

Alberta Floods 2013



Don't Mess With Mother Nature, or



How to Learn From Others' Experience

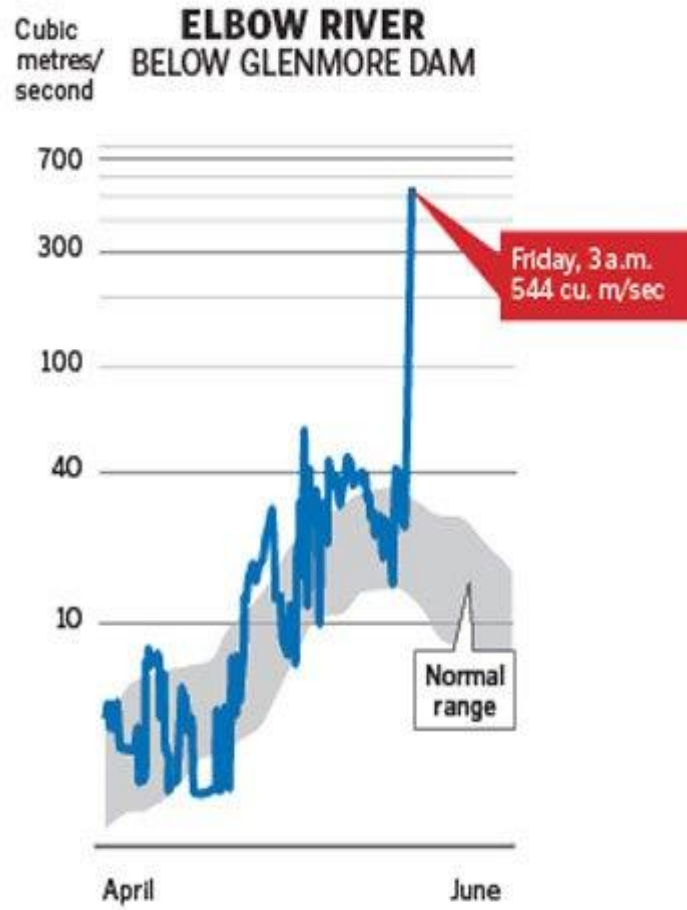


Learning From Experience – Today's Agenda

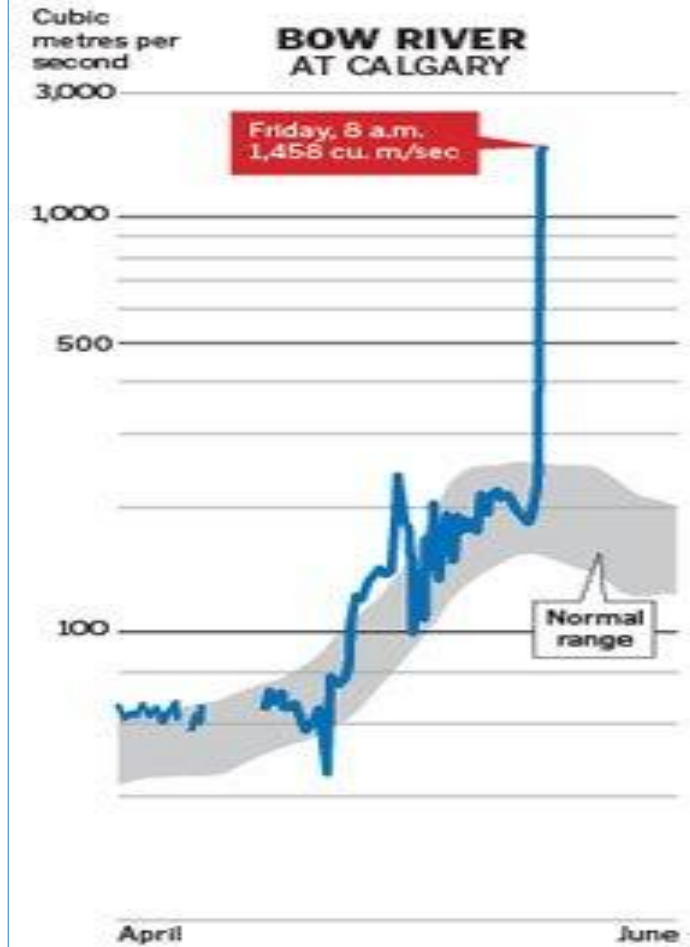
- Provide an overview of the flood (scope, statistics, pictures, etc.)
- Briefly discuss the City of Calgary disaster recovery and planning process (with thanks to Phil Corbeil from the City of Calgary)
- Review more in-depth issues affecting Calgary Catholic Schools
 - Communications and Information Technology
- Key Messages and provide some perspective - as bad as it was, hopefully we can show you some things we did correctly and provide some key take-aways for disaster preparation.

“Only a fool learns from his own mistakes. The wise man learns from the mistakes of others.” – Otto Von Bismark

River Flow Rates



The graphics provided show how dramatically the river flow rates increased during the 2013 flood. There have been a variety of reported numbers for the actual flow but generally, the flow rates were 8 to 12 times higher than the normal range at this time of year. Note that this time of year is when the rivers always have higher flow rates.



Causes For 2013 Flood

- Annual flood risk usually comes from snow melt in the mountains in late May, early June. Sometimes it is worse because there is rain dropped by systems tracking from the west coast.
- Weather in Calgary usually comes from the west with the prevailing winds or from the north, running down along the mountain ranges. It rarely comes from the east (all prairies that way! – nothing to stop the wind.) or the south.
- In 2013, an unusual weather pattern brought wet clouds up from the southeast and the winds trapped them against the mountains where all of the rain fell (250-300 cm in 48 hours). Combined with the higher than normal snow cover in the mountains – the rain accelerated the melt.
- Result – way too much water with nowhere to go but down river!

Calgary's two Rivers – the Bow and the Elbow

(Also two dams for flood control and water supply)



Bears paw Dam

Glenmore Dam



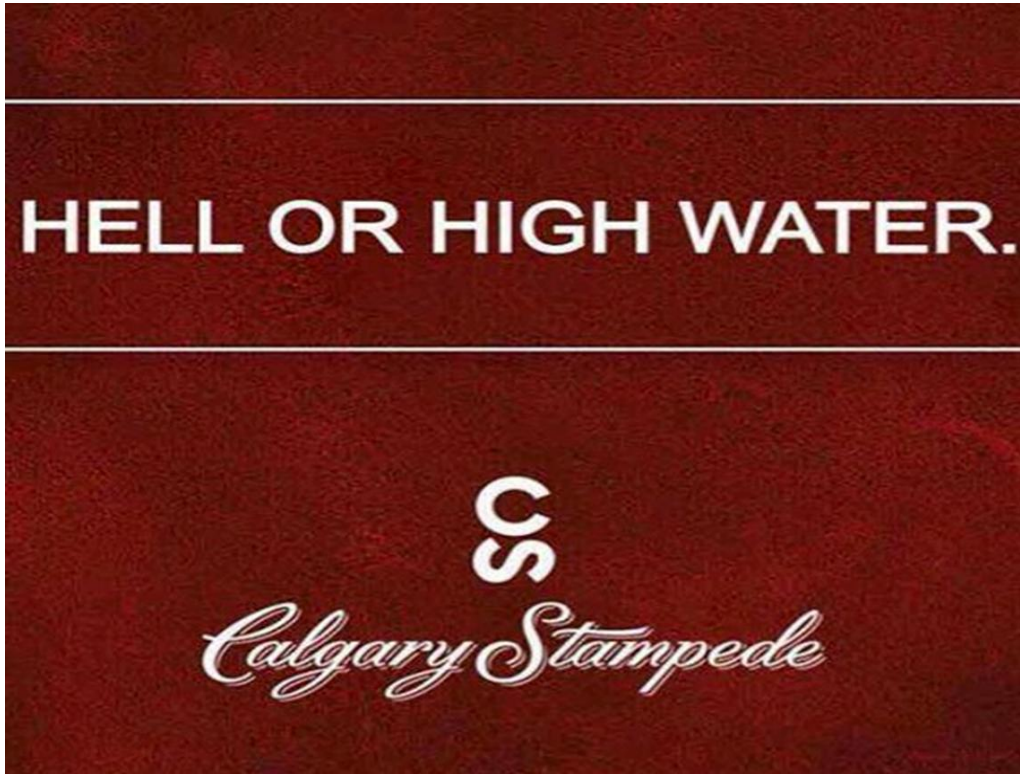
Calgary and Stampede Grounds Before Flood



Calgary and Stampede Grounds During Flood



The Calgary Stampede - A Minor Miracle In Fourteen Days



This picture is post-flood, just prior to the Stampede. The race track was fully refurbished.

Stampede Grounds Fully Inundated

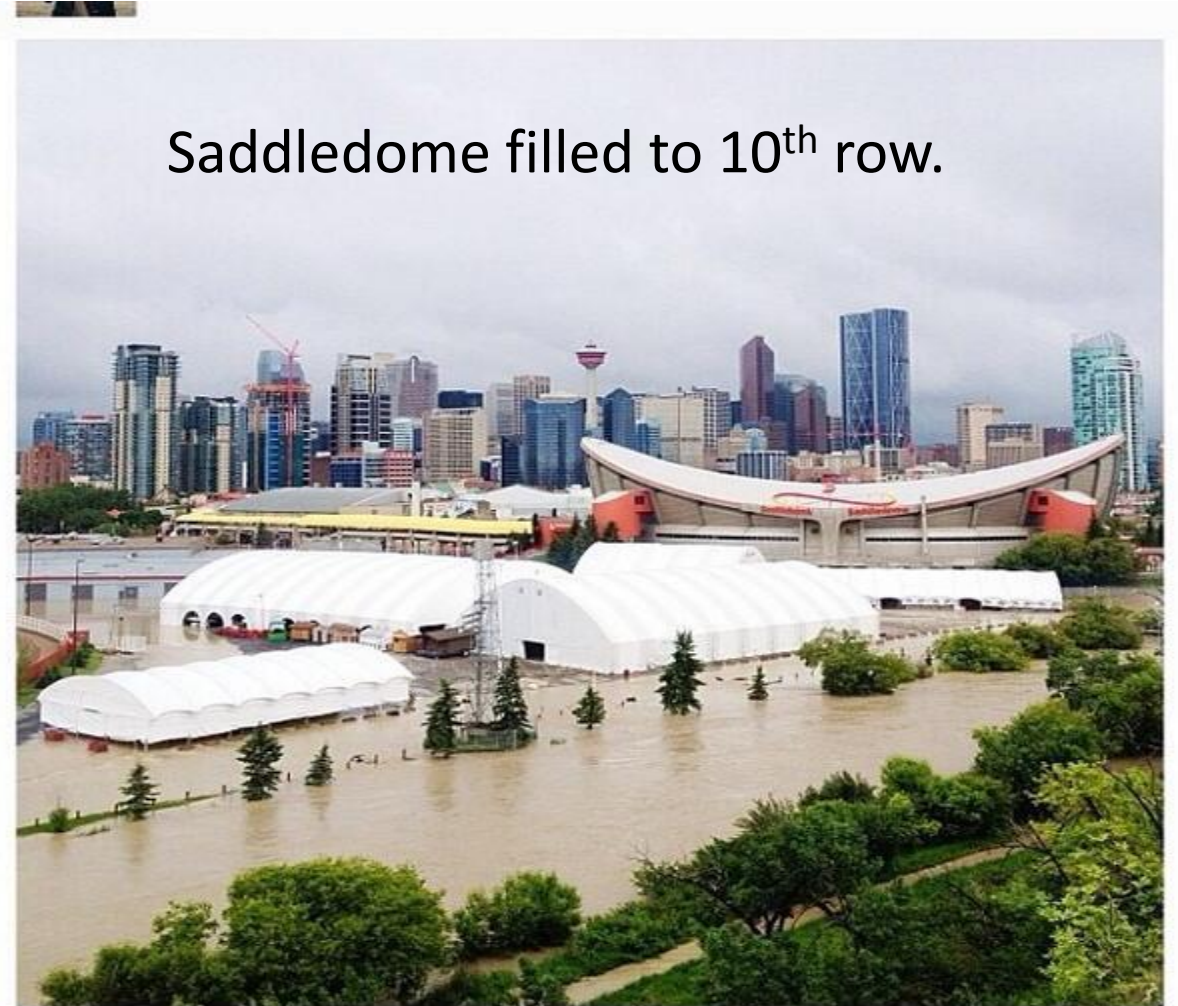


By the time the flood receded, there was about ten days to put it back together before the annual event.

The Stampede



The Saddledome - Before and During



Mayor Nenshi During Stampede – Two Weeks Later

The 10 day Calgary Stampede is a major tourist and economic event in Calgary with over a million visitors each year and over \$350 million benefit to the local economy. With a massive recovery effort, the Stampede went ahead as scheduled and delivered most, but not all, of the expected events.

It was also a focal point for recovery. Some thought it showed the true spirit of the community – others thought it should be cancelled while some people were struggling to cope.



Elbow River Near the Stampede Grounds



Calgary Flooding Arial View – Bow River

The Elbow River joins the Bow River just east of downtown Calgary.





**Downtown
Calgary**

**Approximate
Location of St.
Mary's High
School – in a
“Fringe” zone
according to
these flood
maps!**

Bow River and Princes Island



Centre Street Bridge actually has a lower level which was totally submerged at the peak of the flood.

This is actually an island with a popular park and restaurant. Normally well used by downtown workers.

Near Miss – Our Central Office (and Data Centre)

Downtown Calgary with the Bow River shown. Our office building location is shown (approximately) by the arrow. The worst of the flooding was to the east of us - barely.



Other Major Damage in Southern Alberta

Trans-Canada highway near Canmore was closed for over a week.



Canmore – Cougar Creek (June 20th) (About 100 Km West of Calgary)

Cougar Creek is normally something that you can hop over and had NEVER exhibited any signs of this kind of fury. Decks, logs, garden furniture were swept away and homes were left hanging over the brink. There was virtually no time to prepare.



High River

Worst hit community, just south of Calgary. This is a residential road (below).



Politics and Disaster Recovery



Controversial \$25 million foot bridge was barely above the water level at the peak of the flood.

Politicians at all levels (Federal, Provincial, Local) were keen to be seen as leaders and fixers – some were helpful and some just created more problems.

Lesson - Politics and Disaster Recovery

When it comes to politicians, it is best to let informed leadership and your own team of elected officials provide the necessary liaison. As a risk manager, your role is to ensure accurate information and scenario analysis as requested. Our district is very centralized and our senior management and trustees are a cohesive and effective group with clearly defined roles. Even if this is not the case, it can still impact your planning and response. As an example, our sister school board in Calgary experienced a total loss on a historic school that happened to be in the riding of the Premier at the time. The Premier immediately announced the school would be rebuilt to its former standard. This negated the board's option under their insurance policy to rebuild in a different location (the school services only around 200 students). The government has paid for a temporary school on site and has promised to pay the difference in reconstruction costs but this has seriously impacted the process and delayed recovery – as well as costing the taxpayer additional funds.

Emergency Management and Disaster Recovery Plans

Everybody has one (don't even tell me if you haven't done one!)

- When was the last time it was reviewed
- When was the last revision?
- When did it last get tested?

Without a plan, you are in deep trouble...



Calgary Emergency Management Agency

CEMA had just opened a new state of the art emergency management centre just months before the flood. Note the tables for each agency on the following pages. It was given a royal test and came through when it was needed. The emergency manager was due to retire in the months following the flood – it just proves that **timing is everything!**



Emergency Management = Tons of Preparation Time and Money Well Spent



Prime Communicators – Emergency Director Bruce Burrell and Mayor Naheed Nenshi



Experienced Disaster Leadership – Fire Chief Bruce Burrell

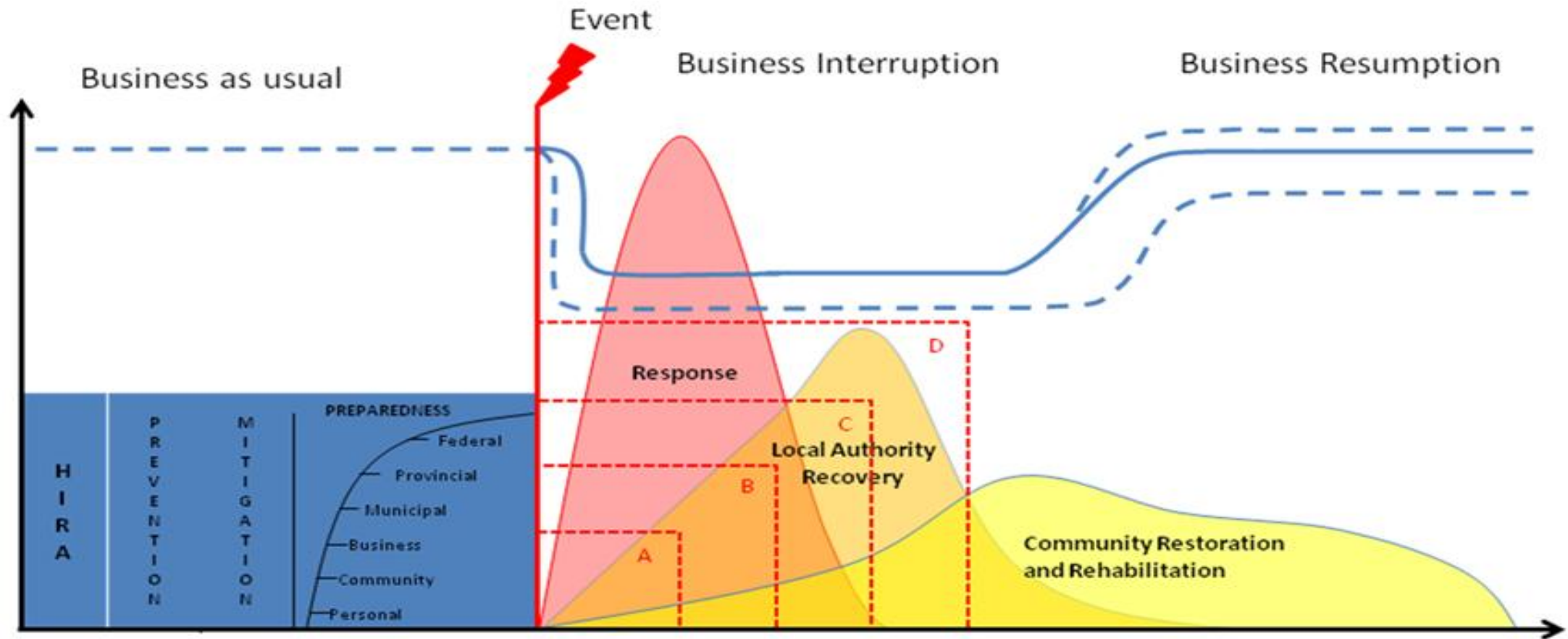
Tremendous communicator – Twitter king!



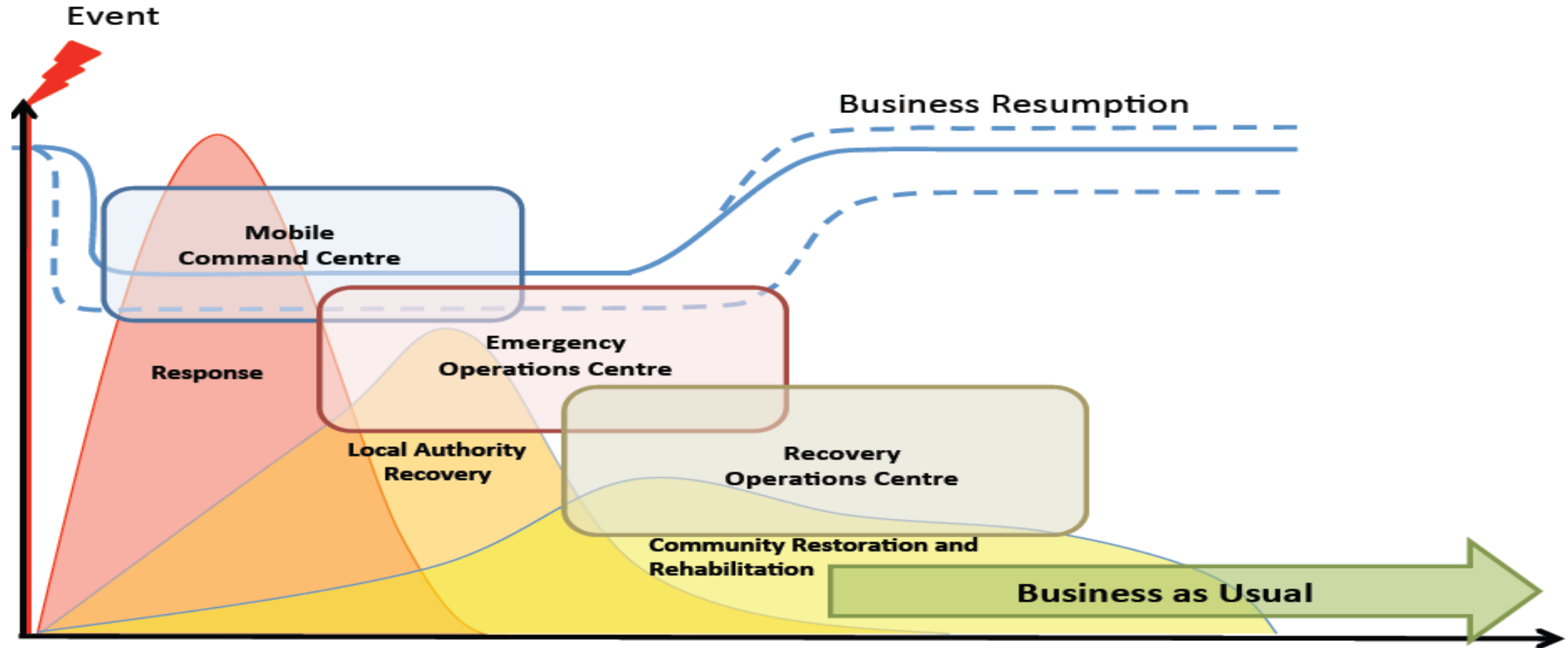
Dedicated Space with State of the Art Equipment and Software



City of Calgary Disaster Recovery Plan Excerpts



City of Calgary – Operational Planning/Control



Lesson - Communication Is Essential – Use What You Have



facebook

The flood as it happened.

There is flooding across southwestern Alberta, with mudslides in Banff and Kananaskis, overland flooding in Black Diamond and Camrose.

Homes in Camrose near Cougar Creek are being evacuated.

Photo courtesy Justin Parsons at the Camrose Leader

<http://www.calgarysun.com/2013/06/20/heavy-rain-in-banff-camrose-area-causes-flooding-evacuations>

Like · Comment · Share

245 175 243

Richard Nardo shared a link.

STATE OF LOCAL EMERGENCY DECLARED

Pursuant to Section 21 of the Emergency Management Act (R.S.A. 2000 C6, 0-13) and Section 4 of The City of Calgary Bylaw 25M2002, a State of Local Emergency (SOLE) has been declared in The City of Calgary ... See More

The City of Calgary - Flooding in Calgary

Like · Comment · Share

245 175 243

URGENT: EVACUATION PLAN - PLEASE SHARE

If you live in the following communities, please evacuate near Mission, Silver Park, Stanley Park, Rockwood, Redden and Discovery Ridge.

Here is the full release:

The City has declared a State of Local Emergency.

To address the safety and security of citizens in low-lying areas, mandatory evacuation orders have been issued for six communities along the Elbow...

Like · Comment · Share

245 175 243

The Calgary Sun

7pm Update: As the Bow River continues to rise you shall see the city taking measures to secure and move animals to safe locations. We will provide further updates as they become available.

Like · Comment · Share

245 175 243

City of Calgary Statistics

1 THE FLOOD

The Bow river flows peaked at **2,400 m³/second, 8x** the regular flow and more than **3x the 2005 flood.**

The Elbow river inflow peaked at **1,240 m³/second, 12x** the regular rate and more than **3x the 2005 flood.**

Outflow below the Glenmore Dam was **700 m³/second,** about **7x normal** and about **2.5x the 2005 flood.**

2 THE FALLOUT

Evacuations in **26 communities** affected **110,000** Calgarians.



16 LRT stations were closed.

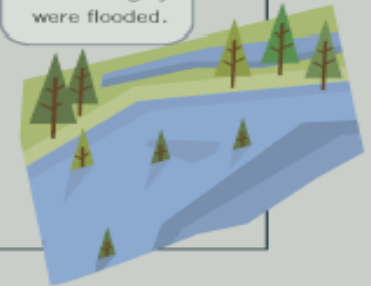


More than 50 bus routes were cancelled or detoured.

More than 20 bridges were closed.



30 parks across Calgary were flooded.



34,000 locations were without power.



More than **1,600 people** registered at community support centres on the first day.



City of Calgary Flood Impact



Water, Water, Everywhere...



LRT Stations

Light Rail Transit



Flood Maps? – Or, Who Thought This Was a Good Place to Build?



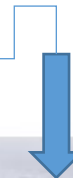
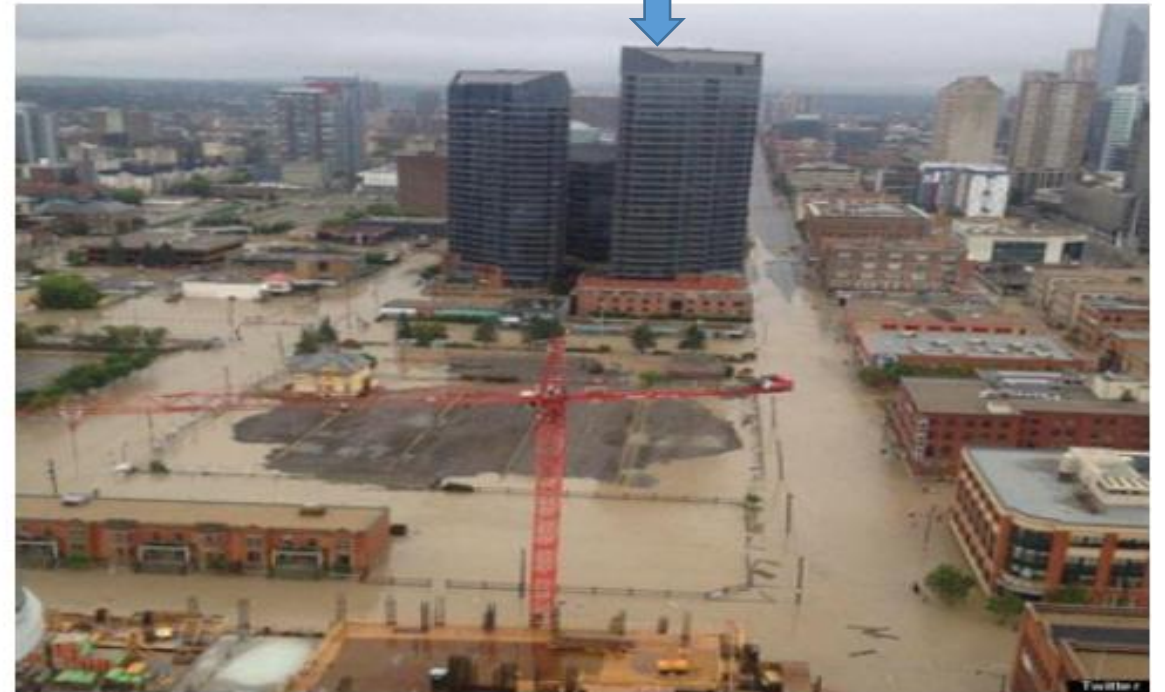
Electrical Substations and transformers – through good planning and execution, some were turned off or protected by berms which prevented greater loss

Critical Infrastructure



Downtown

(My oldest son lives here)



Things We Take For Granted



↑
Traffic Signals

See Electricity at right – need to get equipment checked (time/labour considerations) and back up and running once the water recedes.

Electricity



Electrical Substations and water DEFINITELY do not mix – high risk for loss of life and expensive long-term equipment loss.



Damaged Infrastructure is not always a quick fix...



Expect some major repairs – see Bridges comments

Roadways



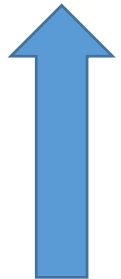
Bridges



Need to have some redundancy for key infrastructure and you have to prioritize repairs and expenses to meet any financial constraints.



So Many Things to Consider...



Don't make the problem worse – plan for containment and remediation.

Slurry Dumping

Environment

Are there hazardous materials or bio-hazards?
(most definitely in this case!)



Affected Citizens, Debris and Volunteers



Not only where to put it all – still have environmental issues and, in this case, huge revenue loss for the City from dumping fees.

Debris Management

Volunteer Management

Calgary is blessed with a culture of volunteerism. A single tweet resulted in 7,000 volunteers ready to work – amazing, but...creates its own issues.



CP Rail and the Mayor Have Differences – Don't Skip ANY Steps During Recovery Process!



CP says bridge was inspected before use, Mayor says not good enough to start moving goods. Should have been stress tested and have complete underwater visual inspection.

Derailment

Bridge Collapse

Including some hazardous materials...as in a lot of circumstances the damage could have been much worse.



A Sad Story With a Positive Ending - Calgary Zoo

On an island, home to over 800 animals and 120 species. In 2014, named Canada's top zoo by Trip Advisor. Fully Reopened November, 2013.

Tiger enclosure – they were moved!



Calgary Zoo Losses

The zoo lost a number of animals, mostly fish and insects due to power outages. Of higher order animals, there were four peacocks(drowning) and one pot-bellied pig (stress) who died.

The keepers moved 160 animals off island in an 8 hour period overnight and moved some animals (elephants, giraffes, gorillas, etc.) to higher ground in their enclosures.

Financial losses incurred were reserved at \$50 million for buildings, property restoration and rebuilding. There were 40 buildings damaged – some beyond restoration. The South America building was beyond repair and the zoo had to move the animals permanently to other zoos.

There were also approximately \$10 million in operating losses.

Some Had to Stay – No Time to Move...

Or were thought to be on high enough ground that they could weather the storm.



Hippo Enclosure That Almost Wasn't!



Animal rescue

The Zoo



Near Tragedy and More Heroics...

Lobi, the approximately 6,000 pound male hippo was inches away from escape to the river. The keeper barred the door with concrete blocks and a bobcat and stood guard with a rifle in case the worst happened.



Humour is Important – Usually Best After the Worst is Over, But Not Always.



Lesson – Humour and Resilience are Important!





CALGARY CATHOLIC SCHOOL DISTRICT

Calgary Catholic School District (CCSD) - Learning From Our Experience

Dissecting the flood of 2013, how we responded to it, what we learned to be our biggest risk exposure, and how it changed the way we manage Information Technology forever.

Pre-2013 there was a belief within district management that only our St. Mary's High School (on the banks of the Elbow River) was at major risk for flooding. Potential fires were a more pressing risk for district facilities. Flooding damage was considered more in the sense of broken pipes.

St. Mary's Flood Timeline – Historical Perspective

- June 2005
 - St. Mary's High School suffers minor flood damage due to the flooding of the Elbow River (at the back of school). HVAC and most electrical moved from basement to higher floors/roof. Time for most valuables to be moved from basement prior to flood.
- June 2006 (Here we go again!)
 - Water rising slowly over two week period. Superintendents debate whether to sandbag and move things out of the basement of St. Mary's High School No Flooding but minor costs incurred.
- June 2007 (Not again!)
 - Superintendents debate whether to sandbag and move things out of the basement of St. Mary's High School No Flooding.
- June 2008 (Are you kidding me – not this again.)
 - Superintendents debate whether to sandbag and move things out of the basement of St. Mary's High School No Flooding.

St. Mary's Flood Timeline – Historical Perspective

- June 2009 (Oh, that again.)
 - Superintendents debate whether to sandbag and move things out of the basement of St. Mary's High School No Flooding.
- June 2010 (Do we really need to look at this again?)
 - Superintendents debate whether to sandbag and move things out of the basement of St. Mary's High School No Flooding.
- June 2011 (Whatever, next item...)
 - Superintendents debate whether to sandbag and move things out of the basement of St. Mary's High School No Flooding.
- June 2012 (Ho-hum...)
 - Superintendents debate whether to sandbag and move things out of the basement of St. Mary's High School No Flooding.

Flood Timeline – 2013 – Maybe Not Just The School...

- June 20, 2013, Morning
 - Superintendents debate whether to sandbag and move things out of the basement of St. Mary's High School – expecting same old, same old.
- June 20, 2013, 12:30 pm District Administration Council Meeting begins
 - Shortly after meeting starts, district representative for Calgary Emergency Management Agency called to the CEMA bunker.
- June 20, 2013, 2:00 pm
 - 6 Communities evacuated. 3 schools in the evacuated communities.
 - St. Mary's
 - St. Monica's
 - Our Lady of Lourdes

Flood Timeline

- June 20, 2013, 9:00 am
 - Insurance Consortium members meet for “Environmental Review” (code for golf) prior to quarterly meeting scheduled for next day. Representatives of fourteen member boards from across the province are in attendance.
 - Biggest concern is rain – do we cancel or move the event indoors.
- June 20, 2013, 10:00 am
 - Event moved to indoor facility with golf simulator. Monitoring news.
- June 20, 2013, 12:00 pm
 - Getting reports of severe flooding in Canmore. OMG, this is not looking good!
- June 20, 2013 2:00 pm
 - Realization that this isn't your normal flood – evacuations begin and disaster plans start to be implemented. Golf is forgotten and the scramble for high ground begins. Most of the consortium members are staying in hotels in downtown Calgary and are in the evacuation zone – some with vehicles underground.

Learning From Our Experience

Overview:

- Summary of our disaster plan for IT department.
 - Our biggest oops! All of our eggs in one (precarious) basket.
- About the CCSD IT department – our unexpected biggest risk to district operations.
- Timeline of the flood (and some more impact photos).
- Lessons learned and how it altered our IT strategy moving forward.

Summary of Our Disaster Plan

Short term plan (3 days or less)

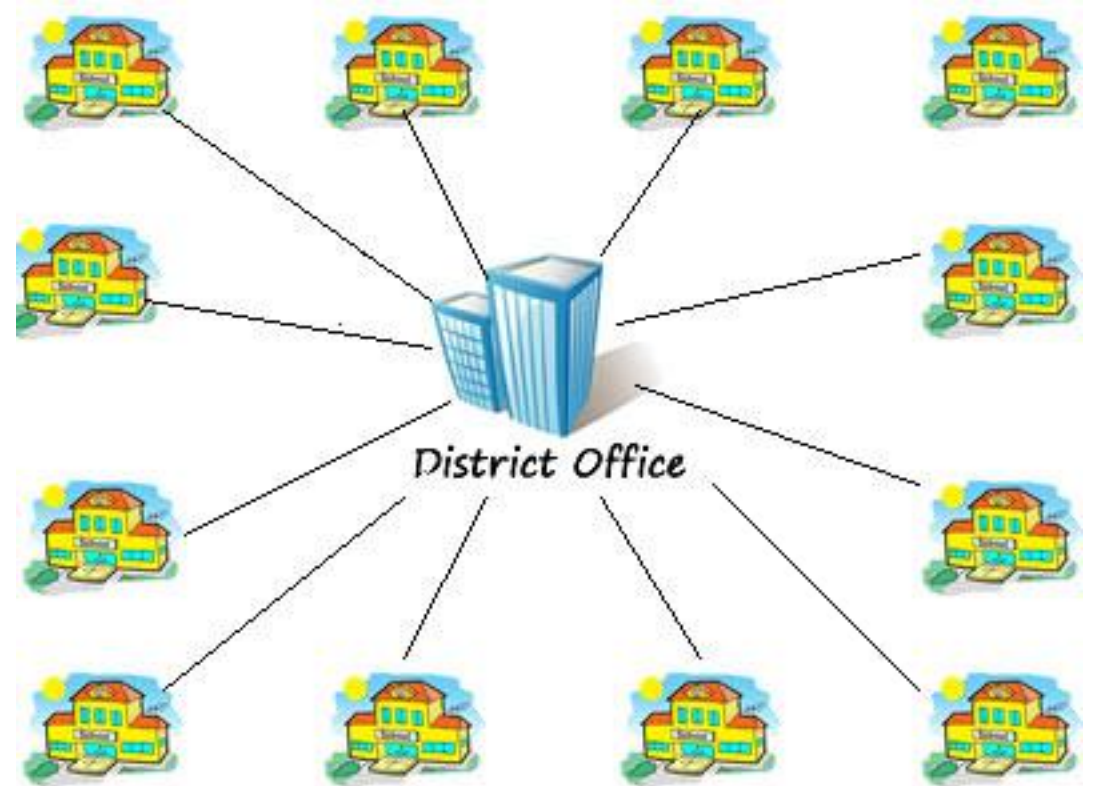
- Battery backup lasts ~20 minutes – hard shutdown is only option without back-up power source.
- Generator starts immediately providing enough power for the Data Centre, basic lighting, one air conditioner and one of three elevators.
- All staff based in head office would relocate to alternate location (Warehouse, other admin buildings and schools)
- No outage required

Long term plan (4 days or more)

- Move essential services to alternate location (Warehouse, other admin buildings and schools) by truck. Note: 70 servers at 50 lbs each and one data storage unit at 700 lbs.
- Re-route network to alternate site.
- All I.T. staff would relocate to alternate site.
- Up to 48 hour outage required.

Overview of the CCSD IT Department

- 65 Staff
- 14,000 PC's
- 3500 Chromebooks
- 3000 iPads
- 26,000 devices on our network daily
- ~400 virtual servers
- 25 major applications supported
- Average of 1.5 TB of data consumed every day.
- Heavily centralized model. All services hosted in our head office.
- Data Centre (DC) is located on the 7th floor.
- Traditional Microsoft based department.



Flood Timeline

- June 20th, 9:00 am. (Thursday)
 - IT are informed that some flooding may occur, but nothing out of the ordinary. This happens annually in Calgary, so no action is taken.



Flood Timeline

- June 20th, 11:00 am.
 - A meeting is called for the CCSD Emergency Response Team. We are informed that the flooding will be above average. A “once in 5 years” event.
 - Sandbags are ordered for St. Mary’s High School (we have them stored at the warehouse – ready to go).
 - A technician is instructed to ensure all PC’s at St. Mary’s are placed on top of tables – the major computer lab is in the basement of the school. Major concern is still supporting provincial exams for grade 12 students – all on computers.
 - I.T. staff in head office are put on alert.
 - State of emergency declared in Canmore - first indication of larger problem.

Flood Timeline

- June 20th, 2:00 pm.
 - Another meeting is called for the CCSD Emergency Response Team. We are informed that the flooding will be more severe than first anticipated.
 - Our 3 day outage plan is enacted.
 - A temporary berm is to be built for St. Mary's High School.
 - The City of Calgary evacuates 6 communities in low-lying areas next to the rivers, requests anyone that can leave downtown to do so now.
 - All I.T. staff are instructed to go home immediately, but make themselves available.
 - Flow rate of Bow River is 3 times normal.

Flood Timeline

- June 20th, 3:00 pm.



Water still rising – level went up several more feet from this picture.

Normal River Level Outside Our Central Office

October 2014



New gravel bar, river flow was dramatically altered.

This gravel bar used to be much smaller and was grass and trees.

Flood Timeline

- June 20th, 9:50 pm.
 - Flow rate of the bow river jumps to 15 times normal.
 - Decision made that all school board buildings will be closed on Friday the 21st.
 - CCSD and CBE jointly announce that all schools will be closed until Monday, June 24th.
 - All staff notified via phone-out that they are to work from home on Friday.
- June 20th, 11:00 pm.
 - We are informed that all electricity service to downtown will be cutoff within the hour.
 - Discovery that we are unsure of the amount of diesel on hand for the generator.
 - Extra sump pumps are brought into the head office parkade to assist in removing water.
 - Decision made to shutdown all non-essential services and IT team instructed to do so.
Essential services are deemed to be:
 - Email
 - External Website
 - Desire 2 Learn (LMS)
 - 17 communities evacuated. 110,000 residents are displaced.

Flood Timeline

- June 20th, 11:00 pm. Our building is to the far right – there is usually an island in the middle of the river where the tree is.



Flood Timeline

- Friday June 21st, 2:50 am.
 - Confirmation received that all non-essential services have been shut down.
 - IT team told to call it a day and head to bed.
 - Power, internet, and supernet services are still operating on regular power.



Flood Timeline

- June 21st – June 25th

We were at the mercy of Mother Nature. There was zero access to our Central Office building or our St. Mary's High School. Final exams still scheduled.

Power was restored to most of downtown on the 25th, so we began bringing systems back online one at a time. This took nearly 30 hours.

Toured St. Mary's on June 26th - This was our book storage area.



St. Mary's After Flood – Remediation Stage



The water level during the flood was at this level.

The sandbagging was consistent with the 2005 flood levels and the height that would not cause structural damage to the building.

Organization is Critical – Use a Site Manager



Air Circulation
equipment

Debris

Our school
principal did
NOT have a good
summer!

St. Mary's High School – Books and Structure



The Power of Water is Amazing!



Flowing Water Rules!



Irreplaceable History – Hard Decisions



Oh, And What About Personal Claims?

Students had over 100 lockers in the basement of this school. It was the last week of school and students had not yet cleared out their lockers. Still, there were minimal claims – it could have been much worse.



Lessons Learned by IT Department

- We were really lucky! The electricity stayed on and our internet service stayed up. Most of downtown Calgary was without electrical service.
- We did not anticipate or plan for several factors:
 - The speed at which the flood hit. Within 10 hours (overnight) we went from an above average flood to a serious disaster. Our 4 or more day disaster plan was impossible to carry out. Mandatory evacuation means EVERYBODY – RIGHT NOW!
 - The loss of the building. It was illegal for us to access our building for 3 days. We could not bring fuel in or take servers out – weight/access?
 - Our systems are much too complex to move. Servers+storage+network.
 - The human factor. 3 staff members were removed from their homes or had family that were evacuated.
- Our plan was outdated and didn't take all potential factors into account.
- Our top priority turned out to be communication tools – Email, IM, Social Media. Without those, it would have been an even worse nightmare.

CCSD IT Department - Moving Forward

- We came to the realization that a centralized, locally hosted data centre is no longer sustainable.
 - All 105+ schools cannot depend on one building for everything.
 - IT Services need to be distributed, resilient and redundant.
 - Some departments – e.g. Finance and Accounting – are fully dependent upon their systems and can't even write cheques or make manual entries.
- The idea of a traditional backup data centre is not affordable
 - Our estimate to build a backup DC was > \$3 million.
 - We lack the resources to have hardware sitting around waiting for a disaster.
- Our plan is to move at least 90% of our data centre to being cloud hosted at a mix of Microsoft Azure, Amazon Web Services, U of A, and local co-location partners.
 - We are still working through risks of cloud based systems, including privacy impact, Patriot Act, etc.

We Know the Road Will Not be Straight and Narrow and We Know That We Have to be Better Prepared for Future Events.

Lessons:

- Plan ahead – do your best to predict possible situations.
- Communications is key – talk about your plan before you need to implement it!
- Work with other departments, agencies and partners to test your plan - regularly.



Other Stories - Calgary Board of Education Elbow Park School



Beautiful old school – heritage designation. Foundation was heaved and building was unsafe to occupy. Cost to replace with new school was around \$6 million. Cost to restore to previous state was double. Check your policy language! Does it cover replacement, restoration or actual cash value?

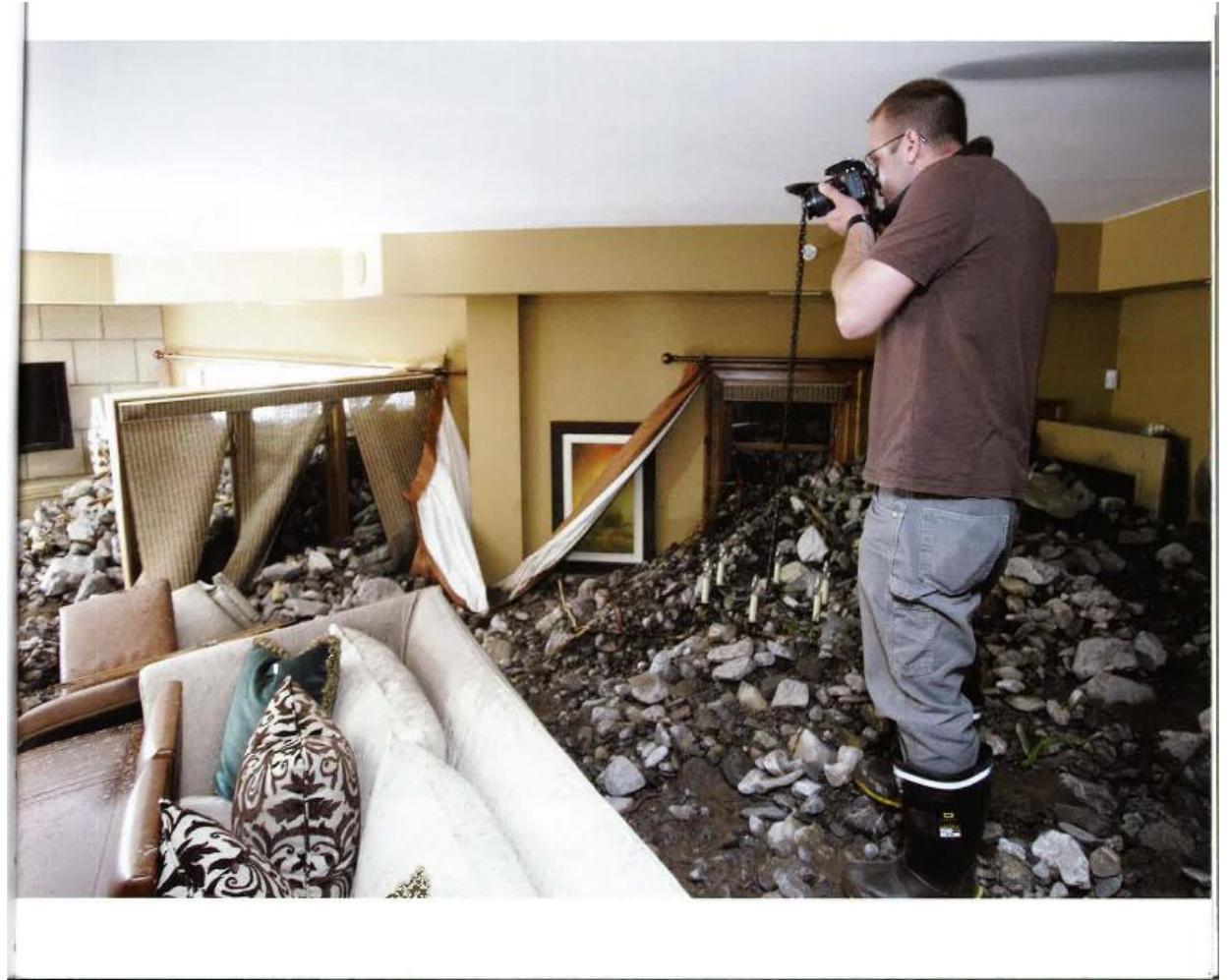


CCSD Key Messages/Lessons

- Keep your emergency plan up to date and test it regularly with respect to potential risks in your community – think worst case.
 - Share your plan with others (staff, emergency management personnel, suppliers, etc.). I know of one instance where senior management of an organization had a great plan but didn't sufficiently share it with key staff and then couldn't contact their staff when it was needed. You don't want confusion and lack of communication to ruin a good plan.
 - Practice your emergency plan, even if only as a table scenario – think outside the box.
- Work closely with municipal/provincial partners to coordinate efforts – in advance and regular contact to ensure smooth flow at time of disaster.
- Communications is key – how are you going to do it? (Twitter, email, satellite phones, cell phones, regular phones, etc.) Any and all methods are acceptable as long as they work.
 - Know who your key contacts (internal and external) are and keep contact info for those individuals/corporations close at hand i.e., not in your office. Don't settle for one type of contact info – get phone numbers, cell numbers, e-mail, etc. Also, Facebook and Twitter work if you know the individuals well enough.
- Redundancy – especially in communications!
- Protect your people – they are your best resource. Prepare for key people who may need to respond to personal circumstances – again, redundancy.

Personal Losses Cannot Be Understated

This is how Mother Nature does renovations – the rocks are a nice touch (not!). Note how close to the ceiling the photographer's head is in a typical 8 foot high room. If this was the home of one of your key staff, where do you think their focus would/should be?

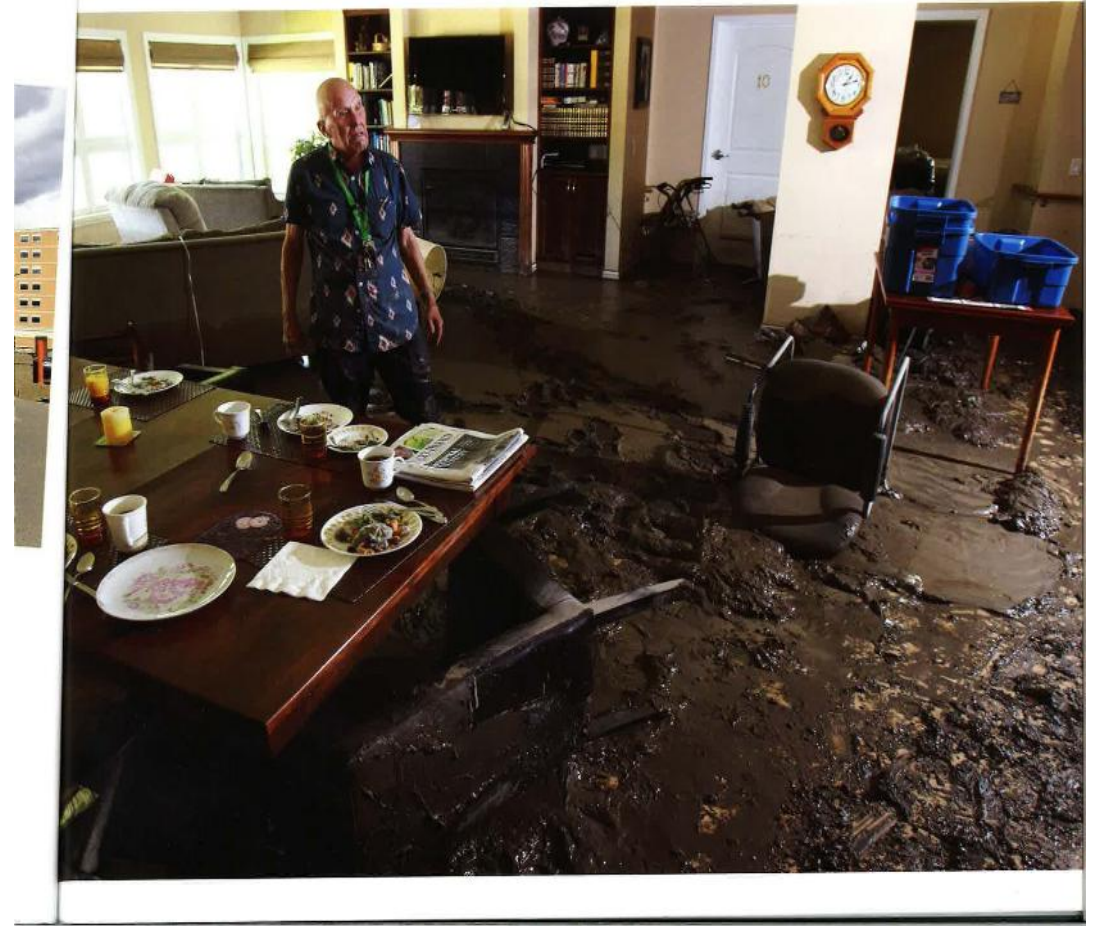


CCSD Key Messages/Lessons (continued)

- Know your facility – including any asbestos or hazardous material risks. Your Occupational Health and Safety personnel can be invaluable in this regard. In the case of a flood, your whole site can be contaminated and increase the costs of remediation. If there are unknown risks there may be unnecessarily increased costs.
- INVENTORY – very difficult to value something if you don't know what you had. Particularly important for “soft” items – books, sheet music, costumes, archives, financial records, etc.
- Work with your adjuster and make sure they are qualified and experienced enough to handle the scope of your claim. We were fortunate to have a senior adjuster brought in from Vancouver to deal with our claim – our sister board had someone less qualified and experienced far greater problems.
 - Where possible, contract services in advance.
 - Site management – having a monitor on site can prevent errors or cost exaggerations. Things like billable machinery on-site, head counts of workers on-site, conditions on-site, building material provided (and actually used), debris removal and work progress.
- Know your policy language – is it full replacement, full restoration or Actual Cash Value (ACV)? Does the language follow form up through your excess layers of coverage?

As Always, The Devil Is In The Details

Aside from the initial clean-up, the work has just begun. There are potential mould considerations, cost and ability to pay, insurance coverage, government support (if any and how much), short-term relocation, contractor issues, etc., etc., etc. Always consider both macro and micro elements of the disaster because both will impact your ability to recover.



So How Much Did it All Cost?

Four lost lives.

CCSD – one school damaged, about \$4.5 million, lost time and productivity.

Our insurance consortium (including CCSD and CBE) – around \$35 million.

Total insured losses in Southern Alberta - \$1.7 billion, which is a Canadian record.

Total losses with uninsured damage are thought to exceed \$5 billion.



Above all - Resilience and Hope.

Resiliency – something needed not just by plants but by everyone impacted by a major natural event. There is always hope and there is always the future. Also, cats know best about survival – there is a reason they are thought to have nine lives!



Questions?

