Risk Reduction – Collaborative Planning and Design
Committed To Our Communities
Resiliency

Safety Moment
Agenda

1. Continuity of operations planning and ways to mitigate risk
2. Assessing energy efficiency and creating solutions for the future
3. Review technology system life cycles
4. Planning adaptive and flexible systems
1 Continuity of Operations
Continuity of Operations (COOP)

Operational endeavor
To operate and provide essential functions and services during emergencies and disasters
Resilient Organizations

Capability to withstand and recover from incident, adapt to and sustain acceptable levels of social and economic function.
Continuity Plans
Operational Phases of Continuity

- Readiness and Preparedness
  - Planning
  - Test, Training, and Exercises

- Activation & Relocation
  - Communications
  - Transition

- Continuity Operations
  - Accounting for personnel
  - Performing Essential Functions

- Reconstitution
  - Returning to full and normal operations
Principles of a COOP

1. Comprehensive
2. Progressive
3. Risk-driven
4. Integrated
5. Collaborative
6. Coordinated
7. Flexible
8. Professional
Viable Continuity of Operations Plan
10 Elements of a Viable Continuity Program

1. Essential Functions
2. Orders of Succession
3. Delegations of Authority
4. Continuity Facilities
5. Continuity Communications
6. Essential Records
7. Human Resources
8. Tests, Training, and Exercises
9. Devolution
10. Reconstitution
1. Essential Functions

Primary Mission Essential and Mission Essential

- Communication
- Resources And Assets
- Staff Responsibilities
- Safety And Security
- Utilities Management
- Patient Clinical And Support Activities
II. ESSENTIAL ELEMENTS CRITERIA

A. PLANS AND PROCEDURES

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Description</th>
<th>Page/Paragraph Indicator</th>
<th>County EM Coordination</th>
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</thead>
<tbody>
<tr>
<td>A-1</td>
<td>The COOP plan contains procedures for:</td>
<td></td>
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<tr>
<td>A-2</td>
<td>The COOP plan contains the following components and/or procedures:</td>
<td></td>
<td></td>
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<tr>
<td>A-3</td>
<td>The COOP plan contains the following documentation:</td>
<td></td>
<td></td>
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<tr>
<td>A-4</td>
<td>Responsibilities and procedures are included for Time-Phased Operations which include:</td>
<td></td>
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<td>A-5</td>
<td>The COOP plan contains mechanisms for implementation according to the magnitude of the incident:</td>
<td></td>
<td></td>
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<tr>
<td>A-6</td>
<td>The COOP plan contains documentation, which describes the incorporation of accompanying Standard Operating Procedures (SOPs) and/or checklists for COOP implementation and execution:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-7</td>
<td>Procedures are in place to notify customers of new work location, phone numbers, re-route US mail, etc.:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-8</td>
<td>The COOP plan addresses Site-Support Procedures for its in-route and alternate facility including re-establishment of communication with critical customers:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-9</td>
<td>The COOP plan has been amalgamated with the:</td>
<td></td>
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</tbody>
</table>

B. MISSION ESSENTIAL FUNCTIONS

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Description</th>
<th>Page/Paragraph Indicator</th>
<th>County EM Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>Mission essential functions are:</td>
<td></td>
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<tr>
<td>B-2</td>
<td>Personnel are assigned to those functions based on skills and knowledge.</td>
<td></td>
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</tbody>
</table>

- Documentation
- Who
- How
- When
- Under What Circumstances
- Supplies/ Materials Needed
- Documentation Accountability
2. Orders of Succession

Provide organized and predefined assumptions
   Who, What, Where

At least “three deep”
Cross Coverage for all entities

One of the Three should be located at a different site from the primary facility
# D. Orders of Succession

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Description</th>
<th>Page/Paragraph Indicator</th>
<th>County EM Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-1</td>
<td>Orders of succession for key leadership positions are identified and address the following:</td>
<td>a. Conditions for succession</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Method of notification</td>
<td>e. Time, geographical, and organizational limitations.</td>
</tr>
<tr>
<td>D-2</td>
<td>The succession order is described by position or titles rather than by person.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CEO**
- Alternative
  - Alternative #2

**Dept. Lead**
- Alternative
  - Alternative #2

**CEO**
- Alternate #1 – Command Center Lead
- Alternate #2 – Finance
- Alternate #3 – Policy
3. Delegations of Authority

Formal authorization for one to act on behalf of the CEO or a department head or other key officials

Ensure documents specify the activities and level of authority
Types of Internal Documents

- EOP Plan (TJC)
- Quality Management Guidelines (ISO9001)
- Policies
- Medical Directives
- Protocols
- Memorandums of Understanding
- Work Agreements
- Disaster Agreements with Suppliers / Vendors
- Licensure Agreements

To help with critical decision making in crisis
4. Continuity Facilities

If continuity activation is required, an agency’s primary operating facility is unavailable and that essential functions will require relocating.
## E. ALTERNATE FACILITIES

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Description</th>
<th>Page/Paragraph Indicator</th>
<th>County EM Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1</td>
<td>The COOP plan contains provisions for the joint development of Alternate Facility Support Procedures coordinated with the alternate facility manager.</td>
<td></td>
<td></td>
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<tr>
<td>E-2</td>
<td>Consideration for the pre-positioning of assets and resources at facility are included in the COOP plan.</td>
<td></td>
<td></td>
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<tr>
<td>E-3</td>
<td>Procedures are in place that provide for reliable logistical support, services, and infrastructure systems.</td>
<td></td>
<td></td>
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<tr>
<td>E-4</td>
<td>The alternate facility is capable of supporting the agency's operations and is able to accept the COOP team.</td>
<td></td>
<td></td>
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<tr>
<td>E-5</td>
<td>Consideration for appropriate physical security and access controls is included for the alternate facility.</td>
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</tbody>
</table>
5. Continuity Communications

Must be **Redundant**

**Available** within 12 hours or sooner, depending on the mission

**Sustainable for up to 30 days** or until normal operations can be resumed.
• Rosters Up to Date
• Roster Initiated/Tested
• Staff Informed of Roles
• Messages prepared

• Equipment Available
• Equipment Working
• Visual Signs Available
• Back up Resources

• Does Everyone Know What To Do & When ??
<table>
<thead>
<tr>
<th>ID Number</th>
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</thead>
<tbody>
<tr>
<td>F-1</td>
<td>The COOP plan identifies the data and communications systems to support mission essential functions.</td>
<td></td>
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<tr>
<td>F-2</td>
<td>The procedures for interoperable communications provide for both internal and external communications.</td>
<td></td>
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<tr>
<td>F-3</td>
<td>Provisions for redundant communications are included in the COOP plan.</td>
<td></td>
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</tbody>
</table>
6. Essential Records

Emergency operating records
Rights and interests records

An essential records program is suggested for all non-Federal organizations
# G. VITAL RECORDS AND DATABASES

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Description</th>
<th>Page/Paragraph Indicator</th>
<th>County EM Coordination</th>
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<tbody>
<tr>
<td>G-1</td>
<td>The COOP plan contains provision for:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Identifying vital records, systems, and data (hard copy and electronic) critical to performing functions</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>b. Off-site back-up of electronic records and databases and storage of duplicate records</td>
<td></td>
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<td></td>
<td>c. Pre-positioning of vital records and databases at the alternate facility prior to deployment</td>
<td></td>
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<tr>
<td></td>
<td>d. Assuring availability of Emergency operating records</td>
<td></td>
<td></td>
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<td></td>
<td>e. Ensuring back-up for Legal and financial records</td>
<td></td>
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<tr>
<td>G-2</td>
<td>The COOP plan describes a maintenance program to assure the records are accurate, current, and frequently updated.</td>
<td></td>
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<tr>
<td>G-3</td>
<td>During Alternate Operations, the COOP plan includes procedures for documenting operations when the COOP is activated.</td>
<td></td>
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<tr>
<td>G-4</td>
<td>Consideration for assuring the agency’s Disaster Recovery Plans are capable of supporting COOP activities in accordance with Florida Statutes, Chapter 252: <em>Communications and Data Processing</em> are included in the COOP plan.</td>
<td></td>
<td></td>
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</tbody>
</table>
7. Human Resources

Have to perform with reduced staffing

All Emergency Relocation Group (ERG) personnel need to be adequately trained and cross-trained
### I. PERSONNEL ISSUES AND COORDINATION

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>I-1</td>
<td>Communications plans have been included which disseminate information to essential and non-essential personnel.</td>
<td></td>
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<tr>
<td>I-2</td>
<td>Considerations that address the health, safety, emotional well-being of all employees and their families have been included in the planning.</td>
<td></td>
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<tr>
<td>I-3</td>
<td>Guidance has been prepared which assure personal preparedness for staff through “personal go-kits.”</td>
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<tr>
<td>I-4</td>
<td>Measures are included in the planning which address pay status, administrative leave, and layoffs.</td>
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<tr>
<td>I-5</td>
<td>Information has been included which provide guidance to employees on medical, special needs, and travel issues.</td>
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</table>

### J. SECURITY

<table>
<thead>
<tr>
<th>ID Number</th>
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</thead>
<tbody>
<tr>
<td>J-1</td>
<td>Provisions for ensuring the Operational Security of the agency’s COOP program and documentation have been incorporated into the COOP plan.</td>
<td></td>
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<tr>
<td>J-2</td>
<td>Consideration has been given to restricting physical access controls to the primary and alternate facility for employees and critical customers.</td>
<td></td>
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<tr>
<td>J-3</td>
<td>Provisions for ensuring cyber security of data and networks have been incorporated into the planning process.</td>
<td></td>
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</tbody>
</table>
8. Test, Training, and Exercise (TT&E)

- Training and Testing
- Cross Training for Competence (Same skill / licensure level)
- Table Top
- Computer
- Drills
### K. TEST, TRAINING AND EXERCISE

<table>
<thead>
<tr>
<th>ID Number</th>
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<th>County EM Coordination</th>
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</thead>
<tbody>
<tr>
<td>K-1</td>
<td>The COOP plan contains a comprehensive Test, Training, and Exercise program.</td>
<td></td>
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<tr>
<td>K-2</td>
<td>Provisions are included for periodic test of the following:</td>
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<tr>
<td></td>
<td>- Alert and notification procedures</td>
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<td></td>
<td>- Equipment at the alternate facility</td>
<td></td>
<td></td>
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<td></td>
<td>- Exercise of operational plans, alternate facilities, and interoperable</td>
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<tr>
<td></td>
<td>communications</td>
<td></td>
<td></td>
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<tr>
<td>K-3</td>
<td>A remedial action plan/process has been established which incorporates</td>
<td></td>
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<tr>
<td></td>
<td>lessons from the test, training, and exercise program.</td>
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</tbody>
</table>
9. Devolution of Control and Direction

Continuity capability – off site, with alternate people and resources and facilities.
10. Reconstitution Operations

Transitioning from continuity status to normal operations

Coordinating and planning options for reconstitution and restored facilities

People
- Patients
- Employees
- Security
- Health and Safety
- Sanitation
- Food Services
- Transportation
- Accommodations

Operations
- Staffing Plan
- Cash Flow
- Salaries
- Patient Records and Tracking
- CMS Reimbursements
- Security
- Staff Health Centers
- Benefit Access

Community
- Transportation
- Accommodations
- Funeral Homes
- EMS
- Police
- Schools
- Retail (Food and Supply)

Municipal Infrastructure
- Power
- Gas
- Water
- Roads
- Sanitation
Reconstitution Operations

Plan for transitioning from continuity status to normal operations – how, when...

Coordinating and planning options for reconstitution

Outlining procedures to new/restored facilities
Lessons Learned....

Life goes on in the community

Where else do families go when they have nowhere else to go?
Plan for the worst
Disaster mitigation measures are those that eliminate or reduce the impacts and risks of hazards through proactive measures taken before an emergency or disaster occurs.

What is the National Disaster Mitigation Program (NDMP)?
Established in April 2015, the NDMP is part of the Government of Canada’s commitment to build safer and more resilient communities. The NDMP fills a critical gap in Canada’s ability to effectively mitigate, prepare for, respond to, and recover from, flood-related events by building a body of knowledge on flood risks in Canada, and investing in foundational flood mitigation activities.

Overall, the NDMP helps reduce the impacts of natural disasters on Canadians by:
- Focusing investments on significant, recurring flood risk and costs; and
- Advancing work to facilitate private residential insurance for overland flooding.

Who can apply for funding?
Provincial and territorial governments are the eligible recipients for funding under the NDMP. However, provincial and territorial authorities may collaborate with, and redistribute funding to eligible entities, such as municipal or other local governments, public sector bodies, private sector bodies, band councils, international non-government organizations or any combination of these entities. Federal entities, including Crown corporations, are not eligible recipients.

What kind of projects will be funded?
There are four funding streams available under the NDMP:
Patients
Hospitals may lose the capacity to be an inpatient facility—at least temporarily, due to the loss of critical systems. The Hospital may have to function as a clinic.

Residents still become ill, injured, and exhibit chronic conditions that all require treatment. They have children, pregnancies and childbirths.

Transportation
Without the ability to take admits, accommodations have to be made to transport admits to facilities accepting inpatients.
Employees Staff themselves may have suffered loss of property and loved ones.

Staff may have to live on site for an extended period – losing access to transportation and communications.

Accommodations for personal security, sleeping accommodations, food services, portable water and sanitation have to be pre-arranged.

Electronic flush valves rendered operational toilets, urinals and sinks non-functioning.
Operations

Staffing Plan
What is the short term mission of the Hospital and the employees? The mission becomes getting the Hospital operational again.

Job Description
What is every person’s role in the recovery mission? Clinics and Physician offices are as damaged as the Hospital. Both Patients and Physicians have no where else to go for treatment.

Salaries and Cash Flow
How will employees continue to be paid? Employees lives continue on – mortgages, expenses, costs of living, etc. They will be on site performing clean-up and recovery functions.
**Reimbursements**
How will treatments and patient records be tracked for reimbursement? Loss of data systems, EMR’s, and access to off-site back-up hinders records management.

**Security**
How will security be maintained in the facilities with the loss of power, electronic locking, and lighting? How is public security managed?
Municipal Infrastructure

Power
Chillers and Boilers
Portable Water and Sewer
Roads and Transportation

Rental Generators
Temporary switchgear and panel boards for distribution
Rental Fuel trucks
Rental Boilers
Stantec Case Studies & Canadian Disasters

Flooding forces evacuation of Saskatchewan hospital

More than 150 acute care patients and long-term residents have been moved from a hospital in eastern Saskatchewan because of flooding.

By: Jennifer Graham The Canadian Press, Published on Tue Jul 01 2014

The full-scale evacuation at St. Peter’s Hospital in the city of Melville, about 145 km northeast of Regina, took place because a creek behind the facility was rising Tuesday.
October 29th, 2013

Stantec was retained to provide technical assistance for financial recovery claims submitted to FEMA.
**Formed October 22, 2012**
**Dissipated November 2, 2012[1]**
(Extratropical after October 29)

**Highest winds** 1-minute sustained: 115 mph (185 km/h)

**Fatalities** 148 direct, 138 indirect

**Damage ≥ $68 billion**
(2012 USD)
(Second-costliest hurricane in US history)
One of the oldest continuously operating hospitals in America, tracing its roots back to 1736.
Facility Recovery Plan

Temporary Occupancy:
- Ventilation
- ACM
- Mold
- Physical Hazards

Continuous Environmental Testing
Recovery & Reconstitution

OPTIONS

Repair for Maximum Reimbursement:
- Temporary Repairs
- Replacement in Kind
- Improvement & Betterment

Repair with Risk Mitigation

Level 1 Repair – Temporary
- Immediate clean-up of hazards
- No improvement in resiliency – same level of exposure to future threats.
- FEMA Reimbursement at 100%

Level 2 Repair – Improvement-in-place
- Improved or upgraded in-place replacement of equipment
- FEMA Reimbursement at 120%

Level 2 Improve-in-place designs MAY mitigate EVACUATION plans or improve patient safety

Level 1 Temporary fixes provide for no change in EVACUATION plans nor any improvement in patient safety
2004 Hurricane Ivan
Formed September 2, 2004
Dissipated September 24, 2004

Highest winds sustained: 165 mph (270 km/h)

Fatalities 91 direct, 32 indirect in USA

Damage $18 billion (2004 USD)

Areas affected Windward Islands (especially Grenada), Venezuela, Jamaica, Grand Cayman, Cuba, Alabama, Florida, Louisiana, Texas and most of the eastern United States
In Florida, Blountstown, Marianna, and Panama City Beach suffered three of the most devastating tornadoes; broke several hydrological records; the largest ocean wave ever recorded, a 91-foot (28-meter) wave that may have been as high as 131 ft. (40 m), and the fastest seafloor current, at 2.25 m/s (5 mph).
2005 Hurricane Katrina

Formed August 23, 2005
Dissipated August 31, 2005[1]
(Extra tropical after August 30, 2005)

Highest winds 1-minute sustained: 175 mph (280 km/h)

Fatalities 1,833 in U.S. confirmed[1]

Damage $108 billion (2005 USD)
2011 Joplin Missouri

13 minutes

48 hours
“When all of the systems and backups failed, our emergency training, knowledge, and experience took over”... We evacuated 183 inpatients and 25 ED patients in about 90 minutes!

Dennis Manley, RN, HRM, CPHQ Joplin Missouri
May 22, 2011

Casualties 158 fatalities (+4 indirect), 1,150 injuries
Damages $2.8 billion (2011 USD)

New Hospital
Is an all-concrete roof structures
• 140-mile-an-hour-rated and 250-mile-an-hour-rated glass systems
COOP References

Smartphone App

The FEMA App (smartphone app for mobile devices) contains disaster safety lists, emergency meeting location information, and a map with open shelter Centers (DRCs).

Android & Apple iOS

New! Disaster Reporter Feature: a public map for others to see if you need assistance.

Emergency Management in Health Care

An All-Hazards Approach
Second Edition

FEMA Fact Sheet

Continuity Readiness Center (CRC)

The Homeland Security Act of 2002, as amended in 2006, provides that FEMA is responsible for continuity plans and programs, to include continuity assessments and readiness. FEMA promulgates Executive Branch guidance to departments and agencies for continuity planning, training, exercising, readiness and assessment. This provides a consistent methodology for continuity planning.

The CRC is an operational capability, located at Mount Weather, that monitors Executive Branch continuity readiness and the ability to maintain essential functions in a crisis. It serves to analyze and integrate continuity-unique situational and readiness information.

Continuity Guidance Circular 1 (CGC 1)

Continuity Guidance for Non-Federal Governments:
(States, Territories, Tribes, and Local Government Jurisdictions)

FEMA 3-790 / July 2013

Continuity Guidance Circular 2 (CGC 2)

Continuity Guidance for Federal Governments: Identification Process (Government Jurisdictions)

FEMA 3-800 / December 2013

Continuity Assistance Tool (CAT)

Continuity Guidance for Non-Federal Governments:
(States, Territories, Tribes, and Local Government Jurisdictions)

FEMA 3-790 / September 2013
Canadian Disasters
Interesting Facts

1918 Epidemics - highest death tolls

1917 Halifax Explosion best known / worst disaster

1912 Tornado Regina 1987 Tornado Edmonton

1998 Ice Storm – most deaths

2001-2010 – Free of Disasters (less than 20 deaths occurring in one incident/day)

<table>
<thead>
<tr>
<th>Disaster Category</th>
<th>Occurrences: Tables 1 &amp; 2</th>
</tr>
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<tbody>
<tr>
<td>Shipwrecks / Sea Waves</td>
<td>121</td>
</tr>
<tr>
<td>Air Transportation *</td>
<td>35</td>
</tr>
<tr>
<td>Fires / Explosions</td>
<td>36</td>
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<tr>
<td>Land Transportation</td>
<td>29</td>
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<tr>
<td>Mines</td>
<td>26</td>
</tr>
<tr>
<td>Weather / Climate</td>
<td>19</td>
</tr>
<tr>
<td><strong>Disease Epidemics</strong></td>
<td>15</td>
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<tr>
<td>Mass Murders *</td>
<td>10</td>
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<tr>
<td>Landslides</td>
<td>9</td>
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<tr>
<td>Snow Avalanches</td>
<td>7</td>
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<tr>
<td>Floods</td>
<td>7</td>
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<tr>
<td>Icebergs / Sea Ice</td>
<td>6</td>
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<tr>
<td>Bridge Collapses</td>
<td>4</td>
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<tr>
<td><strong>Tsunami</strong></td>
<td>3</td>
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<tr>
<td><strong>Wars</strong></td>
<td>2</td>
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<tr>
<td>Building Collapses</td>
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<tr>
<td><strong>Earthquakes</strong></td>
<td>1</td>
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<tr>
<td>Storm Surges</td>
<td>0</td>
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<tr>
<td><strong>Volcanoes</strong></td>
<td>0</td>
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<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>332</strong></td>
</tr>
</tbody>
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http://web.ncf.ca/jonesb/DisasterPaper/disasterpaper.html#Ref5Nh
227 disasters noted since 1500

29% occurred prior to Canada's Confederation in 1867.

49% Disaster in Canada have been Weather Related.

Natural disasters Water, Earth, Air, Fire and a distinctly Canadian fifth element of Ice.
Canada

Emergency Management Act 2007
Lays out the conditions, processes and powers associated with
- Public Welfare Emergency
- Public Order Emergency
- International Emergency
- War Emergency


Federal – Provincial and Territorial Guidance and Regulations
National Disaster Mitigation Program (NDMP)

Assist to effectively mitigate, prepare for, respond to, and recover from, flood-related events.

It’s foundation is a body of knowledge of flood & mitigation activities
Assessing Energy Efficiency And Creating Solutions For The Future
Typical buildings use

Chillers & Cooling Towers to reject heat from interior spaces that require cooling

And at the same time....

Use Boilers to burn fuel to heat perimeter spaces and make domestic hot water
**Enthalpy wheels**
Installed in main ventilation systems with variable speed
Provide an additional heating and cooling source motor

**Cooling plant replacements with heat recovery chillers**
Supplies low temperature water to heating system
Redundant cooling and heating
Operating room pressure differential monitoring over 24 hours

Chillers reaction when varying cooling loads
Cooling valve cycling over a 2 hours period – PID tuning required

Condensing boilers optimisation
Dual-core energy recovery – free cooling still available

Lower energy requirement during both heating and cooling periods

Floor radiant systems for peripheral psychiatry department

Alternative way of heating or cooling a space

Ceiling radiant systems

Alternative way of heating or cooling a space
High efficiency condensing boilers retrofit
Designed parallel configuration sharing heating demand

Winterize modular cooling tower with double exhaust fans with two speed or variable speed
Redundant multiple section that can share the load
Run around heat recovery systems
• for contaminated exhaust air such as fume hood exhaust

Demand control kitchen ventilation
• Commercial kitchen hoods with variable speed exhaust fans manually overrides & communicates with supply system
• Compensates for increase exhaust rates, keeps the differential pressures in adjacent rooms
HVAC System Upgrades

- Supply and return air designed with **multiple fans**
- Laboratory sectors variable speed ventilation systems, using air quality monitoring system
- Variable fan capacity for future needs and expansions
- Coupling different ventilation systems for critical areas

Geothermal Systems
Powerful dependable and sustainable energy source
Commissioning

- Most healthcare clients recommend implementing a commissioning process for their project
- Control systems – commissioning tool - testing and tuning
- Remote management and monitoring
- Training tool for building operators
- Commission critical systems

Recommissioning of existing HVAC systems and lighting systems – 5 to 15% payback
Optimize existing operation

Optimized DDC control strategies
Comfort, Security, Operation
3 Review Technology System Life Cycles
Bedpan Washers vs. Macerators
### Bedpan Washers vs. Macerators

**TABLE 2: Acquisition and operating costs by method for a hypothetical 400-bed hospital**

<table>
<thead>
<tr>
<th>Cost item</th>
<th>Washers ($)</th>
<th>Macerators ($)</th>
<th>Hygienic bags ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reusable equipment†</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machines (n=10 of each)</td>
<td>6,667</td>
<td>6,667</td>
<td>0</td>
</tr>
<tr>
<td>Reusable bedpans</td>
<td>1,584</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Reusable supports for disposable bedpans</td>
<td>0</td>
<td>106</td>
<td>0</td>
</tr>
<tr>
<td><strong>Subtotals – acquisition costs</strong></td>
<td>8,251</td>
<td>6,773</td>
<td>0</td>
</tr>
<tr>
<td><strong>Operating costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>5,000</td>
<td>5,000</td>
<td>0</td>
</tr>
<tr>
<td>Disposable bedpans</td>
<td>0</td>
<td>113,705</td>
<td>0</td>
</tr>
<tr>
<td>Disposable protective covers</td>
<td>0</td>
<td>21,199</td>
<td>0</td>
</tr>
<tr>
<td>Hygienic bags</td>
<td>0</td>
<td>0</td>
<td>154,176</td>
</tr>
<tr>
<td>Disposable supports for hygienic bags</td>
<td>0</td>
<td>0</td>
<td>48,180</td>
</tr>
<tr>
<td>Electricity to run machines</td>
<td>894</td>
<td>236</td>
<td>0</td>
</tr>
<tr>
<td>Detergent</td>
<td>7,747</td>
<td>249</td>
<td>0</td>
</tr>
<tr>
<td>Rinse agent and descaler</td>
<td>2,708</td>
<td>86</td>
<td>0</td>
</tr>
<tr>
<td>Cleanser-deodorizer</td>
<td>0</td>
<td>4,818</td>
<td>0</td>
</tr>
<tr>
<td><strong>Subtotals – operating costs</strong></td>
<td>16,349</td>
<td>145,293</td>
<td>202,356</td>
</tr>
<tr>
<td><strong>TOTAL ANNUAL COSTS</strong></td>
<td><strong>24,600</strong></td>
<td><strong>152,066</strong></td>
<td><strong>202,356</strong></td>
</tr>
</tbody>
</table>

* Assuming that one-third of patients each use four bedpans daily.
† Costs were divided over the life span (assumed to be 15 years) of the equipment.
‡ Costs for sterilizing reusable bedpans were not included.
§ Acquisition and operating costs for one washer used to process disposable bedpan supports were included.

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Point of Use Dialysis Systems
Negative Air Exhaust Considerations
Exhaust air ventilation systems – Safety improvement and energy recovery opportunity

Provides redundant capacity to exhaust laboratory contaminated air

- High Plume Fan vs. Utility Fan Considerations
  - First Cost
    - Fan + Stack + Supports + Curbs
  - Operating Costs
    - Energy + Maintenance
Displacement Ventilation vs. Overhead Mixing

Pictures contrast the temperature profiles, with overhead relatively constant from floor to ceiling; and displacement in a gradient, satisfying only the occupied zone.
Displacement Ventilation vs. Overhead Mixing

Nanaimo Regional General Hospital Perinatal Services Addition - 2009
Displacement Ventilation vs. Overhead Mixing

Nanaimo Regional General Hospital Emergency – Dept. Addition - 2012
Displacement Ventilation vs. Overhead Mixing

<table>
<thead>
<tr>
<th>Function</th>
<th>Type</th>
<th>Minimum outdoor air changes/h^1</th>
<th>Minimum total air changes/h^1</th>
<th>Relative pressurization</th>
<th>Temperature^2, 3, 4, 5, °C</th>
<th>Relative humidity^4, 6, %</th>
<th>Exhaust</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient rooms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A total of 4 total air changes is sufficient for 100% outdoor air systems in Class A facilities.</td>
</tr>
<tr>
<td>Class A facility</td>
<td>II</td>
<td>2</td>
<td>6</td>
<td>Eq</td>
<td>22−24</td>
<td>30−60</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

6.11.2.3

This Standard does not address displacement ventilation. If a system using displacement ventilation is being considered, engineering studies shall be conducted to confirm whether the system can maintain the values specified in Table 1. Displacement ventilation shall not be used unless these studies demonstrate efficacy. The use of displacement ventilation shall not be used as a rationale for decreasing air exchange rates unless the engineering studies have demonstrated an equivalent level of safety.
Planning Adaptive And Flexible Systems
Bariatric Considerations

Dura-Ware® 2125-A Series
Bariatric On-Floor Toilet - ADA Compliant

2125-A-W-2-EG-HSB

Fixture May Show Some Available Only in Satin

Bariatric On-Floor Toilet - ADA Compliant

Fixture is arranged to be installed on a finished wall optionally from the front or rear. Unit is fabricated of 14 gage, type 304 stainless steel and is seamless welded construction. Fixture (less -HSE) hinged seat option shall withstand loads up to 2,000 lbs with no measurable deflection and loads up to 5,000 lbs with no permanent damage. Optional -HSEBig John® hinged toilet seat is rated at 1,200 lbs. Fixture exterior and bowl interior has a satin finish. Optional -4G Enviro-Glaze color finishes are available. Housing includes side access panels to facilitate installation of fixture and hinged seat by others. Toilet complies with ADA requirements for accessibility. Compliance is subject to the interpretation and requirements of the local code-authority.

Toilet is optionally available in both Floor Outlet or Wall Outlet with elongated bowl and an overall depth of 29”. Fixtures are manufactured to comply with ASME A112.19.3-2008 and CSA B454-2008 standards. Toilet requires a minimum of 25 PSI flow pressure and uses a minimum water consumption of 1.28 GPF. Trap will pass a 2-1/8” ball and is fully enclosed with a minimum 3-1/2” seal.

Wall Outlet configurations in Foot Mounting (-FTM) include a wall waste outlet with a 7-1/2” diameter recessed gasket waste flange. Rear Mount (-RM) fixtures include a 2-3/8” plan end which extends 3” beyond fixture.

Floor Outlet configurations include a floor waste outlet with a 7-1/2” diameter recessed gasket waste flange for both Front (-FTM) and Rear (-RM) mount installations.

Flush Valve supply is additionally available for exposed or concealed flush valve styles in 1.28 GPF, 1.6 GPF or 3.5 GPF with 1-1/2” NPT connection.

GUIDE SPECIFICATION

Provide and install Acorn Dura-Ware® Bariatric, ADA Compliant Toilet (specify model number and options). Unit shall conform to ADA requirements. Fixture shall be fabricated from 14 gage, type 304 stainless steel. Construction shall be seamless welded and exposed surfaces shall have a satin finish. Toilet shall have an elongated bowl with a self-draining flushing rim and punching for seat by others. Toilet shall be ASME A112.19.3-2008 and CSA B454-2008 compliant. Toilet requires a minimum of 25 PSI flow pressure and uses a minimum water consumption of 1.28 GPF. Fully enclosed toilet trap shall have a minimum 3-1/2” seal that shall pass a 2-1/8” diameter ball.

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Bariatric Considerations
MEP and Electrical Infrastructures For Future Needs

- Map Needs – Make a Plan
- Know existing systems
- Détermine configuration better suits building
- Plan future ventilation shaft requirements
- Taping ready for fire systems future expansions
- Design with redundancy
- Spare points for main control panels, communication network and license upgrade for BMS
- Use open source communication protocols for information sharing between HVAC, electrical and other building systems
“It wasn't raining when Noah built the ark.”
Howard Ruff
Risk Reduction – Collaborative Planning and Design

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