical Components ... 110
6.8.2 Typical Unprotected Seismic Behavior ... 110
6.8.3 Seismic Protection Strategies and Considerations ... 110
6.8.4 Deformation Considerations ... 111
6.8.5 Pipe Insulation ... 112
6.8.6 Prescriptive Standards ... 112
6.9 Type G: Air Distribution Systems ... 112
6.9.1 Typical Components ... 112
6.9.2 Typical Unprotected Seismic Behavior ... 112
6.9.3 Seismic Protection Strategies and Considerations ... 112

6.9.4 Prescriptive Standards 113
6.10 Type H: Electrical Distribution Systems 113
6.10.1 Typical Components 113
6.10.2 Typical Unprotected Seismic Behavior 114
6.10.3 Seismic Protection Strategies 114
6.10.4 Prescriptive Standards 114
6.11 Type I: Cladding 114
6.11.1 Typical Components 114
6.11.2 Typical Unprotected Seismic Behavior 114
6.11.3 Seismic Protection Strategies 114
6.12 Type J: Partitions 115
6.12.1 Typical Components 115
6.12.2 Typical Unprotected Seismic Behavior 115
6.12.3 Seismic Protection Strategies and Considerations 115
6.13 Type K: Ceilings 116
6.13.1 Typical Components 116
6.13.2 Typical Unprotected Seismic Behavior 116
6.13.3 Seismic Protection Strategies and Considerations 117
6.13.4 Prescriptive Standards 117
6.14 Type L: Light Fixtures 118
6.14.1 Typical Components 118
6.14.2 Typical Unprotected Seismic Behavior 118
6.14.3 Seismic Protection Strategies and Considerations 118
6.14.4 Prescriptive Standards 118
6.15 Type M: Storage Racks 119
6.15.1 Typical Components 119
6.15.2 Typical Unprotected Seismic Behavior 119
6.15.3 Seismic Protection Strategies and Considerations 119
6.16 Type N: Elevators 119
6.16.1 Typical Components 119
6.16.2 Typical Unprotected Seismic Behavior 119
6.16.3 Seismic Protection Strategies and Considerations 120
6.17 Type O: Raised Access Floors 120
6.17.1 Typical Components 120
6.17.2 Typical Unprotected Seismic Behavior 120
6.17.3 Seismic Protection Strategies and Considerations 120

7. Devices for Seismic Restraint 123
7.1 References and Types of Devices 123
7.2 Pads, Bushings, and Mountings 123
7.3 Seismic Spring Mounts and Isolators 124
7.4 Seismic Snubbers 127
7.5 Piping Hangers and Bracing 129
7.6 Other Piping Supports and Devices 134
7.7 Ductwork and Electrical Distribution 134
7.8 Suspended Components 139
7.9 Cost of Devices 139
7.9.1 Floor-Mounted Equipment 140
7.9.2 Suspended Equipment 140
7.9.3 Piping, Ductwork, or Electrical Conduit 140

References 141

Project Participants 145

Applied Technology Council Projects and Report Information 147

Applied Technology Council Directors 163