Using AI on State-wide Imagery for Safer Roadways

Rick Wallace
Government Sales and Partner Program Manager
About Vexcel
30 years of photogrammetric excellence

Global leaders in **aerial imaging**, providing **best-in-class aerial cameras**, a dedicated **aerial fleet**, and the **largest aerial imagery and geospatial data program** in the world.

**Vexcel Imaging**
Designs and builds the market-leading UltraCam sensors and all-in-one aerial photogrammetry software.

**Vexcel Fleet**
Collects aerial data utilizing dedicated aircraft equipped with various camera sensors.

**Vexcel Data Program**
The most comprehensive and accurate library of aerial content in 30+ countries.
Nationwide coverage: Existing U.S. Footprint of 7.6 million km²

Largest collection of its kind with:
✓ Unmatched accuracy
✓ High-resolution aerial imagery
✓ Consistency across imagery

Ongoing cadence
Urban & rural collections
99.6% U.S. population
127 million U.S. households
2024 U.S. Collection Plan Total: 4.4 million km²

- 4.4 million km² total collection plan
- 1.4 million km² of cities at 7.5cm
- 93.1% U.S. population coverage
- Up to 3 collections in urban areas
- 4x more coverage than competition
- Urban and rural coverage
- 120 million U.S. households
- 3 million km² at 15cm
Products & Accuracy

Edwards Air Force Base, CA
Photogrammetry + ground survey points = High level of quality & accuracy

Built for AI

Industry-leading camera and remote-sensing devices

Specialized fleet of ~100 aircraft dedicated to program imagery capture

Consistent image and metadata capture specifications

Flexible delivery and licensing models

In-house data ingest and processing
Positional Accuracy

- Data is matched against professional-grade ground control points (GCPs) 17,683 in U.S.
- Pixel-to-data match across multiple mapping-grade products and derivatives
- Datasets meet ASPRS accuracy standards for appropriate class of each product

High Quality

- Stringent collection spec (sun angle, no clouds, no fog, etc.)
- World-class imagery processing pipeline
- Optimized for AI and ML applications
- Up to 16x finer resolution than the best satellite imagery available in U.S.
Elements: AI-derived products at scale

Properties & Buildings
- 40+ building & property attributes
- Footprint, roof condition, solar panels, hardscapes, defensible space, pools, and more
- 100 million properties in U.S.; buildings in 30+ countries

Damage Assessment
- Wildfires, hurricanes, tornadoes
- Post-disaster analysis on impacted properties
- Compare pre- and post-disaster imagery

Roadways
- Automated insights on non-highway roads in 3,389 cities
- 30+ features: infrastructure & pavement markings
- Assess inventory, condition, safety analysis
Elements - Roadway
Access 30+ automated insights for inventory and condition review to help make roads safer

Pavement Markings
• Crosswalks & crossing distances
• Bicycle symbols & markings
• Arrows
• Street text
• Stop and yield lines

Infrastructure
• Pedestrian refuge islands
• ADA truncated domes “curb mats”
• Roundabouts

Condition Assessment
• Pavement marking quality score for prioritizing maintenance

Available for current and historical imagery
Elements: Roadways
Access 30+ automated insights for inventory and condition review to help make roads safer

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Available for current and historical imagery
# Roadway Inventory for Greensboro, NC

## Detected Roadway Inventory Items

<table>
<thead>
<tr>
<th>Category</th>
<th>Name</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arrow</strong></td>
<td>Lane reduction arrow</td>
<td>344</td>
</tr>
<tr>
<td></td>
<td>Left turn arrow</td>
<td>6307</td>
</tr>
<tr>
<td></td>
<td>Left/right arrow</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Right turn arrow</td>
<td>2135</td>
</tr>
<tr>
<td></td>
<td>Straight arrow</td>
<td>4464</td>
</tr>
<tr>
<td></td>
<td>Straight/left arrow</td>
<td>219</td>
</tr>
<tr>
<td></td>
<td>Straight/right arrow</td>
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</tr>
<tr>
<td></td>
<td>Three way arrow</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Uturn arrow</td>
<td>33</td>
</tr>
<tr>
<td><strong>Bicycle</strong></td>
<td>Shared lane (bicycle)</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td>Bicycle symbol</td>
<td>524</td>
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<tr>
<td></td>
<td>green-colored pavement (bicycle)</td>
<td>1</td>
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<tr>
<td><strong>ADA</strong></td>
<td>Detectable curb mat</td>
<td>2939</td>
</tr>
<tr>
<td></td>
<td>Accessibility symbol (wheelchair)</td>
<td>973</td>
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<tr>
<td><strong>Crosswalk</strong></td>
<td>Ladder crosswalk</td>
<td>572</td>
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<tr>
<td></td>
<td>Longitudinal bar crosswalk</td>
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<tr>
<td></td>
<td>Transverse line crosswalk</td>
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<tr>
<td><strong>Intersection-Junction</strong></td>
<td>Solid crosswalk</td>
<td>346</td>
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<tr>
<td></td>
<td>Pedestrian island</td>
<td>152</td>
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<tr>
<td></td>
<td>Roundabout</td>
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</tr>
<tr>
<td><strong>Railroad</strong></td>
<td>Railroad crossing</td>
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<tr>
<td><strong>Stop</strong></td>
<td>Stop line</td>
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<tr>
<td></td>
<td>Yield line</td>
<td>35</td>
</tr>
<tr>
<td><strong>Symbol</strong></td>
<td>Double chevron</td>
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<tr>
<td></td>
<td>Other symbol</td>
<td>13</td>
</tr>
<tr>
<td><strong>Text</strong></td>
<td>BUS text</td>
<td>4</td>
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<tr>
<td></td>
<td>SCHOOL text</td>
<td>159</td>
</tr>
<tr>
<td></td>
<td>STOP text</td>
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<td></td>
<td>ONLY text</td>
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<td></td>
<td>YIELD text</td>
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<td></td>
<td>Other text</td>
<td>121</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td>26,940</td>
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</table>
"Maintaining up-to-date transportation system inventory data is challenging for many DOTs that use tradition field and desktop methods. For our statewide multimodal system inventory project, we teamed with Vexcel to leverage their AI to deliver data, saving substantial time and money. It helped us rapidly collect the road element data for motor vehicle, pedestrian, and bicycle systems in all 48 urban jurisdictions in the state."

- Carl Springer, Chief Data Storyteller at DKS Associates
Asset Inventory: Automated Roadway Feature Extractions
Asset Inventory: Automated Roadway Feature Extractions
Safety & Compliance Assessment

Standard Crosswalks

High Visibility Crosswalks
Accessibility: ADA Curb Ramp Inventory
Vulnerable Road User Inventory: Bike Route Identification

Los Angeles, CA
“Crosswalk and stop line markings, bike symbols and text, and well-maintained colored pavements are important elements of vulnerable road users (VRU) safety. Our organization is excited to work with Vexcel’s high-res imagery and AI-derived VRU features to inventory and identify current condition and better predict product lifecycle and refresh schedules.”

- Robert Dingess, President of the Traffic Marking Manufacturers Alliance (TMMA)
Maintenance: Identify and Prioritize Marking Quality
GIS Ready: Imagery & Roadway Data

Vectorized AI Data
- Polygons: AI Bounding Box Geometry
- Points: Bounding Box Centroids
- Lines: Crossing Distances

Imagery Integrations
- Native integration with Esri platforms
- Map Tile Services
- Platform APIs
Benefits Across Organizations
Data as a Service

State & Federal Agencies

Geospatial Office
Department of Revenue
Dept of Transportation
Dept of Emergency Management
Depts of Environment, Forestry, Agriculture
Department of Public Safety

BENEFITS

▪ Broad coverage
  ▪ Nationwide – urban + rural
▪ Accuracy – matched against GCPs
▪ Refresh rate of imagery
  ▪ Up to 3x annual in major metro areas
▪ Mapping-grade imagery
▪ AI-optimized data
▪ Easy to sustain
▪ Low cost, quick release package
▪ Licensing options
Orthomosaic Imagery Products

**TrueOrtho & Oblique**
- No building lean or seamlines; color balanced; top-down
- Urban area collection
- Insight for rooftops and property surroundings
- 7.5cm resolution

**Urban Ortho**
- Straight-down aerial view
- Urban area collection
- Increased frequency, greater currency in U.S. urban areas
- 7.5cm resolution

**Wide Area Ortho**
- Straight-down aerial view of buildings, parcels, and farmlands
- Urban and rural collection
- Insight for rooftops and property surroundings
- 15-20 cm resolution
**3D Cities**

Explore and build with detailed 3D data in more than 60 major metro areas around the world

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**Ready-made 3D models**
- Immerse yourself in photo-realistic models of major urban areas
- Take 3D visualization to the next level with ready-made models

**60+ cities at scale**
- Go beyond skyscrapers and city centers in places like Los Angeles, Tokyo, London, Berlin, Sydney, and more
- Get access to large areas, hundreds to thousands of square kilometers
- See more than 60 major metro areas across 4 continents

**Easy integration**
- Access data built as textured mesh and packaged in 3D Tiles OGC Community Standard created by Cesium
- Adapt, integrate, and interact with data across popular platforms

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Austin, TX | 3D Model
Learn how to use these analytics and aerial imagery for your projects

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