Emergency Planning for the Democratic National Convention

THE DRAPP DEMONSTRATES PARTNERSHIP AMONG LOCAL, REGIONAL, STATE, UTILITY AND FEDERAL GOVERNMENTS
FIGURE 6
3D View of Imagery Draped over LiDAR Digital Surface Model (DSM): Cathedral is in foreground, looking southwest toward Capitol. Imagery can be draped over the LiDAR DSM surface to add more detail to three-dimensional landscape models.
When the federal government needed to acquire high-resolution imagery to support emergency preparedness and planning for the 2008 Democratic National Convention (DNC) in Denver, Colorado, it turned to the Denver Regional Council of Governments (DRCOG) for help. DRCOG has led the Denver Regional Aerial Photography Project (DRAPP), a consortium with 50-plus stakeholders, since 2002. As the Metropolitan Planning Organization for the Denver region, DRCOG brings 56 local governments, including towns, cities and counties together to address regional land use and transportation planning issues.

Previous DRAPP efforts in 2002, 2004 and 2006 involved DRCOG’s member governments, partner agencies, the State of Colorado and the United States Geological Survey (USGS). Each project produced one-foot resolution natural color digital orthophotography that met the American Society of Photogrammetry and Remote Sensing (ASPRS) Class I Specifications. DRCOG delivered the imagery on multiple hard drives shared among consortium members, in GeoTiff and Mr. Sid compressed format and in multiple mapping projections. The project area of interest generally ranged between 6,000 and 8,000 square miles.

National security issues associated with the 2008 DNC created new challenges for DRAPP participants working in the public safety arena and required coordination with federal government partners including the USGS and others. The USGS has been a key DRAPP consortium member since 2002 and has used the imagery for The National Map Program. This program acquires up-to-date imagery on a two-year cycle for the 133 Cities Urban Area Project over key metropolitan areas of the United States, which is critical for the U.S. Department of Homeland Security and other agencies for emergency response and preparedness.

In addition to the USGS, the National Geospatial-Intelligence Agency (NGA) required high-resolution LiDAR (Light Detection and Ranging) along with the aerial imagery to support threat mitigation issues associated with the DNC. The USGS Geospatial Liaison for Colorado, Mark Eaton, worked in collaboration with NGA geospatial analysts, with DRCOG’s Geospatial Team Manager, Matthew Krusemark, and with DRCOG’s Customer Resource Support Division Director, Simon Montagu, to come up with the necessary business and technical requirements to meet regional, local and state government needs and to prepare for the 2008 DNC.

The USGS Colorado National Spatial Data Infrastructure (NSDI) Partnership office used this opportunity to collaborate with local partners, especially for acquisition of LiDAR data, which, unlike aerial imagery with DRAPP, did not have a multi-year consortium built around the effort. With NGA paying for the bulk of the cost, the Denver regional GIS community was able to acquire very accurate surface and elevation information for their diverse GIS needs. Many local municipalities are utilizing the LiDAR data to update their base maps and their FEMA Digital Flood Insurance Rate Maps, among other uses.

Additional requirements that made the 2008 DRAPP project unique included higher-resolution six-inch, natural color orthophotography and a 60-day turn-around after initial aerial photo acquisition of an interim photo product. In the past, to meet an ASPRS Class I Specification, DRAPP had not delivered imagery until roughly ten months after initial acquisition. To prepare for the DNC, however, local and federal agencies needed imagery 60 days after acquisition. Due to the time constraints, the DRAPP Consortium decided to acquire ‘interim’ imagery at an ASPRS Class II Specification. This approach secured the imagery well in advance of the DNC event and provided the state, local law enforcement, private utility and federal emergency management agencies plenty of time to incor-
porate the data into their public safety and emergency preparedness systems.

Development of the acquisition requirements for both the orthophotography and the LiDAR projects allowed DRCOG and USGS to work closely together to make sure all the business and technical requirements would be included, so that participants could take advantage of collaborative opportunities and avoid redundancy. Although the LiDAR and imagery acquisition efforts were performed separately, the control that was used to orthorectify the imagery was also used to assure the quality of the LiDAR data. Also, the LiDAR data was provided to the DRAPP vendor, with the potential of enhancing the orthorectification surface model. See Figures 1-6. Both projects benefited from this collaborative effort.

In addition to delivering data on hard drives, DRCOG also served up the 2008 DRAPP imagery to consortium members via an Open Geospatial Consortium-compliant Web Mapping Service (WMS). The WMS was secure, with a username and password required to access the interim imagery. Consortium members could thereby access
imagery immediately using a variety of desktop and server GIS software solutions that would support the consumption of a WMS.

These combined datasets have shown a high level of correlation and accuracy, thus providing two valuable datasets at a very affordable cost to the various stakeholders. The combined cost share between the two projects (USGS National Map Program and the NGA LiDAR data collection) totaled approximately $1.6 million. The acquisition, processing, quality assurance and project management work was performed by five different vendors and managed by DRCOG and the USGS.

The five vendors that performed this work include Bohannan Huston, Inc. (Albuquerque, N.M.) and their subcontractor Surdex Corporation (Chestertown, Mo.) who were contracted to provide digital mapping services and geospatial products in support of the 2008 DRAPP. Technical project management was provided by an ASPRS Certified Photogrammetrist (CP) from Jacobs Engineering (Denver, Colo. office) and final orthophotography product and survey control quality assurance/quality control (QA/QC) was performed by the project’s data acceptance testing (DAT) vendor, IntraSearch, Inc. (Greenwood Village, Colo.). LiDAR acquisition and mapping services for the USGS and NGA and local partners for the DNC.
The combined efforts of both of these projects included over 50 partners all achieving the benefits through collaborative GIS partnerships. The 2008 DRAPP effort and the DNC data acquisition continue to strengthen the relationships and collaborative partnerships among local, state, regional, utility and federal agencies in the Denver metropolitan region. 

**FIGURE 3**
Natural Color Georegistered Imagery: This high-resolution aerial imagery (8-inch pixels) was collected within a few weeks of the LiDAR acquisition, and shows a great level of detail for urban planning and other applications. Although this imagery has not yet been orthorectified (removing “building lean” so that all objects appear as if the observer was directly above), it is geo-registered to allow accurate co-positioning with other geospatial data.

**FIGURE 4**
2-Foot Contours Derived from Bare-earth LiDAR Digital Terrain Model (DTM): These contours were made from the LiDAR DTM and show the utility of the high-resolution LiDAR for urban planning, floodplain mapping, and other applications.

**FIGURE 5**
3D View of LiDAR Digital Surface Model (DSM): Capitol building is in the foreground, looking northeast. The LiDAR DSM surface can be used to visualize the landscape in various software packages that support 3D modeling.