

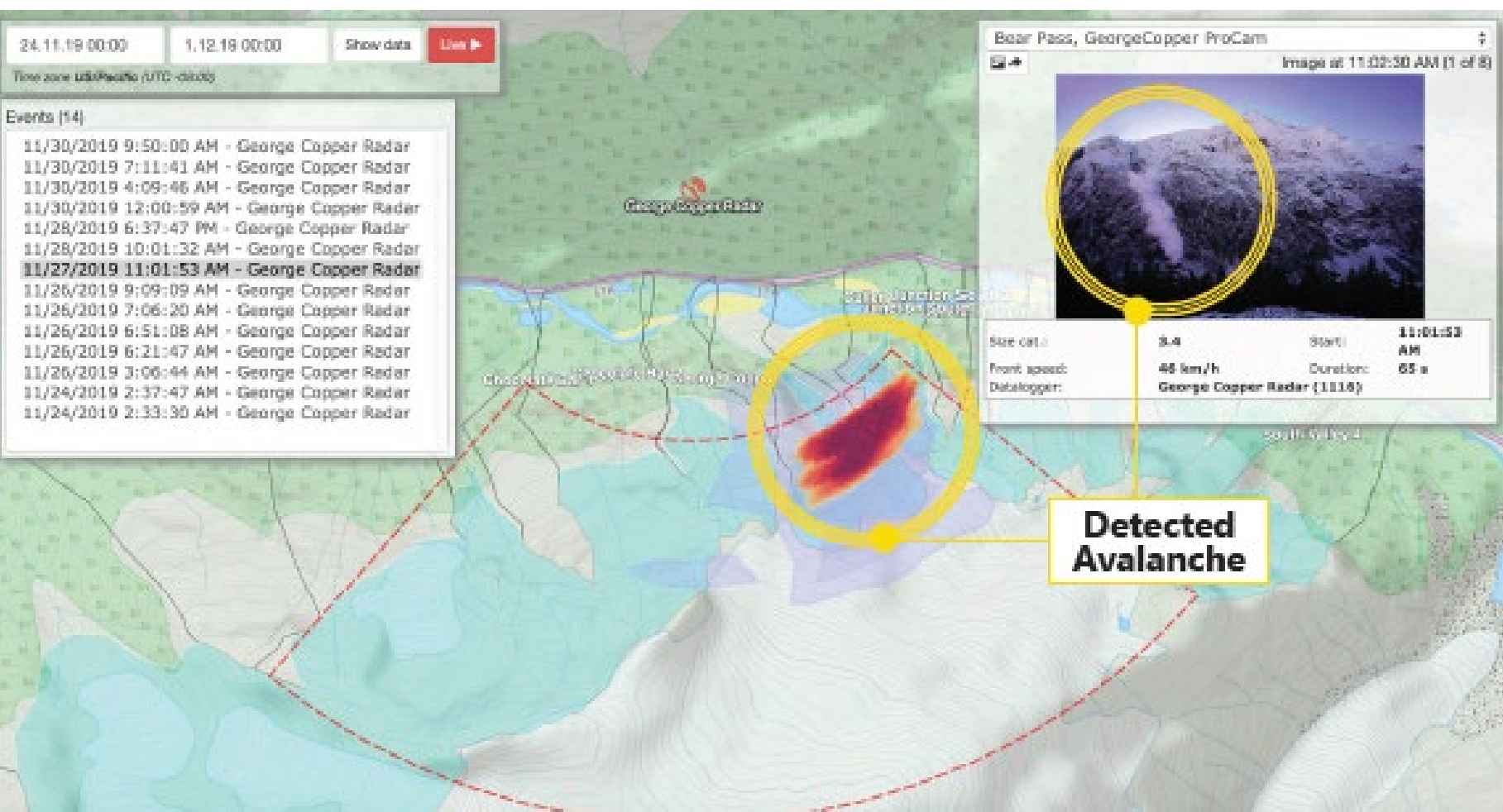
Automated Avalanche Detection System (AADS)

Ian Steele P. Eng. | President and Senior Systems Engineer



CHALLENGE

- To reach Stewart, and other locations further north on the BC-Alaska border, motorists must cross Bear Pass, a 62km stretch of Highway 37A susceptible to frequent avalanche activity. Stewart serves as a border crossing to Hyder, Alaska, and is also home to Canada’s most northern ice-free port. Due to increased traffic and increased reliance on this section of highway, the route is becoming ever more crucial to trade activity. Numerous avalanches impacting the highway occur each winter with natural icefall events occurring year-round.
- Avalanche forecasting, monitoring, activities are critical to maintaining this important road link. Prior to this project, these important activities relied on historical data and manual event reporting. The BC Ministry of Transportation and Infrastructure (MoTI) identified that the highway is closed for approximately 100 hours each year, and operates at a considerable avalanche hazard level for an average of 600-900 hours per winter.

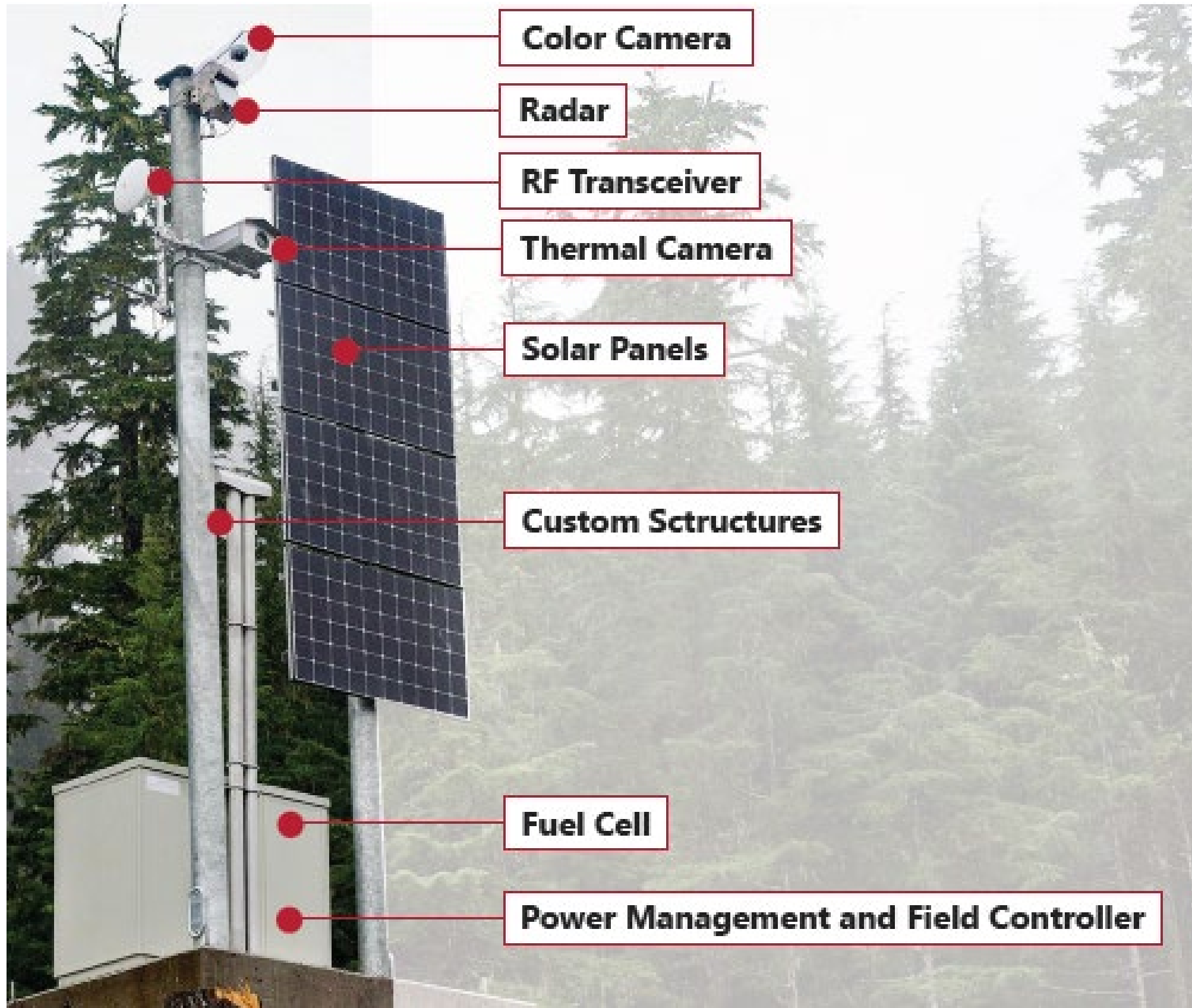


SOLUTION

- Two AADS sites were deployed to monitor high-activity terrain above Highway 37A. The AADS detects the presence of avalanches on the monitored slopes and automatically advises MoTI’s Avalanche Program of the event. Significant research was undertaken to analyze technology options and determine an effective solution.
- The design included systems integration for all components, RF path analysis to ensure reliable communications, multi-source off-grid resilient power supply, and coordination of a multi-disciplinary design team assembled to address the challenges of installing infrastructure in remote, mountainous terrain. The overall system is comprised of the following processes:

- DETECTION**  
Radar and camera system integrated into unique software platform, communicating via robust wireless communication network.
- NOTIFICATION**  
Real-time notification of avalanche events via text and email to maintenance and Avalanche Program staff.
- VERIFICATION**  
Event identification on geo-located area map and visual event verification via camera images. Ability to validate an event’s likely impact before deploying maintenance crews.
- RESPONSE**  
Faster response and dispatch of maintenance crews.
- REPORTING**  
Historical data to support long term forecasting and assessing the effectiveness of artificially-triggered avalanche mitigation work.

INNOVATION THROUGH IMPLEMENTATION



- The system provides automated, timely, and accurate information on avalanche event parameters that are invaluable to support safer and more efficient avalanche response resulting in significant regional benefits, including decreased event response times and road closure durations, as well as increased safety through event forecasting and risk assessment. Because of the proven effectiveness of the AADS, MoTI is considering expanding the system to monitor other high-activity terrain.

August 22-25, 2021 - Virtual Conference  
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Ministry of Transportation & Infrastructure

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