TxDOT Innovations and Technology Deployment Briefs

Snowplow Operations Management System

PROBLEM

The TxDOT Districts send a fleet of approximately 700 snowplows, and their operators, to remove snow and ice during winter storm events, making the highways and streets safe for the traveling public, emergency responders, and other roadway users. These snowplow operators work long hours in cold and dangerous conditions and without continuous communications with the operation managers in the office.

SOLUTION

Equip the snowplows with sensors, cameras, and tablet devices to provide snapshots of roadway conditions every 2 minutes with corresponding GPS coordinates. The District worked with the research team at The University of Texas at Arlington and TxDOT Fleet Operations Division and together determined the best placement for these cameras and tablets within the trucks for safety and ease of operation to send high-quality images to the website. The equipment is an 8-inch tablet cellular device containing the application. If a snowplow is moving 5 mph or faster, the cameras take a picture every 10 minutes and upload that picture along with temperature data and GPS location. These data go to the website and overlay an ARCGIS map. The user in the office can then select a location from the map. Snowplow operators received training for equipment use.

BENEFITS

Using the real-time data from the snowplows enables Fleet Operations to allocate resources accordingly by moving equipment, materials, and personnel to areas efficiently and effectively. It also allows real-time decision-making from the command center. The snowplow operations management system has flexibility, scalability, and is upgradable to integrate with existing TxDOT software and technologies. For example, photo frequency is adjustable to meet existing conditions, such as every hour or on-demand.

KEY TASKS

- Identify District needs and most useful approach.
- Determine data needs and collection methods.

PROJECT DELIVERY

CUSTOMER FOCUS

FOSTER STEWARDSHIP

PRESERVE ASSETS

OPTIMIZE PERFORMANCE

PROMOTE SAFETY

VALUE EMPLOYEES

Texas Department of Transportation

District: Wichita Falls **December 2022**

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Snowplow Operations Management System

- Identify available existing software and technology.
- Equip snowplows with sensors, cameras, tablets, GPS, and other associated technologies.
- Conduct field trials to test equipment and interface with command center.
- Provide training for snowplow operators and other associated personnel.
- Make cost-effective decisions using real-time data to allocate equipment and personnel to areas of need.

DATA SOURCES

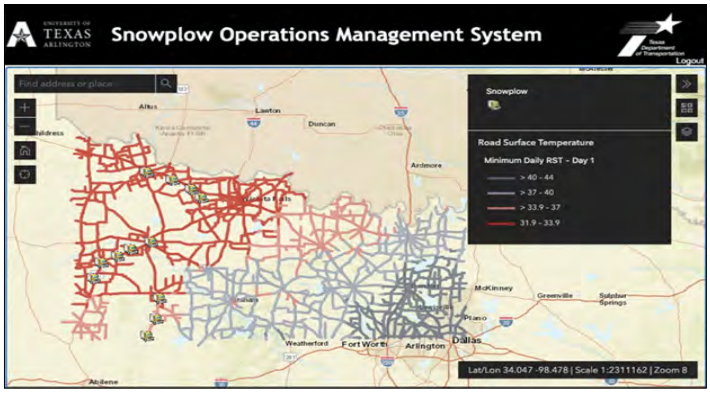
- Sensors upload to GIS-based operations management system:
  - Minimal depth surface temperatures.
  - Air temperatures.
  - Humidity.
- Cameras: Site-specific view of roadway.
- GIS maps: Data received from trucks uploads to command center maps.

PROACTIVE APPROACH

It is important to take a proactive approach when relaying information regarding severe weather conditions. Being able to transmit real-time data to Fleet Operations enables them to allocate equipment and personnel to the most needed areas to provide for the safety of the traveling public.

Instrumentation inside vehicle.

View of data from system.



Map showing road surface temperatures.

View of roadway from snowplow cameras.

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