

# Quality Assessment of Roads in Colorado Based on Satellite Imagery

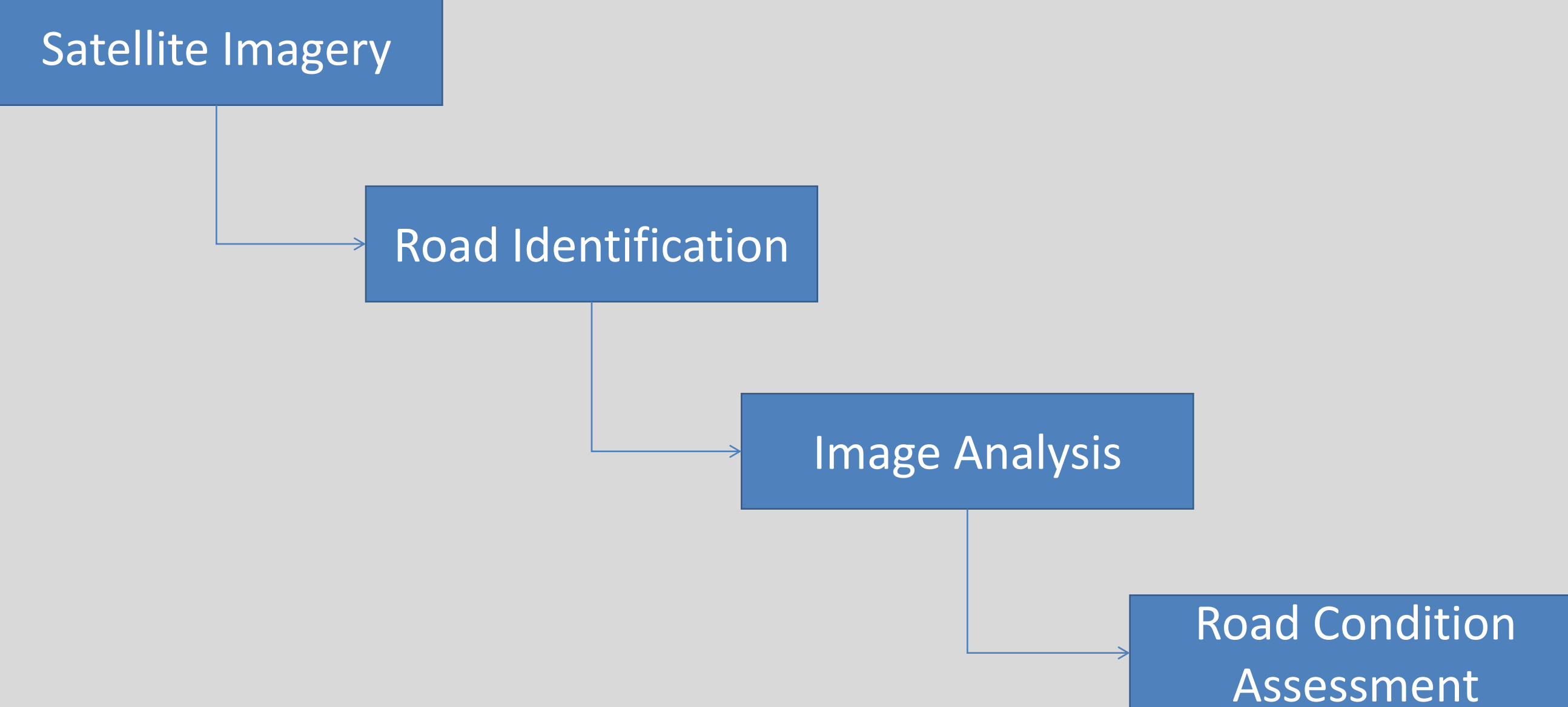
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## Introduction

Road condition surveillance is a tedious task which requires manual inspection of thousands of miles of road length.

Our study has determined that an automated satellite remote sensing based method can be established for this task. We are now working towards designing and developing such a solution.

Our proposed approach can be summarized as:



### Image Acquisition:



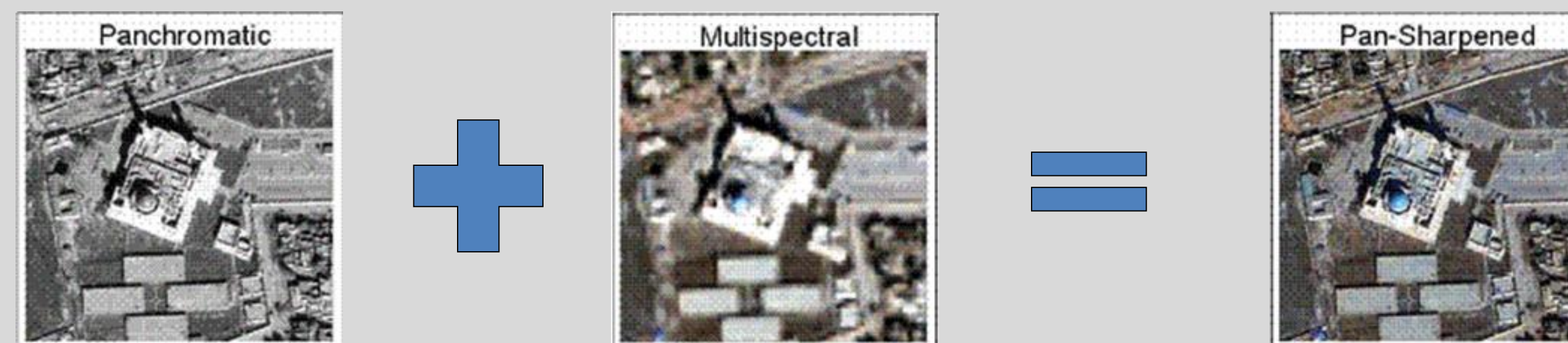
**DigitalGlobe, Inc.** is our research partner and they provide us with high resolution satellite imagery of Colorado. This forms the starting point for our research.

**Left:**  
WorldView-2:  
A remote sensing satellite owned and operated by DigitalGlobe, Inc.



## Methodology

### Image Pre-processing



We have:

~0.5 m resolution panchromatic imagery (1 band, Grayscale)

~2 m resolution multispectral imagery (8 bands, Color)

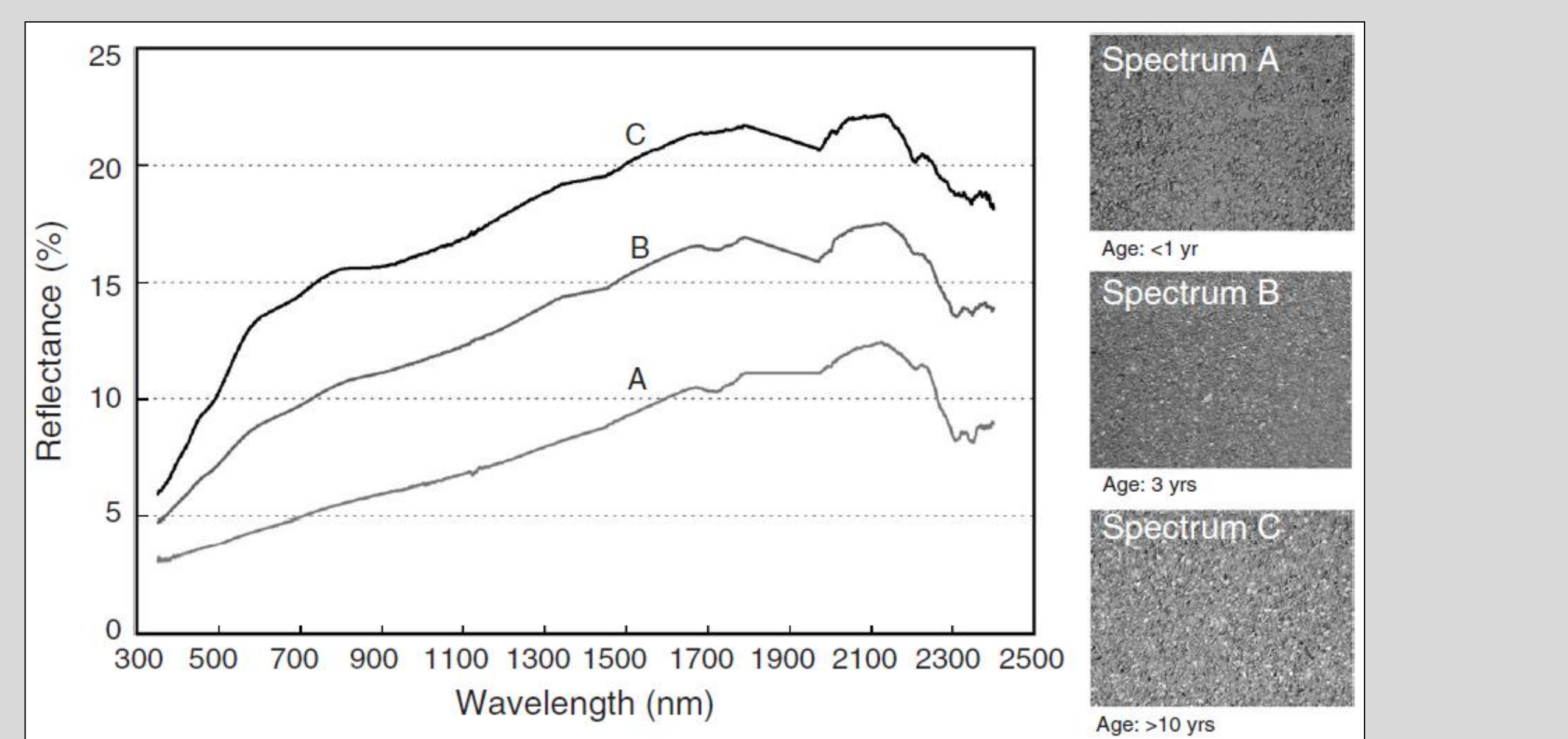
We create: **~0.5 m resolution color images (Pan-sharpened)**

- Helps in retaining 8 bands of information at high resolution
- Helps automatically identify asphalt better

### Road Identification

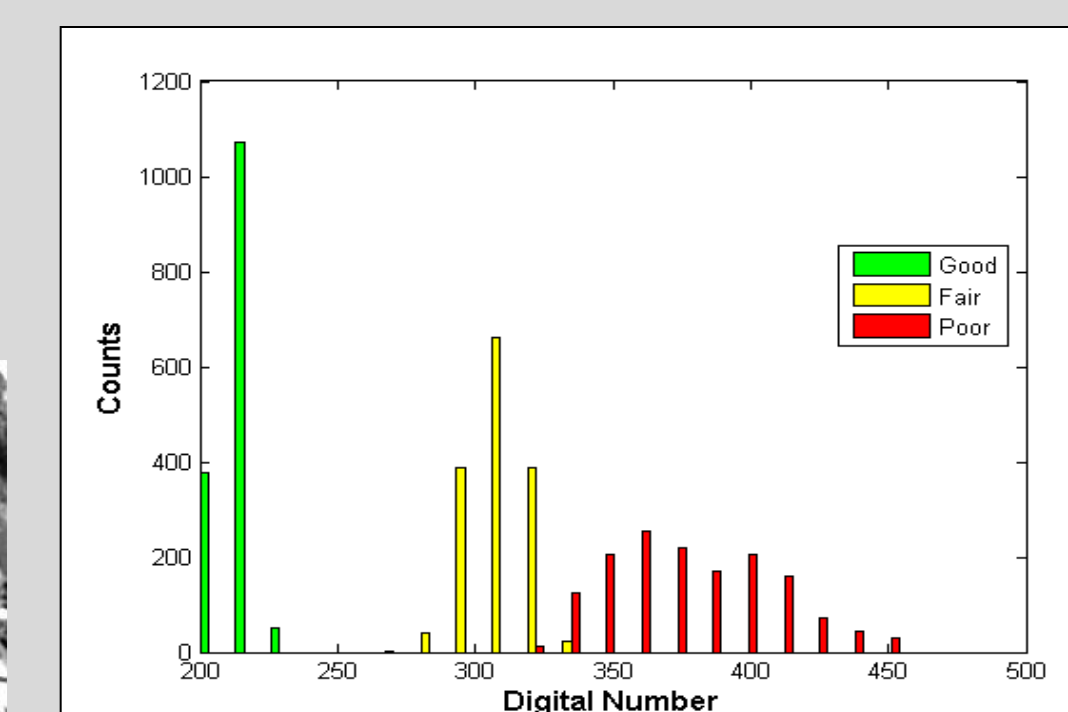
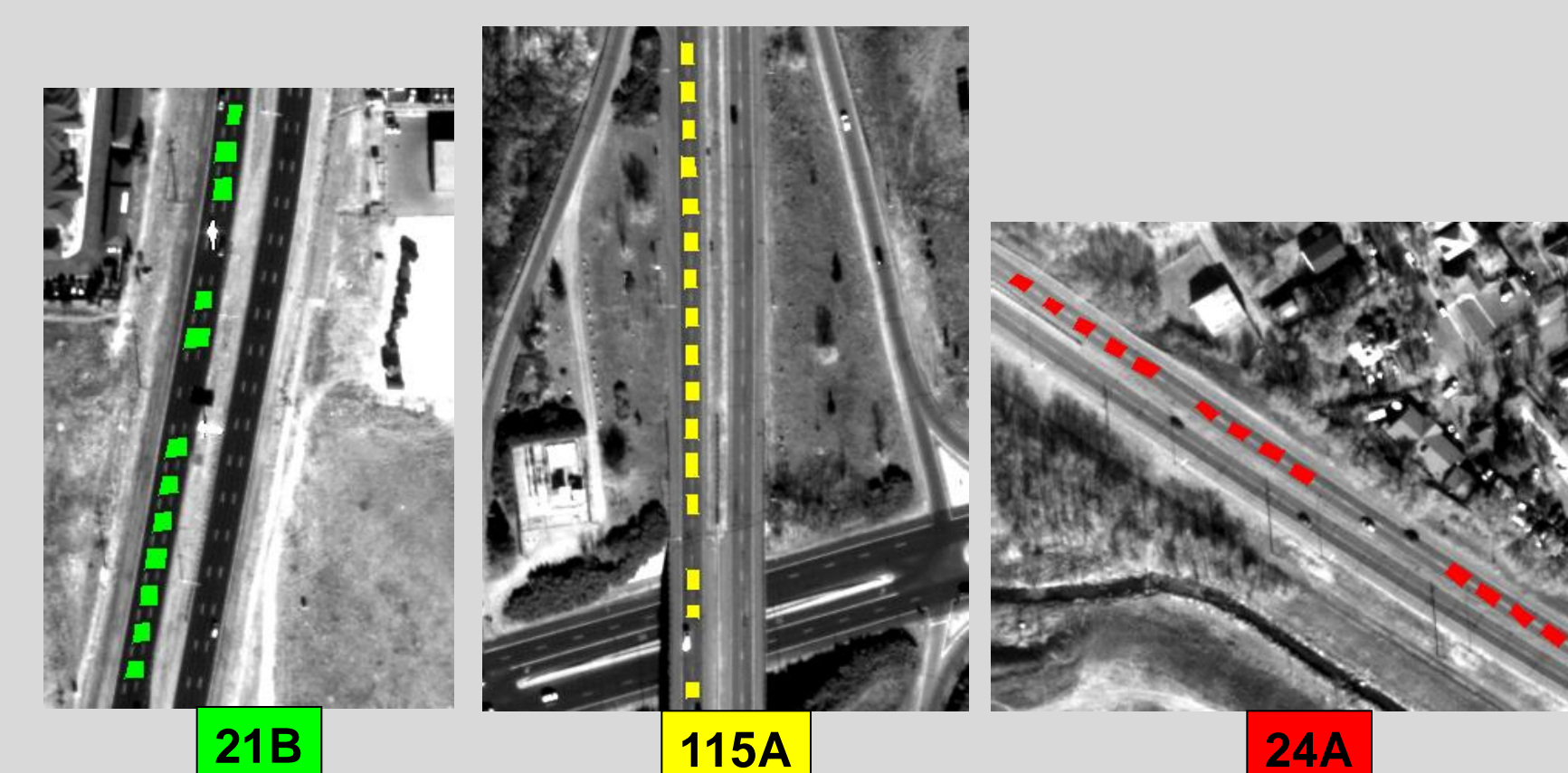


### Road Analysis



Courtesy: M. Herold (2007)

### Example: Digital Numbers



	Good	Fair	Poor
Mean	214.3	307.7	377.7
STD	5.2	10.3	29.5

## Future Work

### Automation

A big part of the overall goal for this project is to automate the process as much as possible. Keeping a minimal manual effort in the loop will:

- Decrease the cost of road survey and quality assessments
- Increase the speed of these traditionally tedious processes

### Integration

The project is reaching a mature stage where the individual steps have been formulated, performed, and tested.

The next phase of the project will involve putting all these steps together into an integrated application which ingests satellite imagery and outputs a map with the roads highlighted and identified as either 'good', 'fair', or 'poor'.

This is what an output may look like:

