NEW ZEALAND DEFENSE FORCE: EARTHQUAKE RESPONSE AND LESSONS LEARNED

Ensuring resilience following natural disasters requires sound preparedness and prompt, unified response from those tasked with keeping facilities and infrastructure working around the clock.

By Lt. Col. Warren G. Parke, NZDF

The devastating Canterbury earthquakes of 2010 and 2011 (along with the multitude of aftershocks that followed) required the New Zealand Defence Force (NZDF) to assist in the Civil Defence response and operate from its military base in the region, Burnham Military Camp. Numerous facilities management (FM) lessons have been learned and some of these are transferable to the wider FM industry to help better prepare itself and the built environment for future emergencies.

Burnham Military Camp (BMC) is located on the outskirts of Christchurch City and is reasonably self-sufficient with regards to its infrastructure with a standby-power generation capacity and an independent water supply drawn from bores. While the earthquakes greatly affected Christchurch City in 2011, they did not severely impact BMC. Instead, it was the 7.1-magnitude earthquake on the Darfield Fault in September 2010 that caused the most damage to the installation, with repairs costing approximately $1 million. Masonry chimneys and others structures collapsed, there was flooding from a water tank that failed in a multi-storey barrack block, and most significantly, there was significant damage sustained to the earthwork structures at the West Melton Rifle Range. This operationally important range was put out of commission until urgent repair work was completed. A few other NZDF facilities in the Christchurch City area were damaged and closed for repair.

Fortunately, there was no loss of life in any NZDF facilities, nor did NZDF or its contracted FM service provider suffer any loss of life. However, a number of the staff's homes were severely damaged, as well as those of friends and families.

Following the major Christchurch earthquake in February 2011, it was quickly ascertained that BMC was relatively undamaged and could be used to support NZDF's response to the emergency in Christchurch City. Accordingly, NZDF surged in troops to BMC that could be used to maintain the cordons in the city and assist with other support tasks. This put a large amount of pressure on the facilities and supporting base infrastructure to accommodate and feed them. The kitchens had to produce three times the normal amount of meals, which put a strain on the electrical reticulation to run the ovens, the water supply for cooking and cleaning, the sewerage system and drains, and the waste management system. It meant that the infrastructure had to be continually monitored and checked as any breakdowns, outages, failures or blockages would have had a greater impact and inhibit the base's ability to continue supporting the emergency effort.

A tented camp was established to accommodate personnel, and other government agencies and service providers made requests for the use of facilities as they sought out locations to operate and coordinate their response from. However, not all these requests could be supported. Decisions had to be coordinated at the government agency headquarters level to ensure that NZDF was conforming to the civil defence's and government's greatest needs.

The lessons learned from NZDF's response to the Canterbury earthquakes incorporate guidance regarding the initial response to an event; what can be done once things have stabilised (bearing in mind that the after effects of emergencies can be protracted depending on the severity of the event); and finally the activities that can be undertaken as preparatory measures to increase the resilience of not just the facilities, but of the staff faced with having to respond to the needs of the end-users and the facilities itself.

FIRST RESPONSE

Personnel. Up-to-date staff contact lists should be kept in hard copy and held by the manager in the office, on mobile devices, and at home. Storage on work hard-drives or servers alone is not good enough. Staffing a FM office as part of response to emergency—a duty rotation plan is needed to allow appropriate amounts of rest and opportunity to deal with own issues too. Consider bringing in other staff to take over or supplement.

Communications. In New Zealand, landlines failed but cell networks survived. Text messaging, smart phone email use and direct cell phone calls were all needed to organise a response and keep senior management informed. Still, it's important to ration calls, as cell networks can be overloaded. Unfailing attendance or representation at local level coordination meetings is essential to keep situationally aware and build confidence in FM ability.

Reporting. A set format for reporting the status of staff and facilities is required when responding to an emergency. Reports should include main infrastructure elements, such as power, water, sanitation, fuel availability and other utilities. It is also necessary to establish a routine of regular reporting of the situation.

Make-Safe and Damage Assessment. FM can assist by isolating the facilities from the infrastructure services so that fires are minimised—switching off the electricity and turning off the gas for instance. Furthermore, water supplies need to be preserved and attention given to isolating the damaged infrastructure and shutting off leaks. Concentrate the survey of damaged facilities on the immediate area first and by criticality of the assets, then broaden the survey to outlying areas as the situation stabilises locally. Some facilities may require cordoning-off. This will require access to stores and materials that are readily identifiable for their intended purpose.

Visible Presence. It is important the FM organisations are actively seen about the area, are easily identifiable, and are responding to issues. They should be wearing appropriate personal protective high-visibility clothing/equipment and driving vehicles with company logos. This helps builds confidence in the minds of the end-users, especially those reliant of FM assistance, like those in defence housing.

Access to Structural Engineers. The FM organisation will require pre-arranged access to qualified structural engineers located outside of the affected region, as local resources will be quickly swamped by Civil Defence needs and made unavailable. This can take the form of "standing offers."

SUBSEQUENT ACTIONS

Broadening the Damage Survey. Once the needs of the immediate base have been dealt with, teams can be sent out to ascertain the status of the other facilities and sites that are the responsibility of the FM organisation.

Ongoing Checks. Given the likelihood of multiple aftershocks, it is important to know in advance what level shakes will elicit a response and to check only critical facilities given the time that checking all structures consumed. During the Canterbury quakes, occupants of buildings were told to mark extent of cracks on walls or floors then observe them after subsequent shakes and make a reasoned judgement call as to when FM needed to get involved.

Fuel Monitoring and Ordering. There are competing demands on fuel (standby power generators and vehicles). Fuel needs careful management and requires coordination with the Base Headquarters given that units will want to utilise fuel for vehicles and other tasks. An extra layer of security of the fuel supply can come from the FM Section owning its own portable tank that it manages and uses to top up standby power generator tanks. Contact with the fuel suppliers needs to be established so that situation updates can be provided and resupply ordered. A trailer mounted refuelling tank for generators is advisable.

Water Quality and Dissemination of Information. The water supply during an emergency is a significant worry; do what is necessary to ease those worries, including conducting water testing and communicating the results. Have access to emergency testing kits for speedy confirmation of water quality and issue and communicate any warnings as soon as possible—for instance, notify citizens if water needs to be boiled before use.

Demand on Facilities. Emergency response staff surge into an affected region and require support from military camps and cases. This puts a huge strain on facilities. Accordingly, infrastructure requires constant monitoring and attention to keep needs like waste disposal, electrical loading and water use

running effectively. Tented camps may be required and prior planning of where these are best located should be undertaken. Some considerations when establishing a tented camp include: hard-standing to negate the effect of rain and mud; access to electrical reticulation for lighting; safety requirements e.g. fire extinguishers and warning systems; and easy access to ablutions (this may mean having to establish a stand of portable toilets).

Furthermore, other government agencies and external parties (e.g. service providers) are likely to make requests for facilities and locations to organise their own responses from. These requests need to be referred to the government agency level for coordination to ensure that the highest priority for the Civil Defence response is met, instead of a local "first in first" served approach.

Accounting for Costs. There is a need to capture the costs associated with responding to emergencies and follow on remediation. This allows claims against insurance or requests for additional funding to budgets to be robustly justified.

PREPAREDNESS

Earthquake Response Training. FM staff should undergo industry-provided earthquake response training so that this forms part of the employee skill set. Personnel should have an understanding of what elements of a facility's structure should be checked and what to look out for, such as cracking and leaks, and able to articulate and report that information accurately. They also should understand the Post-Earthquake Building Safety Evaluation Guidelines, what the ratings mean and more importantly, what they do not mean. Senior FM staff should also be "up-skilled" to understand what systems are used by the engineering profession to rate and assess buildings for their seismic resilience. Facility managers should attend local-level civil defence exercises to help build integration for disaster preparedness.

Standby-Power Preparedness*.* Organisations need to ascertain what level of standby power they require in order to continue their outputs if the grid fails and be able to implement a simple and easily controlled system. Small portable trailer-mounted standby power generators that can be plugged into pre-prepared operationally critical buildings and power kiosks will add a level of electrical supply security. Scheduled maintenance is essential to keep the system operational given its standby nature and must include monthly "runups" of the generators and load testing. Contractual arrangements need to be made with generator maintenance specialist contractors, and include terms for timely response and preferential support during emergencies.

Business Continuity Plan (BCP). An FM organisation must have a BCP in place that has been developed in conjunction with the FM service provider. BCP needs to contain maps and diagrams of what to do to make the facilities safe along with identification of items that must not be touched for safety reasons, and not be overly technical. Contact numbers are required (cell, landline and email addresses) for specialist contractors and suppliers as well as callout staff of the FM service provider. Drawings of critical

facilities and an overall site plan are essential to an effective BCP. Hard copies must be printed and kept by the key FM staff so that they are on hand after hours. At a minimum, the BCP must be reviewed, tested and updated annually.

Emergency Response Stores. An FM organisation should keep an amount of emergency response stores and personnel protective equipment available and dedicated for use in times of emergency. This should include items for the FM office to use as part of their own safety (Civil Defence agencies can supply pre-prepared kits that can be purchased), and also items that the FM staff can then use as part of their response to the camp or base e.g. cordoning off tape, and signage, crow bars and other digging implements, local area communications equipment and batteries, torches etc.

Work Place Preparedness. FM should promote work place preparedness and provide advice to occupants on how they keep their work areas. For instance, securing items on shelves is a simple yet effective way to reduce risk of falling items during an earthquake.

UNDERSTANDING RESPONSIBILITY

The terrible and devastating Canterbury earthquakes were an unprecedented event for New Zealand and caused great suffering and damage. NZDF FM staff and its contracted FM service provider were outstanding, and a model for others to follow with how they performed their duties at BMC in support of NZDF's response. There will always be a next time.

Countries like New Zealand live with many significant natural hazards and preparedness is a major factor in minimising their impact. FM organisations can learn from New Zealand's experience to help prepare themselves and the built environments they manage so that when an event occurs, they can respond effectively and assist with returning life back to normal—as quickly as possible.