British Columbia’s Approach to Post Disaster Building Assessments

Steven Bibby
Director, Security and Emergency Services
sbibby@bchousing.org
POST-DISASTER DAMAGE AND SAFETY ASSESSMENT OF THE BUILT ENVIRONMENT PROJECT
CSSP-2016-CP-2268

Funded by:
PDBA as a “System of Systems”
Components:

- Recruitment & Training
- Pre/Post Event
- Strategies
- Other Assessments
- Legislative Framework
- Information
- Management
- Administration
- Assessment
- Procedures
- Outcomes
Post Disaster Building Assessment

- Building Safety Indicators
  - Applied Technology Council (ATC)
  - Earthquake Engineering Research Institute
  - Engineers & Geoscientists BC
  - Emerging Technology (e.g. PPR)

- Governance and Administration
  - Pre-Disaster Planning
  - Program Direction
  - Training & Certification
  - Personnel Deployment
  - Data Collection
  - Situational Awareness
  - Support & Mutual Aid
  - Building Typology

- Program Management and Habitability
  - Authority to Enter
  - Placard Authority & Change/Removal
  - Team Assignment & Integration
  - Habitability Standards
  - Habitability Milestones
  - Information Management
  - Building Prioritization & Assessment Type
Governance and Administration

• BC Housing
  ▪ Establish and lead the Building Damage Assessment Branch at the PECC/PERRC. Manage Registry & Co-Chair Committee.

• BC Post-Disaster Building Assessment Advisory Committee
  ▪ Advise, Recommend, Implement, Promote, Integrate

• Working Groups
  ▪ Governance
  ▪ Forms & Placards
  ▪ Curriculum & Training
Adapting to Changing Goals
• Police and Fire
• Building Officials
• Engineers
• Architects
• Emergency Coordinators
• Facility Managers
• Housing Inspectors
• Construction Trades
Information Management &
Common Operating Picture

Damage Assessment
App/Form
ESRI Collector

FIELD STAFF
Data Creators

Multiuser, Editable,
Central
Spatial Database

Dynamic/Interactive
Web Map and Dashboards
on Desktop
for Clients/Decision Makers

DECISION MAKERS
Users of Data

DATA REPOSITORY

GIS STAFF
App, Map, Dashboard Creation/Maintenance,
Damage Assessment Coordination

BRITISH COLUMBIA
BC HOUSING
ESRI Dashboards

2018 Rapid Damage Assessment Dashboard

List of Building(s)
Within Map Extent:

- 7430 Granby
- Unit 9: 7151 Hwy 3
- Unit 10: 7151 Highway 3
- 6435 9th ave
- 215 control ave
- 7433 riverside dr

Legend
- INSPECTED (Green placard)
- RESTRICTED USE (Yellow placard)
- UNKNOWN (Access not possible)
- UNSAFE (Red placard)

Mapped Floodplains in BC (Historical)

Structural Damage

Fall Hazards

Primary Occupancy
Ongoing Challenges

- Ownership of PDBA processes
- Building taxonomies
- Assessment of specific types of buildings
- Fit of PDBA with EM & transition to recovery
- Placards (e.g., who can modify, change, remove, etc.)
- Overlap of PDBA with USAR and other rescue/response activities

Personnel

- Types of personnel involved in PDBA
- Desired credentials or certification
- Use of non-credentialed personnel in PDBA
- Recruitment of personnel for PDBA
- Prior training
- Just-in-time training and/or preparation for PDBA
- Liability for personnel involved in PDBA

BDSA Operations

- Overall management of PDBA
- Decision-making and priority determination
- Logistics and dispatching of PDBA teams
- Data collection
- Data reporting
- Data management
- Use of data in subsequent decision-making
- Use of technology in data management
- Team size and composition
**Unique or Ground Breaking?**

- Assessment process includes SAR, EM, credentialed and non-credentialed personnel
- Captures the informal & ICS processes used for deployment, team selection/allocation
- Links and captures academic requirements and building typologies in a Canadian context
- First ever in Canada:
  - Provincial Registry of Assessors
  - Provincial Advisory Committee
Questions?

Steven Bibby
Director, Security & Emergency Services
sbibby@bchousing.org
www.bchousing.org
Research and Development of the Framework

Steven Bibby
Director, Security & Emergency Services
sbibby@bchousing.org
www.bchousing.org
Research Goals

- Develop a provincial framework for Building Damage Safety Assessment
- Develop a community-level framework to engage and support
  - Professional (credentialed)
  - Public (non-credentialed)
- Establish a sustainable network
  - Resources
  - Tools
  - Support
Project Data Sources

- Review of Literature
- Site visit to exemplar program
- Interviews with key informants and experts
- Stakeholder consultation and validation
Design and Work Plan

Research
- Literature: Academic Professional Manuals
- Site Visit: New Zealand Operational Personne Documents and Processes
- Stakeholder Workshop: BC Stakeholders Practitioners International Experts
- Structured Conversations: Analysis & Synthesis
- Additional Data: Interviews MATILDA Opportunistic Data
- Draft Framework: Processes Tools Resources
- Validation Workshop: BC Stakeholders Practitioners
- Deliverables: BC Post-Disaster Building Assessment Framework, Processes, Tools, & Resources

Framework
- Data Collection

Sustainability
- Analysis & Synthesis
- BC Post-Disaster Building Assessment Advisory Committee

BRITISH COLUMBIA
BC HOUSING
Core Concepts: System of Systems
Core Concepts: Contextual Process

- An Event is a series of Events
- Dynamic Process that Changes across time
- Embedded Process
- Strong Recommendations on Personnel
- Contextual Implementation
- Simple Core Process with Nuanced Strategies
<table>
<thead>
<tr>
<th>Area/Windshield</th>
<th>New Zealand 2010</th>
<th>New Zealand 2014</th>
<th>Italy 2011</th>
<th>Japan</th>
<th>ATC</th>
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<tbody>
<tr>
<td>Overall Damage Survey</td>
<td>Rapid Impact Assessment</td>
<td></td>
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<td>Rapid Evaluation</td>
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<tr>
<td>Rapid Assessment Level 1</td>
<td>Residential Rapid Assessment</td>
<td>First Inspection</td>
<td>Quick Risk Inspection</td>
<td>Detailed Evaluation</td>
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<td>Detailed BDSA</td>
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<td>Rapid Building Usability Assessment Level 1</td>
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<td>Detailed BDSA</td>
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<td>Rapid Assessment Level 2</td>
<td>Rapid Building Usability Assessment Level 2</td>
<td>Second Inspection</td>
<td>Damage Survey</td>
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<td>Engineering</td>
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<td>Detailed Engineering</td>
<td>Detailed Building Damage Assessment</td>
<td>Engineering Evaluation</td>
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</table>
Similarities and Differences

PLACARD MODEL

W
CAN BE USED

Y1
RESTRICTED
PARTS ONLY

Y2
RESTRICTED
SHORT TERM ONLY

R1
ENTRY PROHIBITED
ADJACENT BUILDINGS
OR GROUND FAILURE

R2
ENTRY PROHIBITED
SIGNIFICANT DAMAGE

PLACARD MODEL

INSPECTED

LIMITED ENTRY

PLACARD MODEL

USABLE

USABLE WITH
COUNTERMEASURES

PARTIALLY
USABLE

TEMPORARILY
UNUSABLE

UNUSABLE

UNSAFE FOR
EXTERNAL RISK

OUTCOMES

USABLE

PLACARD MODEL

INSPECTED

No restrictions on use
or occupancy
No apparent hazards

PARTIALLY
USABLE

ENTRY only by owner
at own risk
Dangerous condition
is present

UNUSABLE

UNSAFE

UNSAFE FOR
EXTERNAL RISK

BC HOUSING

BRITISH COLUMBIA
Core Concepts: Changing Goals
# Core Concepts:
PDBA Assessment Matrix

<table>
<thead>
<tr>
<th>RESPONSIBILITY AUTHORITY</th>
<th>ASSESSMENT TYPE</th>
<th>LA</th>
<th>LA</th>
<th>LACKOWNER</th>
<th>OWNER</th>
<th>AKE</th>
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## Definitions

### Assessment Types

- **Area**: large-area assessment by car, drone, satellite, etc.
- **Rapid Exterior Only**: 15 minute exterior assessment.
- **Detailed**: 2+ hour detailed assessment.

### Assessor Types

1. (non-credential) contractor, tradesperson, building manager, ATC 2045 or equal
2. building official, architect, engineer of any kind, ATC 2045 or equal
3. structural engineer, ATC 2045 or equal

### Team Composition Notes

<table>
<thead>
<tr>
<th>Responsibility Authority</th>
<th>Assessment Type</th>
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**Damage Assessment Professionals: Qualifications Matrix (Domestic)**

<table>
<thead>
<tr>
<th>Professional Licenses and Certifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Inspector, Fire Inspector, Residential Inspector</td>
</tr>
<tr>
<td>Commercial Inspector, Fire Marshall, Building Official, Building Inspector</td>
</tr>
<tr>
<td>Building Official, Architect, Engineer, ATC 2045 or equal</td>
</tr>
<tr>
<td>Structural Engineer, ATC 2045 or equal</td>
</tr>
</tbody>
</table>

**Exclusions**

- Only for Hospitals
- Only for Hospitals
- Only for Hospitals

**Team Composition Notes**

- Construction Inspector, Fire Inspector, Residential Inspector
- Commercial Inspector, Fire Marshall, Building Official, Building Inspector
- ATC 2045 or equal
- ATC 2045 or equal
- ATC 2045 or equal

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**Contact Information**

- 800-Guardian
- 800-ATC2045

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**Training and Education**

- ATC 2045
- ATC 2045
- ATC 2045

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**Additional Information**

- ATC 2045
- ATC 2045
- ATC 2045
PDBA as a 10 Step Program:

1. Identify Scope and Complexity of PDBA Requirements
2. Establish PDBA Leadership Group
3. Obtain Formal Commitment from Organization
4. Confirm/Establish Legal/Regulatory Mechanism
5. Develop Operational Plan, Procedures & Guidelines
6. Develop Assessment Personnel
7. Situational Awareness Capabilities
8. Program Support/Coordination Personnel
9. Equipment and Supplies
10. Address Recovery/Reconstruction PDBA Implications

(PDBA Framework and Recommendations: Appendix #1)
Step 1

Step 2

British Columbia
Post-Disaster Building Assessment (PDBA) Advisory Committee
TERMS OF REFERENCE - 12 September 2018 - Prop

BACKGROUND
In support of enhanced Post-Disaster Building Assessment (PDBA) in the province, BC Housing, Justice Institute of BC, Engineers and Geoscientists BC, and the Architectural Institute of BC (AIBC) partnered in a research project funded by the Department of National Defence to explore and develop a framework for post-disaster building assessment.

One of the outputs of this project was recognition of the importance of a broad stakeholder group that would further support and advance development of a provincial system. The PDBA Advisory Committee has been formed to facilitate the ongoing coordination, and for sharing of stakeholders’ collective knowledge and resources in this area.

The Province of British Columbia “BC Earthquake Immediate Response Plan” (July 2015) identifies that the role of BC Housing in a catastrophic earthquake will be:
- Establish and lead the Building Damage Assessment Branch at the PHCC-PEER;
- Provide rapid damage assessment teams, prioritize and coordinate rapid damage assessment of provincial and other key facilities;
- Provide rapid damage assessment training, assessment coordination, action plans, response/recovery priorities, and authority to access and restrict access to government housing property.

MISSION AND MANDATE
The mission of the committee will be to recommend, develop, and enhance standards, processes, and guidelines for the effective implementation and the sustainable management of a post-disaster building assessment system for the Province of British Columbia. In support of this mission, the committee will:
- provide advice on all matters within BC Housing areas of responsibility to coordinate post-disaster building assessments, and
draw on the committee’s collective expertise to assist BC Housing to identify new and emerging issues and opportunities in building assessment, and to strengthen the provincial PDBA framework.

GOALS
- Develop and promote standards, processes, and guidelines for a province-wide integrated PDBA system.
- Advise on the development, maintenance, training, and exercising of PDBA systems, plans, and procedures.
- Provide recommendations on cross government and cross organizational issues related to post-disaster building assessments.
- Promote integration and consistency between the Province’s PDBA system, including all levels of government and non-government organizations.

Pb1 of 2
## Step 3

### Rapid Damage Assessment Stakeholder Types and Interests

<table>
<thead>
<tr>
<th>Critical and Potential Critical Infrastructure Owners and Subject Matter Experts</th>
<th>Subject Matter Experts Only</th>
<th>Damage Assessment Record Manager/Owner</th>
<th>Damage Assessment Information &amp; Process Consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisations who need to: Perform Damage Assessment, Coordinate Damage Assessment, Leverage Damage Assessment results</td>
<td>Individuals / Professionals that will: Perform Damage Assessment, Coordinate Damage Assessment</td>
<td>Organisations that will: Leverage Damage Assessment results for property valuation, emergency response and recovery needs</td>
<td>?</td>
</tr>
<tr>
<td>People and professionals that can perform damage assessment and can bring their advice and expertise</td>
<td></td>
<td>Organisations with expertise in recording information and sharing property assessments</td>
<td>Organisations to be informed of the processes and results of damage assessment</td>
</tr>
<tr>
<td>The organisation has the technical capacity to perform damage assessment and can provide quick and quality property valuations on a voluntary basis</td>
<td></td>
<td>Improved and Manned Settlements</td>
<td></td>
</tr>
</tbody>
</table>

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## Step 4

### Province of British Columbia

### B.C. Earthquake Immediate Response Plan

<table>
<thead>
<tr>
<th>Type of Property</th>
<th>Personnel Referenced by Legislation</th>
<th>Legislation</th>
<th>Section</th>
<th>Summary</th>
<th>Limitations/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Property</td>
<td>Fire Commissioner, Commissioner's Inspectors, and Local Assistants</td>
<td>Fire Services Act</td>
<td>Part 1, Sections 7, 9, 10, 21</td>
<td>Authorizes &quot;peace officer&quot; powers to Fire Commissioner, Commissioner’s Inspectors and Local Assistants to all times to: investigate fires, enter and examine and exclude persons from building or premises where fire has occurred, and at all reasonable hours to inspect and order remedies for fire hazards that may endanger life or property.</td>
<td>Fire has occurred or fire hazard suspected.</td>
</tr>
<tr>
<td>All Property</td>
<td>Medical Health Officers, Provincial Health Officers</td>
<td>Public Health Act</td>
<td>Part 4, Division 1 - Inspections, Sections 23, 24 &amp; 25, Division 2 Order of the Minister - Quarantine, Division 4 Orders Respecting Health Hazards A, Contaminations, Division 6 Enforcement of</td>
<td>Authorizes Health Officers to enter a place at reasonable time with notice or without notice if not reasonably possible to obtain consent to conduct inspection, issue quarantine orders, orders in infectious and hazardous agents and other health hazards.</td>
<td></td>
</tr>
<tr>
<td>All Property</td>
<td>Medical Health Officers, Provincial Health Officers</td>
<td>Public Health Act</td>
<td>Part 5 - Emergency Powers, Part 9 - Regulations</td>
<td>Authorizes Health Officers in emergency events to act with limited or no notice to conduct inspections, including private dwellings at any time without warrant.</td>
<td></td>
</tr>
</tbody>
</table>
Step 9

Step 10

Emergency Lodging Design Guidelines