

# DISASTER RESILIENCE FRAMEWORK

50% Draft for Norman, OK Workshop

20 October 2014

# DISASTER RESILIENCE FRAMEWORK

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## **1. Introduction (To be included in 75% Draft)**

### **1.1. Community Disaster Resilience**

1.1.1. Introduction and Purpose

1.1.2. Scope of Framework

### **1.2. Need for Resilience Guidance, Metrics and Tools**

1.2.1. Risk Methodology for Resilience Assessment

1.2.2. Review of Available Metrics and Tools for Community Resilience

1.2.3. Review of Sector Codes and Regulations

*Address stove-piping issue and need for overarching performance criteria*

### **1.3. Key Elements in Disaster Resilience Framework**

1.2.1. Disaster Resilience Framework

1.2.2. Stakeholder Workshops

1.2.3. Disaster Resilience Standards Panel

1.2.4. Model Resilience Guidelines

### **1.4. Alignment with Other Resilience Programs**

1.4.1. Federal Programs

1.4.2. State and Local Programs

1.4.3. Non-Profit Programs

## **2. The Community**

### **2.1. Introduction**

### **2.2. The Community Defined**

2.2.1. *Levels of a Community*

2.2.1.1. Society (or Culture)

2.2.1.2. Community Systems

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2.2.1.3. Households or Businesses

2.2.1.4. Individuals

2.2.2. Interaction among Community Levels – Addressing Needs

### ***2.3. Social Performance Goals for Community Resilience***

2.3.1. Performance Goals for the Response Phase (0-3 Days)

2.3.1.1. Life Safety

2.3.1.2. Food and Water Resources

2.3.1.3. Shelter

2.3.1.4. Health

2.3.1.5. Situational Awareness

2.3.2. Response Phase Discussion

2.3.3. Performance Goals for Workforce/Neighborhood Recovery (1 to 12 Weeks)

2.3.4. Performance Goals for Community Recovery (4-36+ Months)

### ***2.4. Community Engagement in Resilience***

### ***2.5. Conclusion***

## **3. Community Disaster Resilience for the Built Environment**

### ***3.1. Community Level Disaster Resilience***

3.1.1. Community Disaster Resilience for the Built Environment

3.1.2. Diversity of Communities

3.1.3. Acceptable Risks

3.1.4. Implementing Community Resilience Planning

### ***3.2. Pathway to Community Resilience***

3.2.1. Hazard Events

3.2.2. Hazard Levels for Resilience Planning

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3.2.3. Hazard Intensity

3.2.4. Performance Goals

3.2.4.1. Performance Levels for Buildings

3.2.4.2. Restoration Times for Clusters and Systems

3.2.5. Identify Building and Infrastructure Clusters for Each Phase

3.2.6. Estimating the Vulnerability of the Existing Buildings and Infrastructure Systems

3.2.7. Summary Resilience Matrix

### ***3.3. Mitigation and Recovery Strategies***

3.3.1. Non-Construction Strategies

3.3.2. Construction Related Strategies

## **4. Interdependencies and Cascading Effects**

### ***4.1. Introduction***

### ***4.2. Interdependencies of Building Clusters***

***4.2.1. Critical Facilities***

***4.2.2. Emergency Housing***

***4.2.3. Workforce/Neighborhoods***

***4.2.4. Community Recovery***

### ***4.3. Interdependencies among Infrastructure***

***4.3.1. Identifying Interdependencies***

### ***4.4. References***

## **5. Building Sector**

### ***5.1. Introduction***

5.1.1. Social Needs and Systems Performance Goals

5.1.2. Reliability v. Resilience

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5.1.3. Interdependencies

#### **5.2 Building Classes and Uses**

5.2.1. Government

5.2.2. Healthcare

5.2.3. Schools and Daycare Centers

5.2.4. Religious and Spiritual Centers

5.2.5. Residential including Neighborhood Commercial Districts

5.2.6. Business and Services

#### **5.3. Performance Goals**

#### **5.4 Regulatory Environment**

#### **5.5 Standards and Codes**

5.5.1. New Construction

5.5.2. Existing Construction

#### **5.6. Resilience Assessment Methodology**

*5.6.1 Assessment Methodology (current conditions, including dependence on sources outside the community)*

*5.6.2 Strategies for new/future Construction*

*5.6.3. Strategies for Existing Construction*

*5.6.4 Addressing Gaps in Resilience Plans*

#### **5.7 Tools Needed for Resilience**

5.7.1. Standards and Codes Gaps

5.7.2. Practice and Research Needs

#### **5.8. Summary and Recommendations**

## **6. Transportation Sector**

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### **6.1. Introduction**

6.1.1. Social Needs and System Performance Goals

6.1.2. Interdependencies

### **6.2. Transportation Infrastructure**

6.2.1. Roads, Bridges, Highways, and Road Tunnels

6.2.2. Rail and Subway Systems

6.2.3. Air

6.2.4. Ports, Harbors, and Waterways

6.2.5. Pipelines

### **6.3. Performance Goals**

### **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

6.4.1.5. US Coast Guard (USCG)

6.4.2. Regional

6.4.3. State

6.4.4. Local

### **6.5. Standards and Codes**

6.5.1. New Construction

6.5.1.1. Implied or Stated Performance Levels for Expected Hazard Levels

6.5.1.2. Recovery levels

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### 6.5.2. Existing Construction

#### 6.5.2.1. Implied or Stated Performance Levels for Expected Hazard Levels

#### 6.5.2.2. Recovery levels

### **6.6. Resilience Assessment Methodology**

*6.6.1. Assessment Methodology (current conditions, including dependence on sources outside the community)*

*6.6.2. Strategies for new/future Construction*

*6.6.3. Strategies for Existing Construction*

*6.6.4. Addressing Gaps in Resilience Plans*

### **6.7. Tools Needed for Resilience**

6.7.1. Standards and Codes

6.7.2. Practice and Research Needs

### **6.8. Summary and Recommendations**

### **6.9. References**

## **7. Energy Sector**

### **7.1. Introduction**

7.1.1. Social Needs and Systems Performance Goals

7.1.2. Reliability vs Resilience

7.1.3. Interdependencies

### **7.2. Energy Infrastructure**

7.2.1. Electric Power

7.2.1.1. Generation

7.2.1.2. Transmission

7.2.1.3. Distribution

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#### 7.2.1.4. Emerging Technologies

#### 7.2.2. Liquid Fuel

#### 7.2.3. Natural Gas

#### 7.2.4. Emergency and Standby Power

### **7.3. Performance Goals**

### **7.4. Regulatory Environment**

#### 7.4.1. Federal

#### 7.4.2. State

#### 7.4.3. Local

### **7.5. Standards and Codes**

#### 7.5.1. New Construction

##### 7.5.1.1. Implied or Stated Performance Levels for Expected Hazard Levels

##### 7.5.1.2. Recovery Levels

#### 7.5.2. Existing Construction

##### 7.5.2.1. Implied or Stated Performance Levels for Expected Hazard Levels

##### 7.5.2.2. Recovery Levels

### **7.6. Resilience Assessment Methodology**

*7.6.1. Assessment Methodology (current conditions, including dependence on sources outside the community)*

*7.6.2. Strategies for new/future Construction*

*7.6.3. Strategies for Existing Construction*

*7.6.4. Addressing Gaps in Resilience Plans*

### **7.7. Tools Needed for Resilience**

#### 7.7.1. Standards and Codes

#### 7.7.2. Practice and Research Needs



## **7.8. Summary and Recommendations**

## **7.9. References**

# **8. Communication and Information Sector**

## ***8.1. Introduction***

8.1.1. Social Needs and System Performance Goals

8.1.2. Reliability vs Resilience

8.1.3. Interdependencies

## ***8.2. Critical Communication and Information Infrastructure***

8.2.1. Landline Telephone System

8.2.1.1. Central Offices

8.2.1.2. Transmission and Distribution

8.2.2. Internet Systems

8.2.2.1. Internet Exchange Points (IXP)

8.2.2.2. Internet Backbone

8.2.3. Cellular/Mobile Systems

8.2.3.1. Cell Towers

8.2.3.2. Backhaul Facilities

## ***8.3. Performance Goals***

## ***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***

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### 8.5.1. New Construction

8.5.1.1. Implied or Stated Performance Levels for Expected Hazard Levels

8.5.1.2. Recovery levels

### 8.5.2. Existing Construction

8.5.2.1. Implied or Stated Performance Levels for Expected Hazard Levels

8.5.2.2. Recovery levels

## **8.6. Resilience Assessment Methodology**

*8.6.1. Assessment Methodology*

*8.6.2. Strategies for New/Future Construction*

*8.6.3. Strategies for Existing Construction*

*8.6.4. Addressing Gaps in Resilience Plans*

## **8.7. Tools Needed for Resilience**

8.8.1. Standards and Codes

8.8.2. Practice Gaps and Research Needs

## **8.8. Summary and Recommendations**

## **8.9. References**

# **9. Water and Wastewater Sector**

## **9.1. Introduction**

9.1.1. Social Needs and Systems Performance Goals

9.1.2. Interdependencies

## **9.2. Water Infrastructure**

9.2.1. Water Systems

9.2.1.1. Supply

9.2.1.2. Transmission

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9.2.1.3. Treatment

9.2.1.4. Pumping

9.2.1.5. Storage

9.2.2. Wastewater Systems

9.2.2.1. Collection

9.2.2.2. Treatment

9.2.2.3. Pumping

9.2.3. Combined Storm and Sewer Lines

### **9.3. Performance Goals**

### **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. Implied or Stated Performance Levels for Expected Hazard Levels

9.5.1.2. Recovery Levels

9.5.2. Existing Construction

9.5.2.1. Implied or Stated Performance Levels for Expected Hazard Levels

9.5.2.2. Recovery Levels

### **9.6. Resilience Assessment Methodology**

*9.6.1 Assessment Methodology*

*9.6.1.1. Tier 1 Plus Resilience Assessment*

*9.6.2 Strategies for New/Future Construction*

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*9.6.3. Strategies for Existing Construction*

*9.6.4 Addressing Resilience Performance Gaps*

### **9.7. Tools Needed for Resilience**

9.7.1. Standards and Codes

9.7.2. Practice and Research Needs

9.7.2.1. Current Research

9.7.2.2. Future Development Needs

### **9.8. Summary and Recommendations**

### **9.9. References**

## **10. Tools and Metrics for Evaluating Disaster Resilience (To be included in 75% Draft)**

*10.1. Resilience Tools and Metrics*

*10.2. Prioritization of Community Resilience Alternatives*

*10.3. Risk Management*

## **11. Recommendations and Next Steps (To be included in 75% Draft)**

*11.1. Priority Action Plans for Standard Development*

*11.2. Research Needs*