

DISASTER RESILIENCE FRAMEWORK

25% Draft for Hoboken, NJ, Workshop

23 July 2014

0. Introduction¹

0.1 Plan for Developing Community Disaster Resilience

0.1.1. Disaster Resilience Framework

0.1.2. Model Resilience Guidelines

0.1.3. Workshops

0.1.4. Disaster Resilience Standards Panel

0.2. Key Elements in Disaster Resilience Framework

0.3. Need for Resilience Standards

0.4. Alignment with Other Resilience Programs

1. The Community

1.1 Social Vulnerabilities

1.2 Social Networks and Capital

1.3 Social Needs of a Community

1.2.1 Business and Industry

1.2.2 Shelter and Food

1.2.3 Healthcare

1.2.4 Education

1.2.5 Government

1.2.6 Recreation, Arts, and Culture

1.2.7 Public Safety and Security

1.3 Risk Communication and Public Education and Training

¹ A new Chapter 1 has been added which was accommodated by the numbering shown. All chapters will be renumbered after the Hoboken Workshop.

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1.3.1 Slow Onset Events

1.3.2 Rapid Onset Events

1.4 Emergency Planning

1.5 Economic Development

1.6 Standards and Codes

1.7 Community Resilience Needs

2. Community Disaster Resilience for the Built Environment

2.1. Community Level Disaster Resilience

2.1.1. Community Disaster Resilience for the Built Environment

2.1.2. Diversity of Communities

2.1.2. Acceptable Risks

2.1.4. Pathway to Community Resilience

2.2. Pathway to Community Resilience

2.2.1. Hazard Events

2.2.2. Hazard Levels for Resilience Planning

2.2.3. Mitigation and Performance Levels

2.2.4. Phases of Response and Recovery

2.2.5. Building and Infrastructure Clusters for Each Phase

2.2.6. Performance Goals, Values, and Objectives

2.2.7. Vulnerability of Existing Buildings and Infrastructure Systems

2.2.8. Non-Construction Strategies

2.2.9. Construction Related Strategies

3. Examples of Community Disaster Resilience

3.1. Introduction

3.2. Past Performance of Communities and Their Critical Buildings and Infrastructure Systems

3.2.1. 2005 Hurricanes Katrina and Rita

3.2.2. 2012 Hurricane Sandy

3.2.3. 2011 Joplin Tornado

3.2.4. 2013 Colorado Flooding

3.2.5. 1994 Northridge Earthquake

3.2.6. 2010 Chile Earthquake

3.2.7. 2011 New Zealand Earthquake

3.2.8. 2013 Japan Tsunami

3.2.9. 2007 Southern California Wildland-Urban Interface Fires

3.2.10. 2012 Colorado Wildland-Urban Interface Fires

3.3. Current Performance and Common Problems

3.4. Challenges for Disaster Resilience Standards Development and Harmonization.

4. Sectors, Interdependencies and Cascading Effects

4.1. Introduction

4.2. Interdependencies of Sectors

4.3. Buildings and Transportation

4.4. Buildings and Lifelines for Functionality

4.5. Transportation and Lifelines for Functionality

4.6. Energy and Other Lifelines

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4.7. Cascading Effects

4.8. Sequential Recovery from Disasters by Sector

4.8.1. Critical Buildings

4.8.2. General Recovery Sequence

5. Building Sector

5.1. Introduction

5.2. Performance Goals

5.2.1. Government

5.2.2. Healthcare

5.2.3. Schools

5.2.4. Residential

5.2.5. Business and Services

5.3 Building Codes and Standards

5.3.1. New Construction

5.3.1.1 Performance Levels

5.3.1.2 Hazard Levels

5.3.1.3 Recovery Levels

5.3.2. Existing Construction

5.3.2.1 Performance Levels

5.3.2.2 Hazard Levels

5.3.2.3 Recovery Levels

5.4 Building Stock Performance

5.5. Resilience Needs

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5.5.1. Standards and Codes

5.5.2. Practice and Research Needs

5.6. Summary and Recommendations

6. Transportation Sector

6.1. Introduction

6.2. Performance Goals

6.3. Transportation Infrastructure

6.3.1. Roads, Bridges, Highways, and Road Tunnels

6.3.2. Rail and Subway Systems

6.3.3. Air

6.3.4. Ports, Harbors, and Waterways

6.4 Regulatory Environment

6.4.1 Federal

6.4.1.1 Federal Highway Administration

6.4.1.2 Federal Transit Administration

6.4.1.3 Federal Railroad Administration

6.4.1.4 Federal Aviation Administration

6.4.2 State

6.4.3 Local

6.5 Standards and Codes

6.5.1. New Construction¹⁶

6.5.1.1 Performance Levels

6.5.1.2 Hazard Levels

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6.5.1.3 Recovery Levels

6.5.2. Existing Construction

6.5.2.1 Performance Levels

6.5.2.2 Hazard Levels

6.5.2.3 Recovery Levels

6.6. Resilience Needs

6.6.1. Standards and Codes

6.6.2. Practice and Research Needs

6.7. Summary and Recommendations

7. Energy Sector

7.1. Introduction

7.2. Performance Goals

7.3. Energy Infrastructure

7.3.1. Electric Power

7.3.1.1 Generation

7.3.1.2 Transmission

7.3.1.3 Distribution

7.3.1.4 Emerging Technologies

7.3.2. Liquid Fuel

7.3.3. Natural Gas

7.3.4. Emergency and Standby Power

7.4 Regulatory Environment

7.4.1 Federal

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7.4.2 State

7.4.3 Local

7.5 Standards and Codes

7.5.1. New Construction

7.5.1.1 Performance Levels

7.5.1.2 Hazard Levels

7.5.1.3 Recovery Levels

7.5.2. Existing Construction

7.5.2.1 Performance Levels

7.5.2.2 Hazard Levels

7.5.2.3 Recovery Levels

7.6. Reliability vs Resilience

7.7. Resilience Needs

7.6.1. Standards and Codes

7.6.2. Practice and Research Needs

7.8. Summary and Recommendations

8. Communication and Information Sector

8.1. Introduction

8.2. Performance Goals

8.3 Communication and Information Infrastructure

8.3.1 Landline Telephone System

8.3.2 Internet System

8.3.3 Cellular/Mobile System

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8.3.3.1 Cell Towers

8.3.3.2 Backhaul Facilities

8.4 Regulatory Environment

8.4.1 Federal

8.4.2 State

8.4.3 Local

8.4.4 Overlapping Jurisdictions

8.5 Standards and Codes

8.5.1. New Construction

8.5.1.1 Performance Levels

8.5.1.2 Hazard Levels

8.5.1.3 Recovery Levels

8.5.2. Existing Construction

8.5.2.1 Performance Levels

8.5.2.2 Hazard Levels

8.5.2.3 Recovery Levels

8.6. Reliability vs Resilience

8.7. Resilience Needs

8.6.1. Standards and Codes

8.6.2. Practice and Research Needs

8.8 Summary and Recommendations

9. Water and Wastewater Sector

9.1. Introduction

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9.2. Performance Goals

9.3. Water Infrastructure

9.3.1. Water Systems

9.3.2. Wastewater Systems

9.3.3. Combined Storm and Sewer Lines

9.4 Regulatory Environment

9.4.1 Federal

9.4.2 State

9.4.3 Local

9.5 Standards and Codes

9.5.1. New Construction

9.5.1.1 Performance Levels

9.5.1.2 Hazard Levels

9.5.1.3 Recovery Levels

9.5.2. Existing Construction

9.5.2.1 Performance Levels

9.5.2.2 Hazard Levels

9.5.2.3 Recovery Levels

9.6. Resilience Needs

9.6.1. Standards and Codes

9.6.2. Practice and Research Needs

9.7. Summary and Recommendations

10. Tools and Metrics for Evaluating Disaster Resilience

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10.1. Community Resilience Metrics

10.2. Prioritization of Resilience Alternatives

10.3. Risk Management

11. Recommendations and Next Steps

11.1. Standards Identified for Implementation

11.2. Priority Action Plans for Standard Development

11.3. Research Needs