



City of Fort Collins, CO

Dynamic flood maps for public awareness, and flood insurance rate savings

Located against the foothills of the Rocky Mountains and home to Colorado State University (CSU), the City of Fort Collins is located 65 miles north of Denver. With an estimated population of 161,000, it is the fourth most populous city in Colorado. The City needed to build a flood mapping application to display live rain gauge and stream flow information and meet FEMA's Community Rating System requirements.

About the City of Fort Collins

The City of Fort Collins offers a diverse culture, educated and engaged citizens, outdoor recreation, and a thriving economy. Throughout the year, live music, entertainment, and great local dining can be found throughout the historic downtown area. Fort Collins offers the convenience of a small town with all the amenities of a larger city.

The City's GIS department consists of four full time members and one ¾ time resource. They manage approximately 48 sites built using Geocortex, which is integrated into multiple asset management systems, the City's permitting system, and is also used for tracking locations of streets using

the Goevent processor. The City's GIS department also provides training to the organization and manages the City's ArcGIS® Online site.

The GIS department supports almost every department within the City. Examples include:

- Support for cultural departments with high quality mapping for brochures and Geocortex sites, such as the Annual Studio Tour: <https://gisweb.fcgov.com/art%20studio>;
- Support for streets/transportation departments, including interactive mapping for bike to work day, live snow plow tracking, and management of Cityworks® asset management data;



“ Geocortex allowed us to stand up a website quickly and consistently with just the right amount of customization. Prior to using Geocortex, there was a simple static map on the City’s website that was difficult to manage and maintain with very limited functionality. We plan to continue using Geocortex as one of our main GIS tools. ”

Marcus Bodig, *GISP, Manager GIS - Information Technology*

- Support for the Parks Department with asset management and interactive websites such as the Cemetery Locator: <https://gisweb.fcgov.com/Cemetery>
- Support for a regional application for managing the status of trails in real-time: <https://gisweb.fcgov.com/Trail%20Status> and
- Support for local utilities with internal applications for power outage management using secure Geocortex viewers.

In fact, GIS is integrated throughout the City, and those sites can be found here: <https://gisweb.fcgov.com>

The Challenge

Fort Collins participates in the National Flood Insurance Program and FEMA’s Community Rating System (CRS). The CRS is a voluntary program that provides discounts on the rates citizens pay for flood insurance.

The City needed to build a dynamic flood map that showed live rain gauge and stream flow information. Areas that are impacted by imminent flooding needed to dynamically appear on the map, which also needed to auto-refresh the data every five minutes to provide an effective early warning system.

This solution needed to comply with FEMA CRS requirements, as participation in the program translates into significantly discounted flood insurance rates for citizens.

The Solution

There are several pieces to this solution: The field equipment (stream flow and rain gauges) wirelessly transmit data to a central repository, and the data is collected in an Oracle database. Custom views of the data are created to make sense of the incoming information, and the data in these views are what is published as a service with ArcGIS Server. Within the application, the Stream Flow gauges dynamically change color based on an alarm stage that is dynamically set in the database. Inundation polygon areas are associated with specific stream flow gauges; these inundation areas have



definition queries associated with them that cause them to show up when the alarm stage values change for the associated stream flow gauge. The application’s data layers automatically refresh every five minutes so that end-users see the most up-to-date information available. <https://gisweb.fcgov.com/Flood%20Warning>

Several workflows were developed to guide end-user interactions within the solution, which is managed in Geocortex Viewer for HTML5. One workflow allows the user to switch the time period display for the labels. Other workflows allow users to toggle between rain and stream flow gauges, and interpret custom URL arguments. This allows the user to go directly into the site and see stream flows without having to first load rain gauges then toggle to stream flows.

The Results

The solution is currently being used for public awareness and information. It regularly sees high use during rain events. For example, the month of July 2018 saw approximately 4,600 unique page views.

The citizens of Fort Collins have saved money on flood insurance because of their involvement in FEMA’s CRS program, with an average premium discount of \$703 for those in the FEMA 100-year floodplain. The Dynamic Flood Map solution has helped the City achieve a CRS Class 2 rating, resulting in up to a 40% discount on flood insurance premiums for citizens and businesses, and is one of only seven Class 2 or better rated communities in the United States.



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