



The Council of State Governments  
Sharing capitol ideas.

## 2010 Innovations Awards Application

**DEADLINE EXTENDED: MARCH 15, 2010**

ID # (assigned by CSG): **10-MW-240H**

**Please provide the following information, adding space as necessary:**

State: **Ohio**

Assign Program Category (applicant): **Infrastructure and Economic Development**

1. Program Name **Office of Aerial Engineering, LiDAR Mapping**
2. Administering Agency **Ohio Department of Transportation**
3. Contact Person (Name and Title) **John Ray, P.E., Administrator**
4. Address **1602 W Broad St, Columbus OH 43323**
5. Telephone Number **614-275-1357**
6. FAX Number **614-275-1673**
7. E-mail Address **john.ray@dot.state.oh.us**
8. Web site Address **<http://www.dot.state.oh.us/Divisions/ProdMgt/Aerial/Pages/HOME%20PAGE.aspx>**
9. Please provide a two-sentence description of the program. **Airborne Light Detection And Ranging (LiDAR) is being used for acquisition of existing ground surface models for design engineering projects. Techniques used for collection and processing have been innovative, thus setting the standard by which other agencies may follow.**
10. How long has this program been operational (month and year)? Note: the program must be between 9 months and 5 years old on March 1, 2010 to be considered. **Program was implemented January 2005 (5 years).**
11. Why was the program created? What problem[s] or issue[s] was it designed to address? **This program was created to allow the Department to develop more accurate ground surface models, as well as the ability to deliver the products in less time.**
12. Describe the specific activities and operations of the program in chronological order. **The program developed in the following order:**
  - a. **Initiated research with The Ohio State University**
  - b. **Acquired hardware and software**
  - c. **Evaluated various LiDAR processing software packages**
  - d. **Determined optimum LiDAR processing software packages**
  - e. **Developed specific data collection procedures**
  - f. **Developed processing techniques**
13. Why is the program a new and creative approach or method? **At the time of implementation, LiDAR had not been used for high accuracy mapping by any other entity. Industry held the belief that LiDAR could not be used for design level engineering projects.**
14. What were the program's start-up costs? (Provide details about specific purchases for this program, staffing needs and other financial expenditures, as well as existing materials, technology and staff already in place.) **Research was performed to determine the best LiDAR unit for our specific needs. The cost of the research was \$1,385,000.00, which included acquisition of the LiDAR unit and the first year of maintenance. Other start-up costs included the purchase of a variety of software packages and two high-end Dell workstations,**

which are estimated at \$30,000.00. Initial staffing requirements consisted of two engineers, which has grown to 3 members, including engineers and a technician. The Dell workstations have been increased to 6 over the past couple of years as well.

15. What are the program's annual operational costs? The average estimated cost of maintenance over the last 5 years for the LiDAR sensor and processing software is approximately \$103,000.00 annually. This does not include maintenance for the aircraft or the HP Servers.
16. How is the program funded? The program is funded through the Department of Transportation.
17. Did this program require the passage of legislation, executive order or regulations? If YES, please indicate the citation number. No
18. What equipment, technology and software are used to operate and administer this program? The primary equipment includes the following: Cessna Grand Caravan (Aircraft), Optech 30/70 LiDAR sensor system, Dell 670 & 690 workstations, 4TB HP Server. Software includes the following: TerraMatch, TerraScan, Microstation, GeoCue, Dashmap, Geopak, and PosPac.
19. To the best of your knowledge, did this program originate in your state? If YES, please indicate the innovator's name, present address, telephone number and e-mail address. Yes. The program originated via a research project with The Ohio State University that was proposed by John Ray.
20. Are you aware of similar programs in other states? If YES, which ones and how does this program differ? No. We are not aware of other DOT's that have similar capabilities.
21. Has the program been fully implemented? If NO, what actions remain to be taken? Yes
22. Briefly evaluate (pro and con) the program's effectiveness in addressing the defined problem[s] or issue[s]. The program exceeded expectations for the vertical accuracy thought possible by industry. Triangulated Irregular Networks (TIN) of the existing ground surface created from LiDAR data has very high accuracy. The vertical accuracy is less than 0.15 feet Root Mean Square Error (RMSE) on a routine basis. Collection and processing of LiDAR data into a TIN is very efficient and allows the Department to be very responsive to emergency or critical concerns such as rock slides or roadway subsidence.
23. Provide tangible examples. How has the program grown and/or changed since its inception? The program has been shaped and developed since its inception into a productive asset for the Department. LiDAR collection and processing techniques have been developed over the last couple of years to yield viable, high accuracy products. The program has increased production of mapping deliverables while increasing vertical accuracy and responsiveness. The program continues to develop as new software becomes available.
24. What limitations or obstacles might other states expect to encounter if they attempt to adopt this program? The biggest obstacle will be acquisition of the hardware required. Hardware is very expensive and the initial cost of the equipment could be a challenge. The second major obstacle will be processing and handling of LiDAR data into a finished product, which is where our experience could benefit others.

CSG reserves the right to use or publish in other CSG products the information provided in this application. If your agency objects to this policy, please advise us in a separate attachment.



The Council of State Governments  
Sharing capitol ideas.

## 2010 Innovations Awards Application Program Categories and Subcategories

Use these as guidelines to determine the appropriate Program Category for your state's submission and list that program category on page one of this application. Choose only one.

### *Infrastructure and Economic Development*

- Business/Commerce
- Economic Development
- Transportation

### *Government Operations and Technology*

- Administration
- Elections
- Information Systems
- Public Information
- Revenue
- Telecommunications

### *Health & Human Services*

- Aging
- Children & Families
- Health Services
- Housing
- Human Services

### *Human Resources/Education*

- Education
- Labor
- Management
- Personnel
- Training and Development
- Workforce Development

### *Natural Resources*

- Agriculture
- Energy
- Environment
- Environmental Protection
- Natural Resources
- Parks & Recreation
- Water Resources

### *Public Safety/Corrections*

- Corrections
- Courts
- Criminal Justice
- Drugs
- Emergency Management
- Public Safety

**Save in .doc or rtf. Return completed application electronically to [innovations@csg.org](mailto:innovations@csg.org) or mail to:**

CSG Innovations Awards 2010  
The Council of State Governments  
2760 Research Park Drive, P.O. Box 11910  
Lexington, KY 40578-1910

### **Contact:**

Nancy J. Vickers, National Program Administrator  
Phone: 859.244.8105  
Fax: 859.244.8001 – Attn: Innovations Awards Program  
The Council of State Governments  
E-mail: [nvickers@csg.org](mailto:nvickers@csg.org)

**This application is also available at [www.csg.org](http://www.csg.org).**