CRITICAL INFRASTRUCTURE PROTECTION


Source: CASFM

HAZARDS ADDRESSED

HOW IT WORKS

A **Critical Infrastructure Protection Plan** is a strategy to make critical infrastructure more resilient. What qualifies as "critical infrastructure" is defined locally, but generally refers to infrastructure that is necessary to providing vital community and individual functions. It can include both buildings (e.g., schools, town halls, hospitals), and also physical facilities such as roads, storm drains, potable water pipes, or a sewer collection system. Critical infrastructure must be designed, located, and sufficiently protected to remain operational during hazard events and emergencies, including floods, wildfires, high winds, and severe weather. Key infrastructure assets can be owned, operated, and maintained by either public agencies (e.g., roads, bridges, water and sewer systems, school facilities, etc.) or the private sector (e.g., hospitals, utilities, etc.). A diminished or vulnerable critical infrastructure system will greatly impede a whole community's ability to withstand or recover sooner from hazard events.

To make these facilities more resilient requires taking actions that removes risk to physical infrastructure. In terms of buildings, examples include: relocation; elevation of the building above the base flood elevation (BFE); dry proofing and wet floodproofing; fire-resistant building materials; and, in some cases, engineered solutions such as levees and floodwalls. In terms of hardening capital facilities, examples include: double sleeving water pipes, elevating roadways prone to flooding above BFE, expanding the capacity of road culverts, removing physical impediments that restrict water flow in rivers and floodplains, and elevating heating and air conditioning equipment and generators.

IMPLEMENTATION

Each local community must identify and analyze its own critical infrastructure in relation to known hazards and develop a comprehensive strategy. The results should include a list of prioritized capital

improvements and associated costs and potential funding sources. The strategy should be incorporated into the local hazard mitigation plan's list of mitigation projects, the local comprehensive plan, and the capital improvement program/plan. It is especially important to develop plans for the long-term maintenance of critical infrastructure, since FEMA (and potentially other agencies) may not provide funding for repair unless the damage is related to a specific disaster event.

WHERE IT'S BEEN DONE

Similar to many growing communities in the semi-arid climate of Colorado, the **City of Aurora** faces an increasingly complex future with regard to its water supply and infrastructure planning. Uncertainties related to a host of future conditions including population growth, aging infrastructure, climate change, and extreme events present clear risks to the provision of safe drinking water to its citizens far into the future. As part of developing its 2015 *Integrated Water Master Plan* (IWMP), Aurora Water, the City's water utility, applied a scenario-based planning process in which the potential impacts of these and other factors to its assets were quantified using performance metrics of reliability and resilience. In so doing the City developed a risk management framework to identify key risks inherent to the entire Aurora Water infrastructure system – from watershed supply to storage, treatment, distribution, and delivery. This systematic approach considered the future frequency and severity of drought, wildfire, and floods among other threats and was used to evaluate and rank all the system vulnerabilities to serve as the basis for decisions regarding future capital projects, programs, and policies. Typical of most utilities, Aurora Water's refined Capital Improvement Program outlines projects over the next 20 years. However, despite uncertain future conditions, the planning horizon for their IWMP extends to 2070 with updates planned on a three to five-year basis.

The Erie Municipal Airport, owned and operated by the **Town of Erie**, is located only three miles from its central business district and has long been recognized as critical to the economic well-being of the community. More recently, it was identified by the Town's mitigation planning team as a critical "transportation and lifeline" facility, defined as essential in providing utility or direction either during the response to an emergency or during the recovery operation.

The airport lies in a valley created by Coal Creek, a perennial stream that borders the airport on two sides. One of the facility's most vital infrastructure assets is the Coal Creek crossing, a bridge and culvert system which provides vehicular access to the airport and connects the runway to a maintenance facility, several businesses, and private hangars. The crossing is also viewed as critical to the success of a proposed Airport Business Park adjacent to the airport. For years, the decaying culvert required frequent clearing and significant repairs just to keep it operational during small storms. In response to these mounting maintenance costs, combined with the recognition of the crossing's high vulnerability to larger flood events which could cause the airport to shut down, the Town replaced the culvert through the assistance of FEMA's Pre-Disaster Mitigation (PDM) program. The construction of two parallel precast concrete box culverts was completed in 2011 for just over $400,000, and soon thereafter the project proved its cost-effectiveness in the wake of the September 2013 flood which resulted in no damage or service interruptions. "The structure worked per its design," said Russell Pennington, Deputy Director of Public Works for the Town of Erie. "It's a great asset to the town and the airport." (*Best Practices*, 2014, p. 8)

Garfield County initiated a long-term *Critical Facilities Protection Plan* (CFPP) in 2015. The County identified the need for such a plan in its local hazard mitigation plan. The County Community Development Department joined with its Emergency Management Department in developing its CFPP. The CFPP is expected to be adopted by the County Commission and integrated into the Garfield County Comprehensive Plan.

ADVANTAGES AND KEY TALKING POINTS

The speed at which a community is able to recover is linked closely to the resilience of its critical infrastructure and ability to avoid damage from disaster. The following steps need to be taken:

- Have a critical facilities protection plan (CFPP) in place prior to any disaster event.
- Establish an on-going program to implement recommended actions in the CFPP.
- Build support for funding of the CFPP by educating the general public and key stakeholder groups.
- Implement the CFPP to achieve long-term savings to the local government, as well as state and federal governments.

CHALLENGES

- Gaining funding support to implement the CFPP can be a struggle when a community has not experienced a disaster for some time.
- Another challenge is avoiding funding competition among agencies responsible for certain infrastructure elements.
- Some critical facilities may also be classified as historic structures, which may introduce additional challenges in terms of upgrading the structures to be more resilient.

KEY FACTS

Administrative capacity	Planner, public works official, engineer, finance office, emergency manager
Mapping	As needed
Regulatory requirements	N/A
Maintenance	Minimal
Adoption required	Yes
Statutory reference	N/A
Associated costs	Staff time to file for grant(s) – cost can be recovered out of grant(s); to prepare Critical Facilities Protection Plan requires staff time

EXAMPLES

City of Aurora Water Department	auroragov.org/LivingHere/Water/index.htm

Town of Erie Emergency Preparedness	erieco.gov/369/Emergency-Preparedness
Garfield County Emergency Management Department	garfield-county.com/emergency-management

FOR MORE INFORMATION

Colorado Department of Local Affairs – Financial Assistance

colorado.gov/pacific/dola/financial-assistance-0

U.S. Office of Infrastructure Protection

dhs.gov/national-infrastructure-protection-plan

Silver Jackets Program

silverjackets.nfrmp.us

Colorado Silver Jackets Program – (under development)

silverjackets.nfrmp.us/State-Teams/Colorado

National Institute of Standards and Technology

Disaster-Resilient Buildings, Infrastructure, and Communities: nist.gov

National Renewable Energy Laboratory

nrel.gov/tech_deployment/drr_nj_ny