

AUTOMATED COLLECTION AND MEASUREMENT FOR CONSTRUCTION PAY ITEMS

Chul Min Yeum

Department of Civil Engineering
Purdue University



Research Interest

- Structural Health Monitoring
 - Computer Vision
 - Machine Learning
 - Big Data
 - Nondestructive Testing;





- **Automated crack detection**
- **Localization**
- **Large-scale image analysis**
- **Object detection**
- **Drone**
- **Automated documentation**

We want to

Measure Distance

in a safe and efficient way



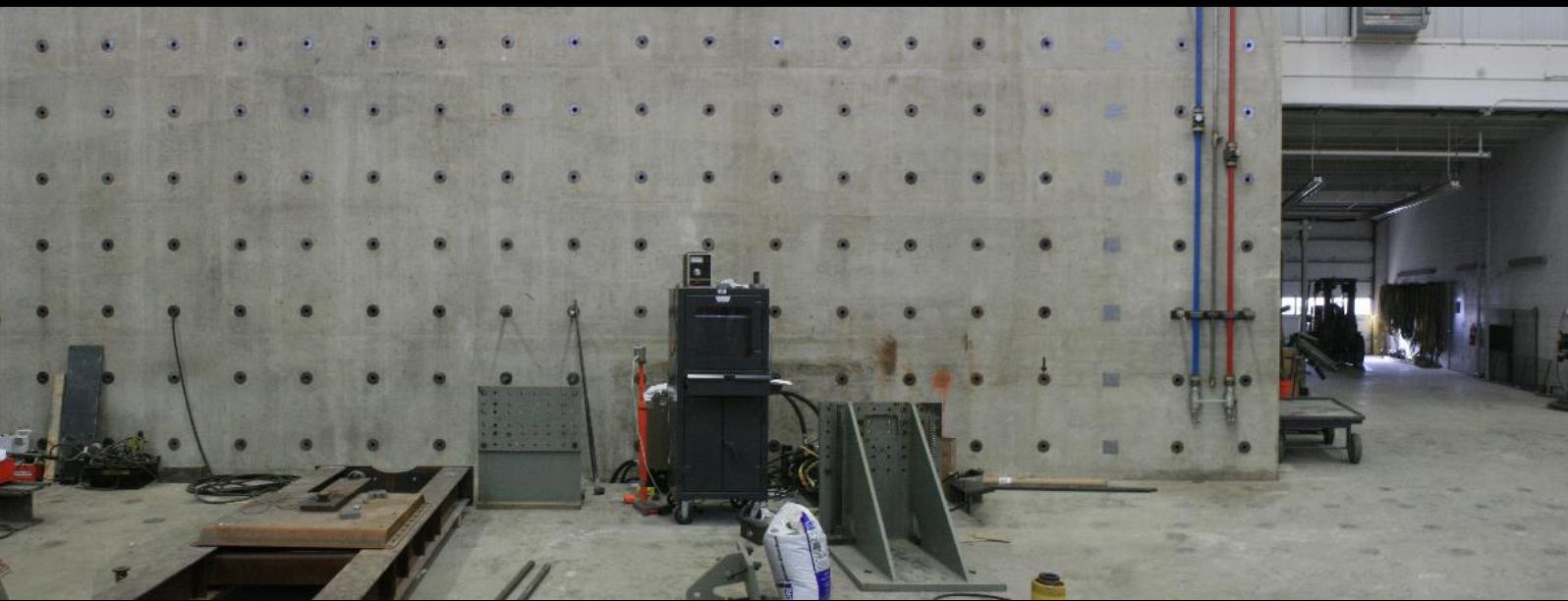
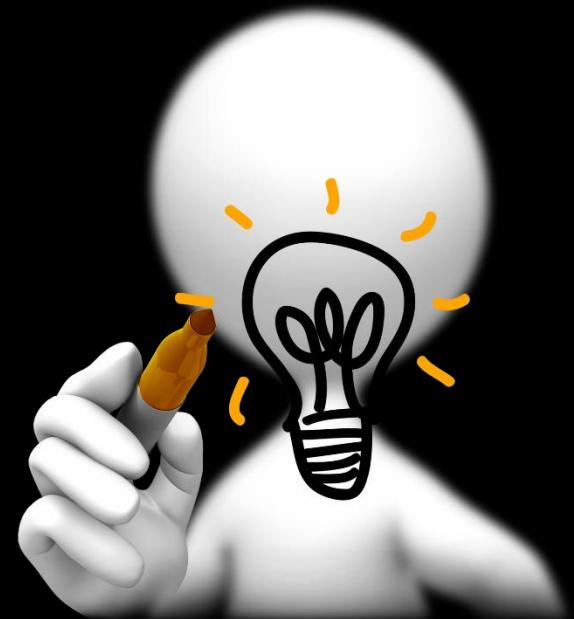
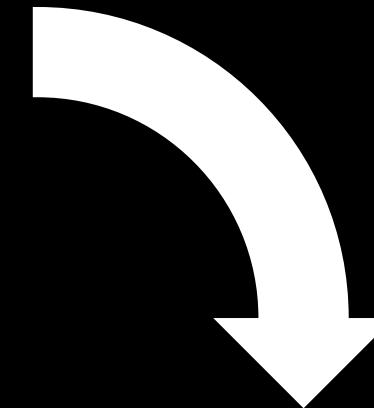


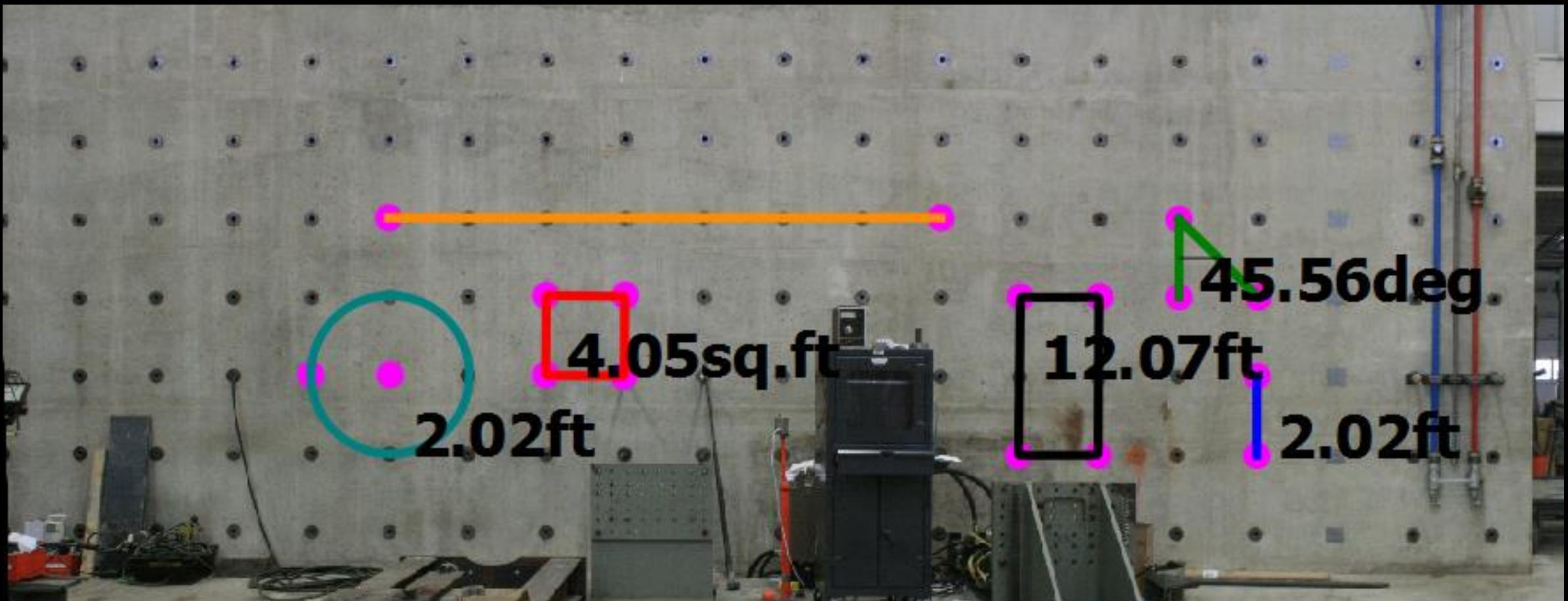












OBJECTIVE

Image-based measurement software

Collection of
images



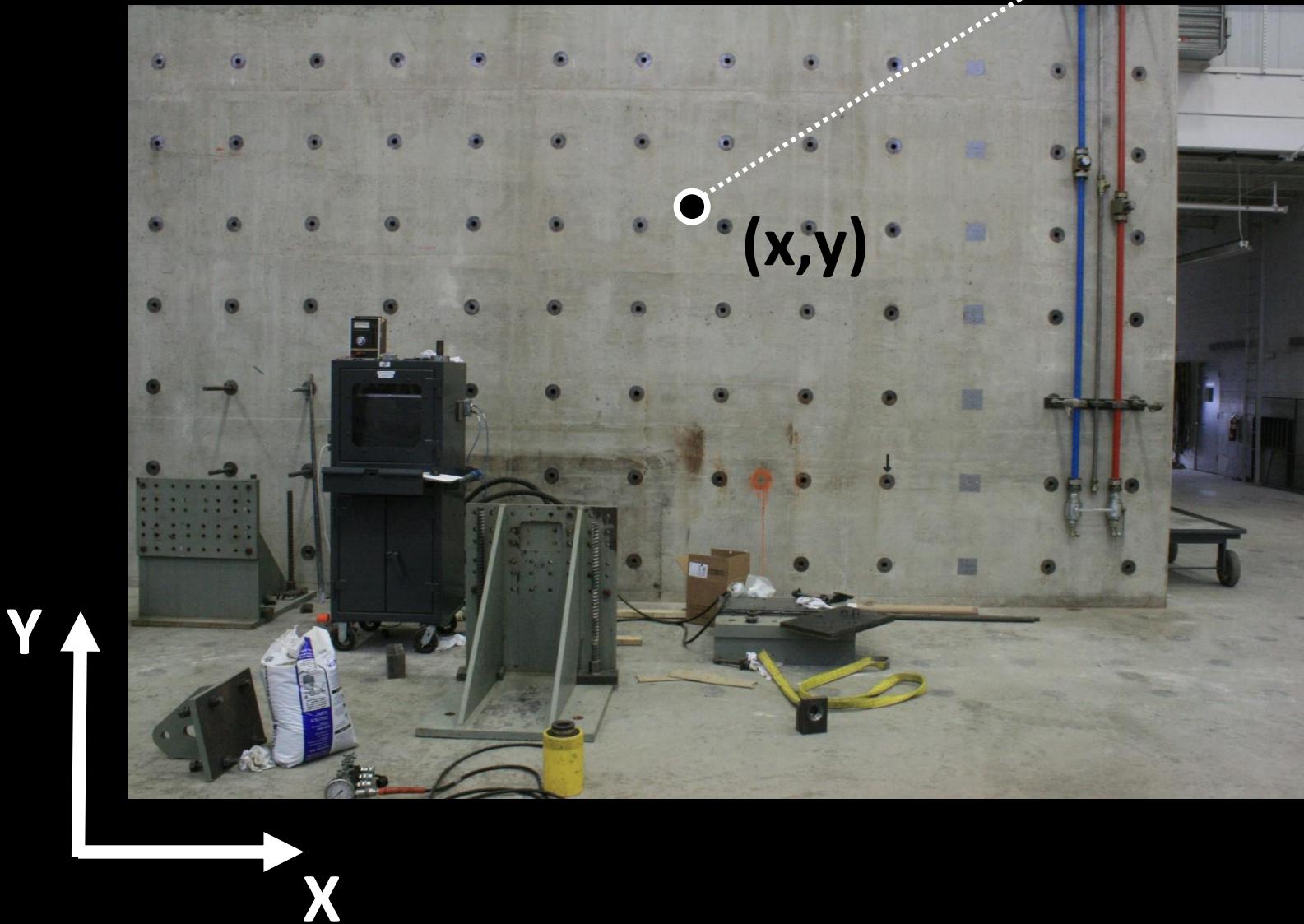
Measurements

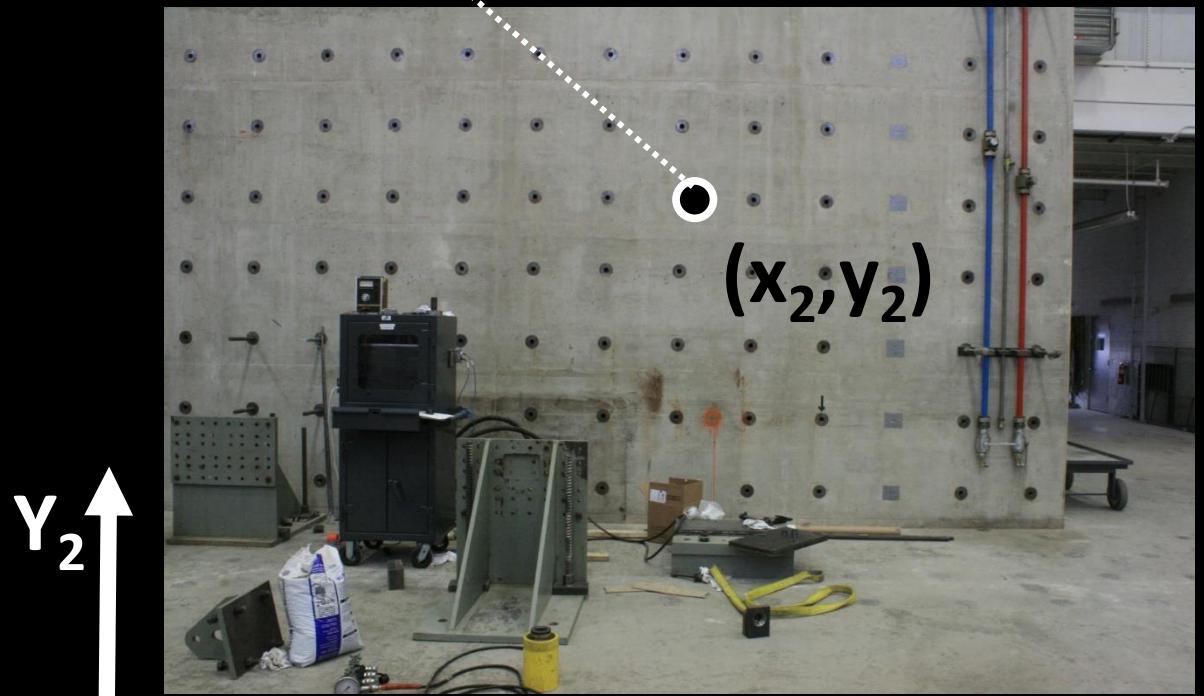
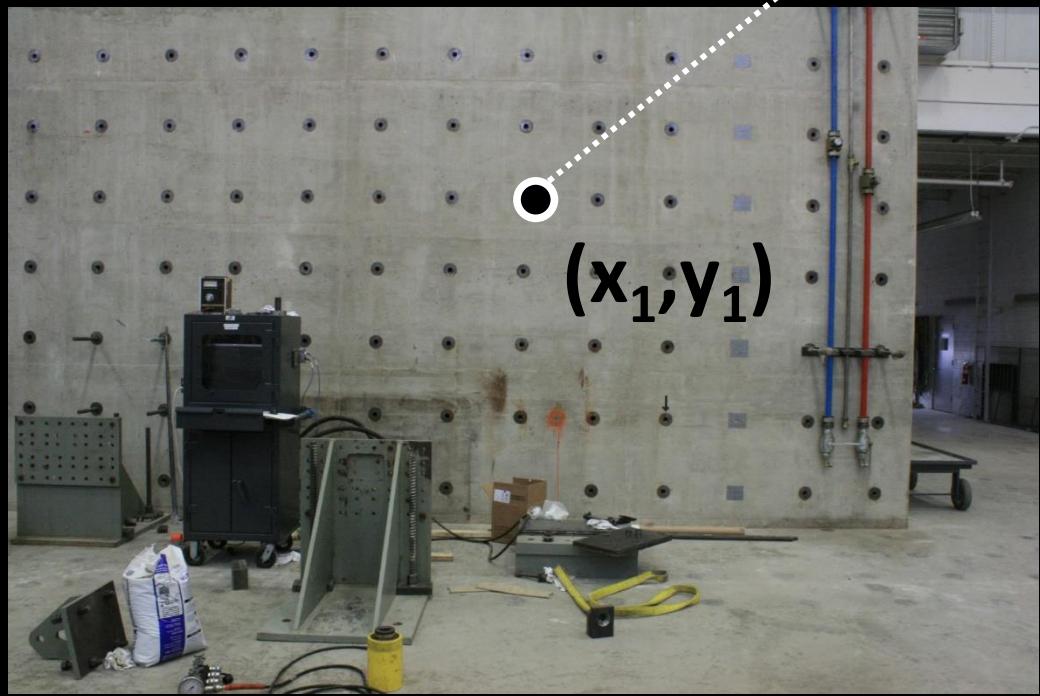
ADVANTAGES

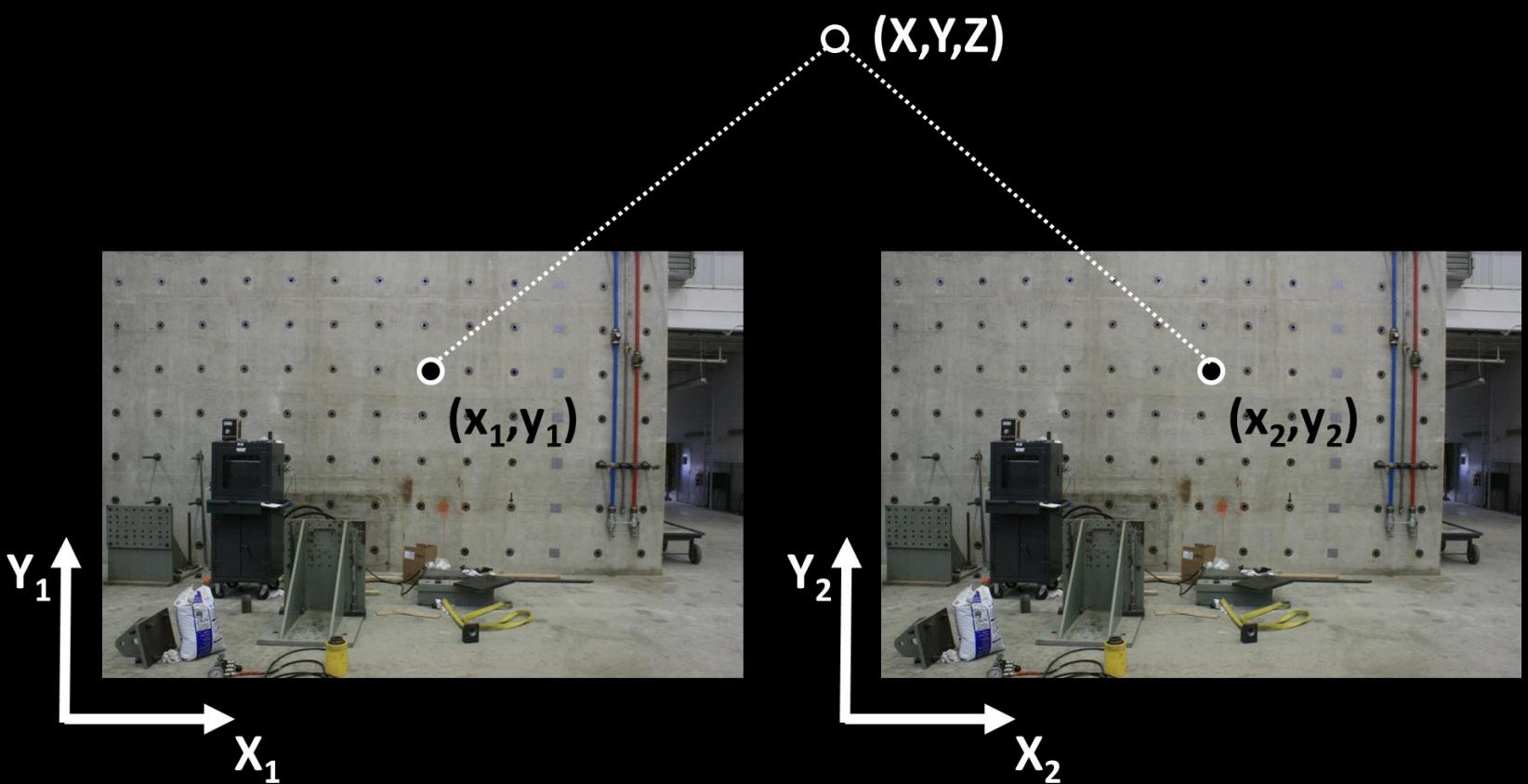
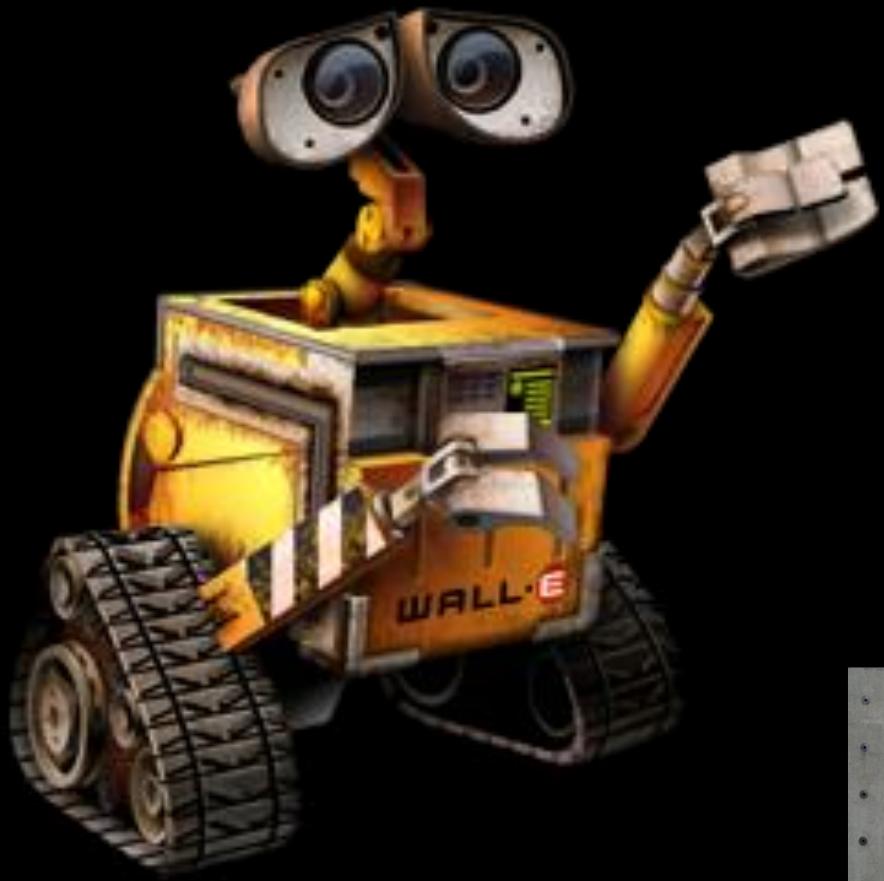
- Safe
- Easy and simple
- Accurate
- Convenient
- Useful

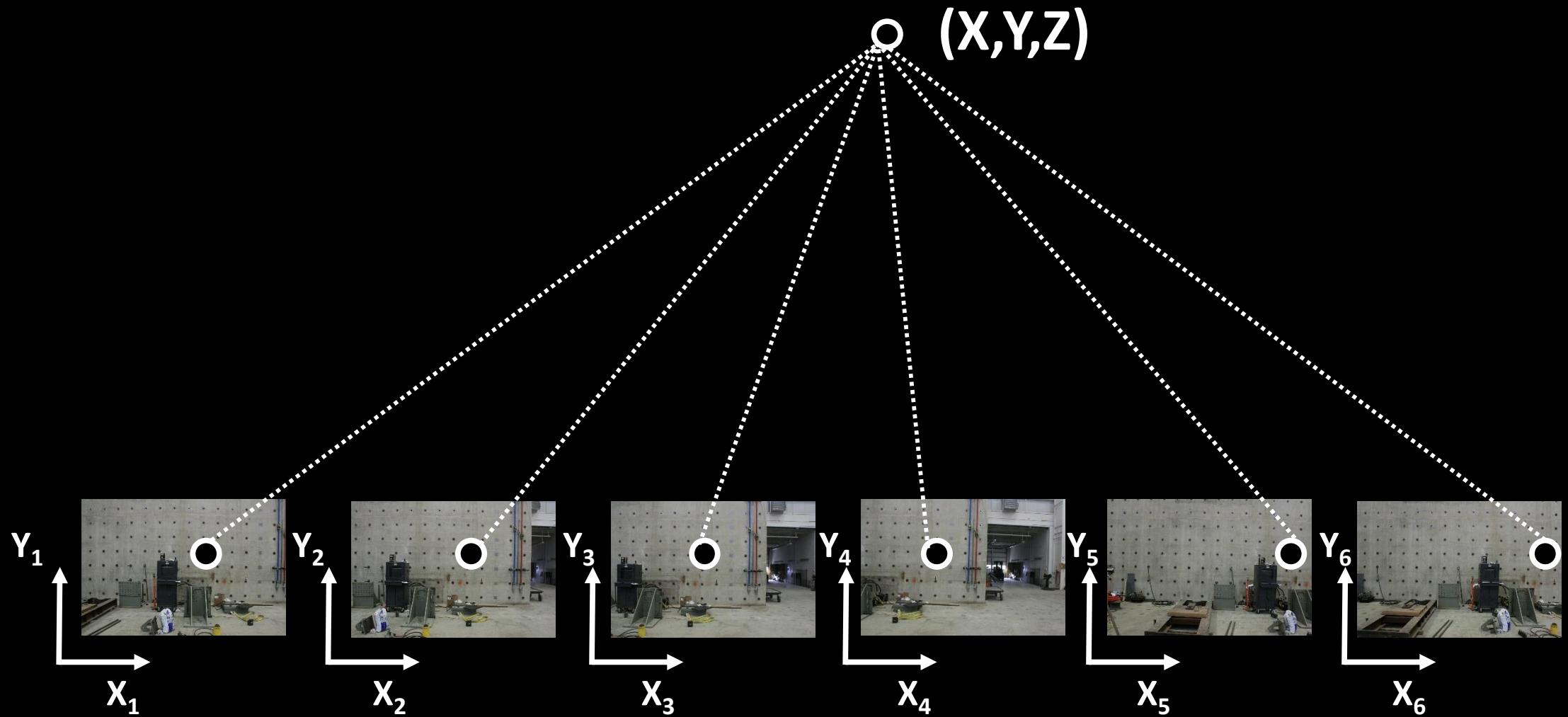
HOW IT WORKS

$O (x,y,z)$



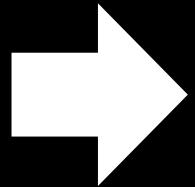








Original Image



Projected Image

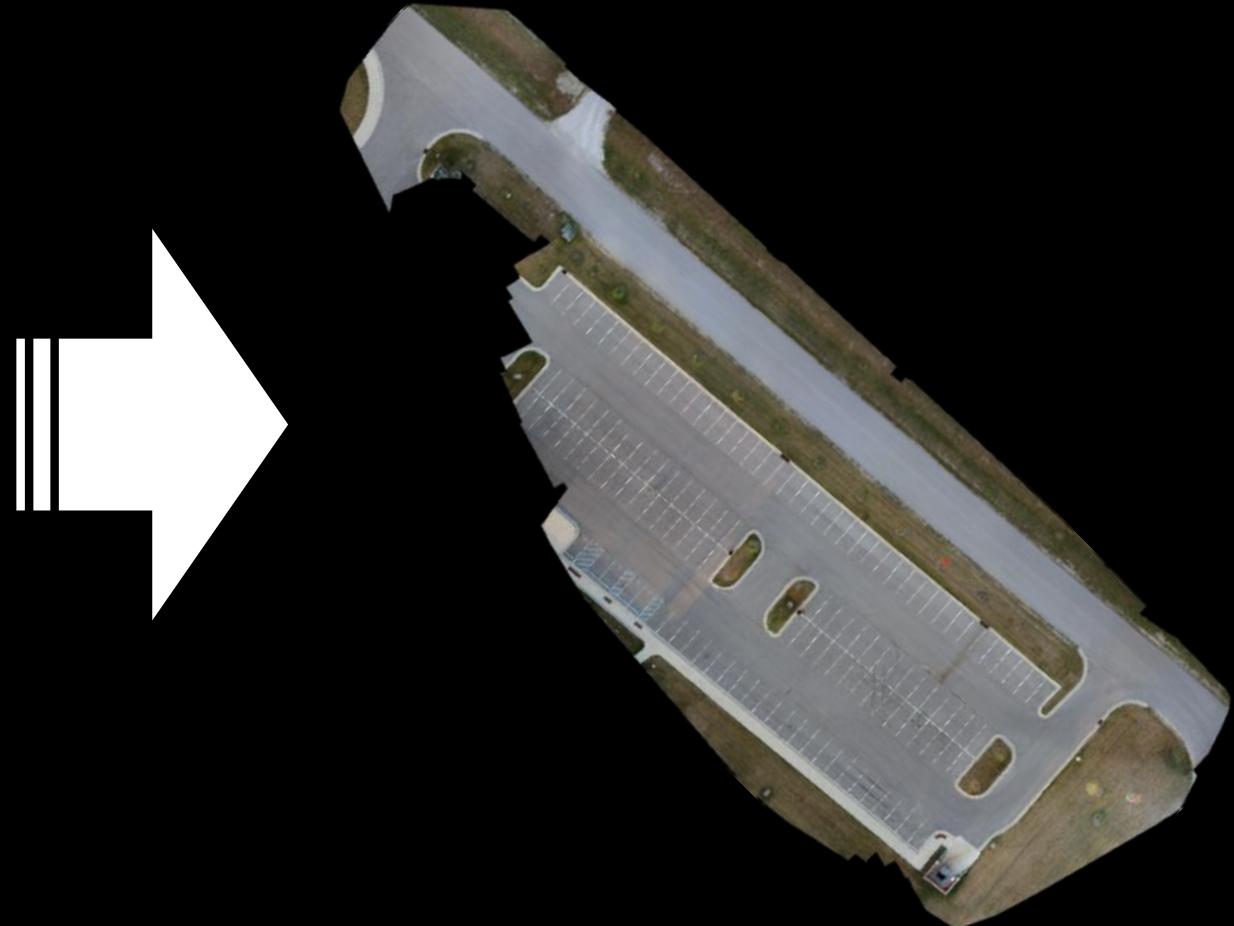
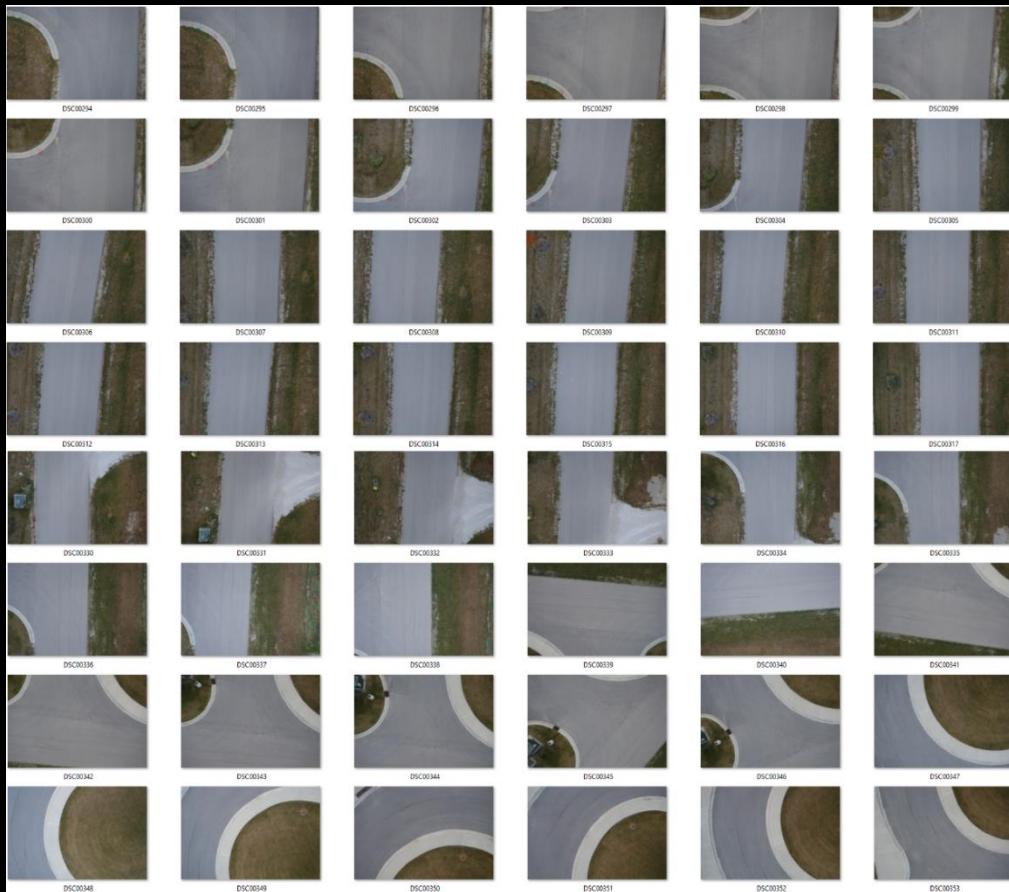
Step 1. Typical Construction Sites for Measurement



Step 2. Image Collection



Step 3. Image Stitching and Blending



Step 4. Measurement using Images

Image processing

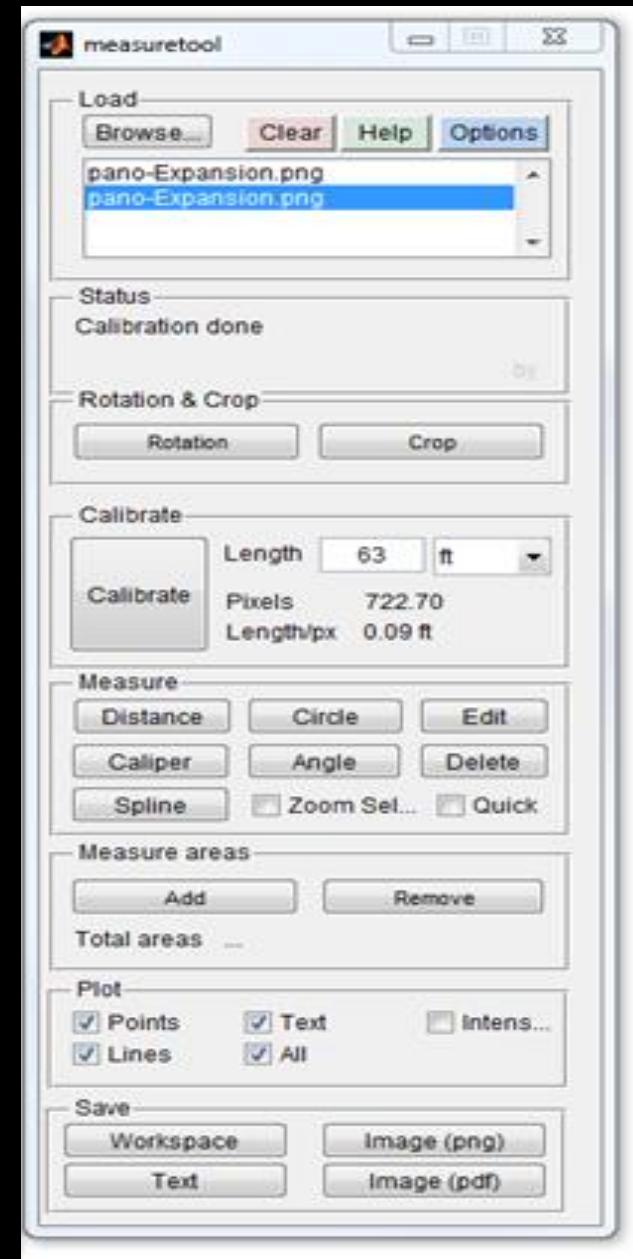
- Picture rotation
- Picture cropping

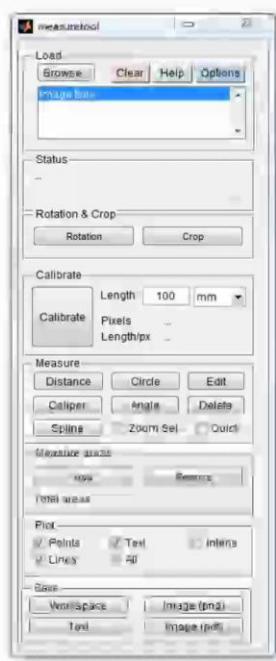
Measurement

- Distance between two points
- Radius (Circle)
- Distance between a line and a point (Caliper)
- Angle between two lines
- Perimeter (linear)

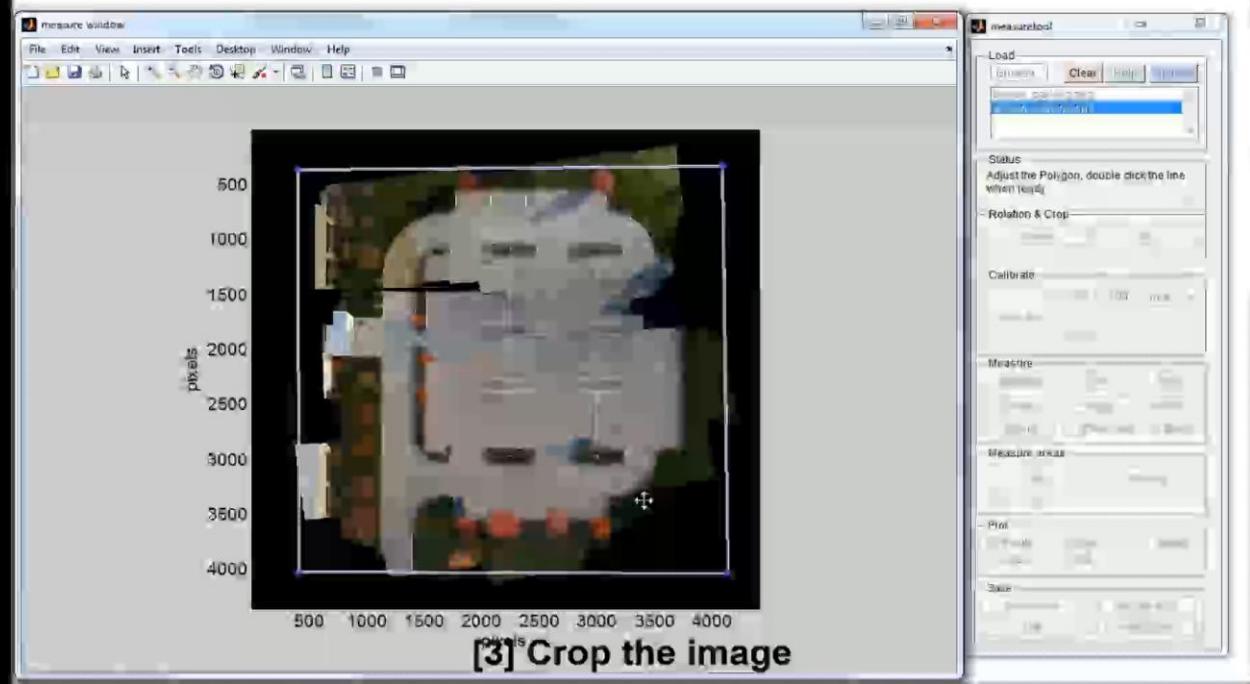
Functions

- Zoom / quick select
- Edit / delete : undo (layer)
- Export as pdf or jpg
- Export as text

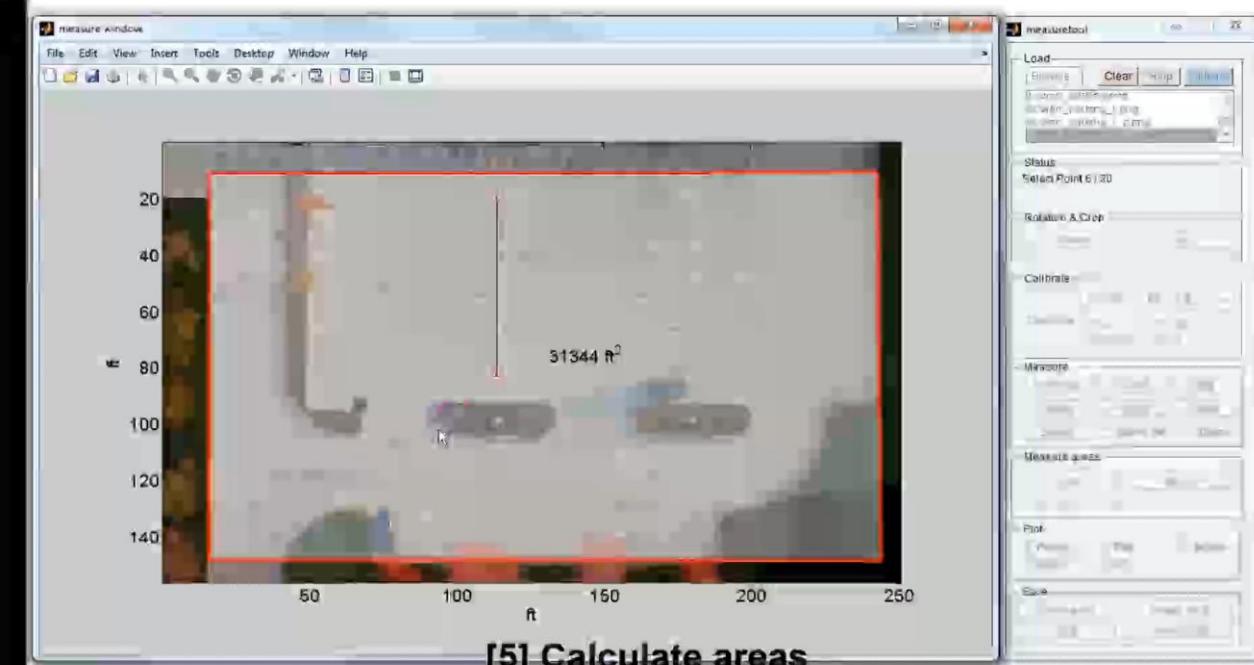




[1] Load an image



[3] Crop the image



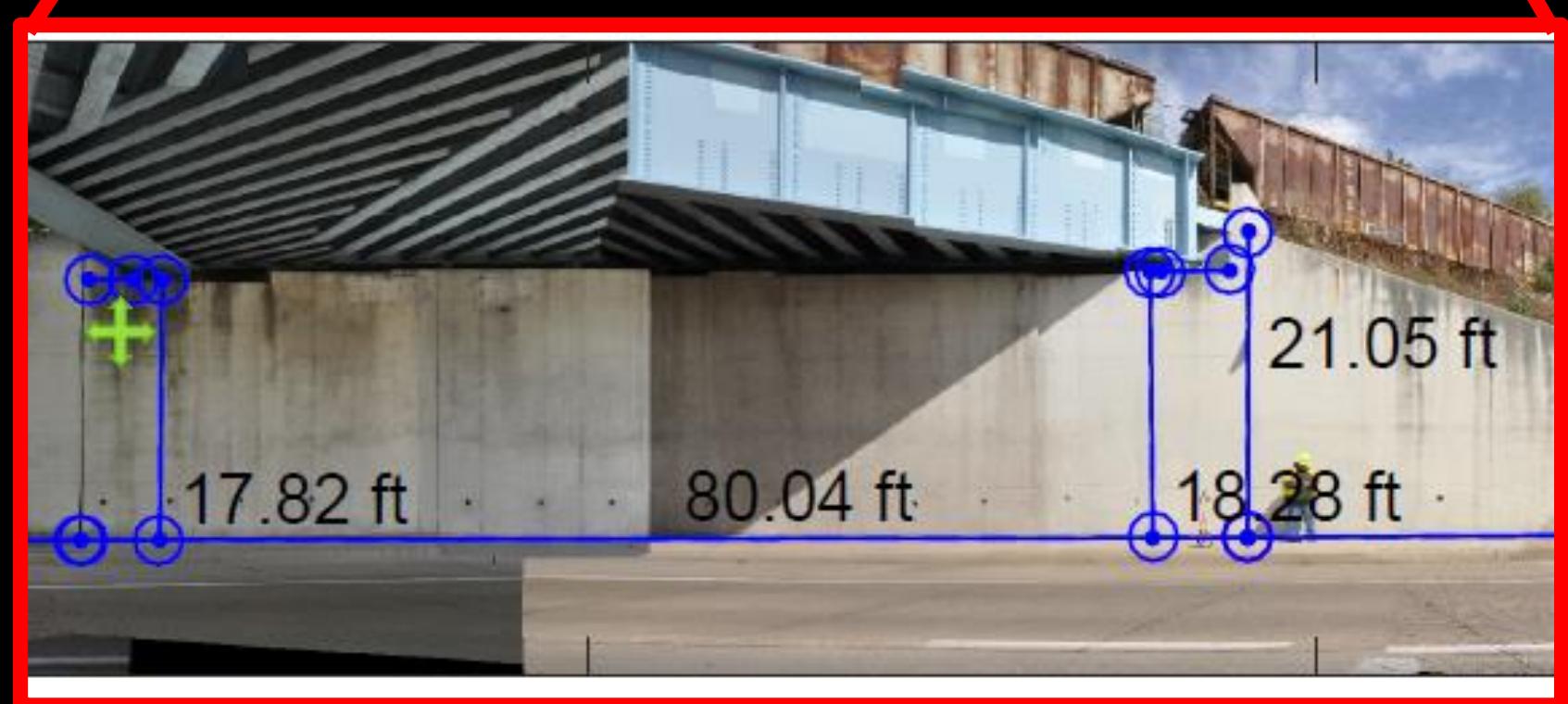
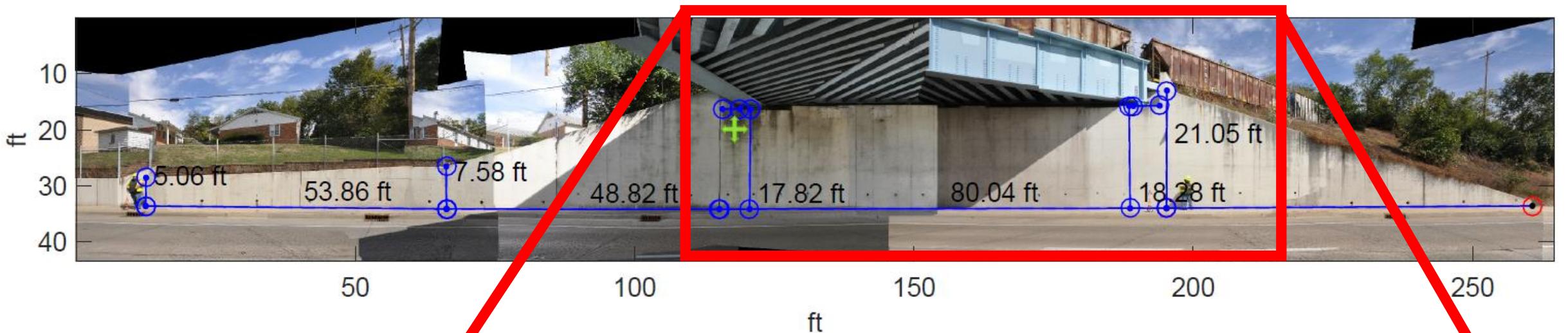
[5] Calculate areas

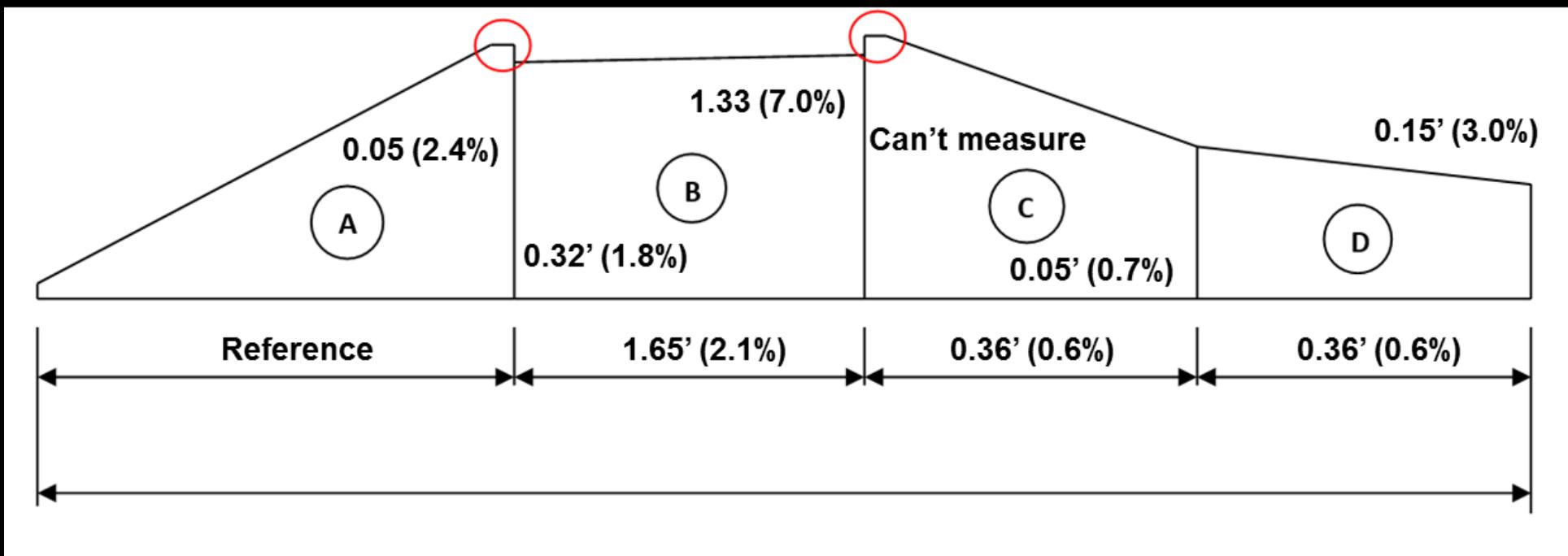
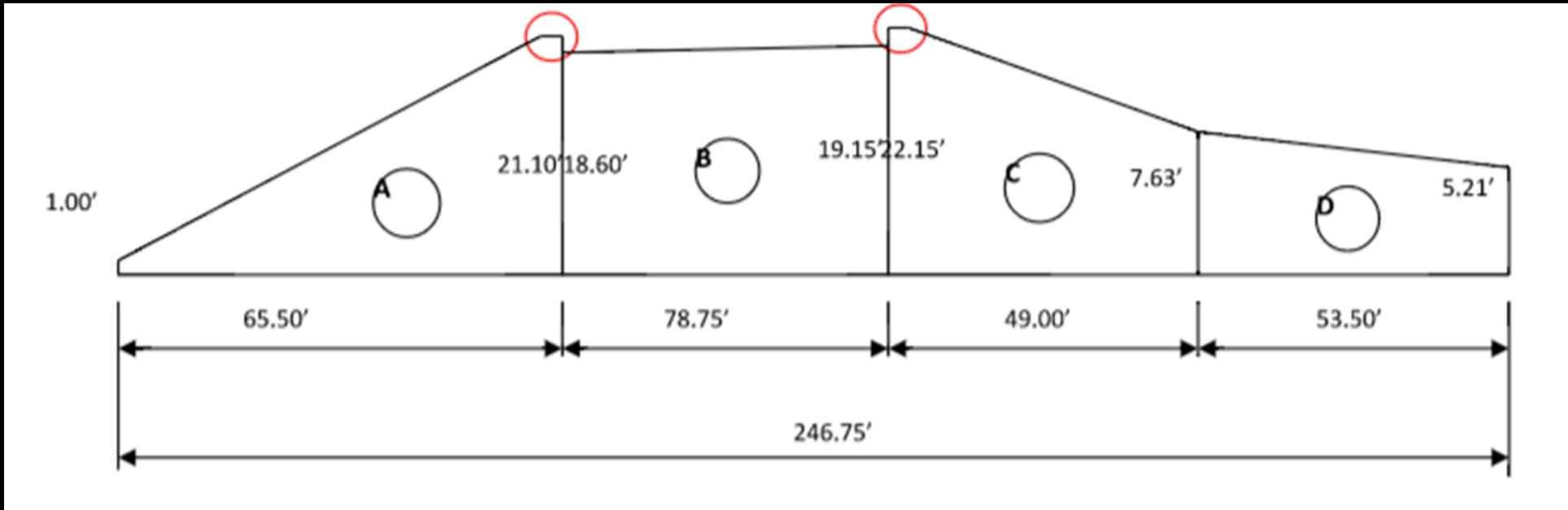


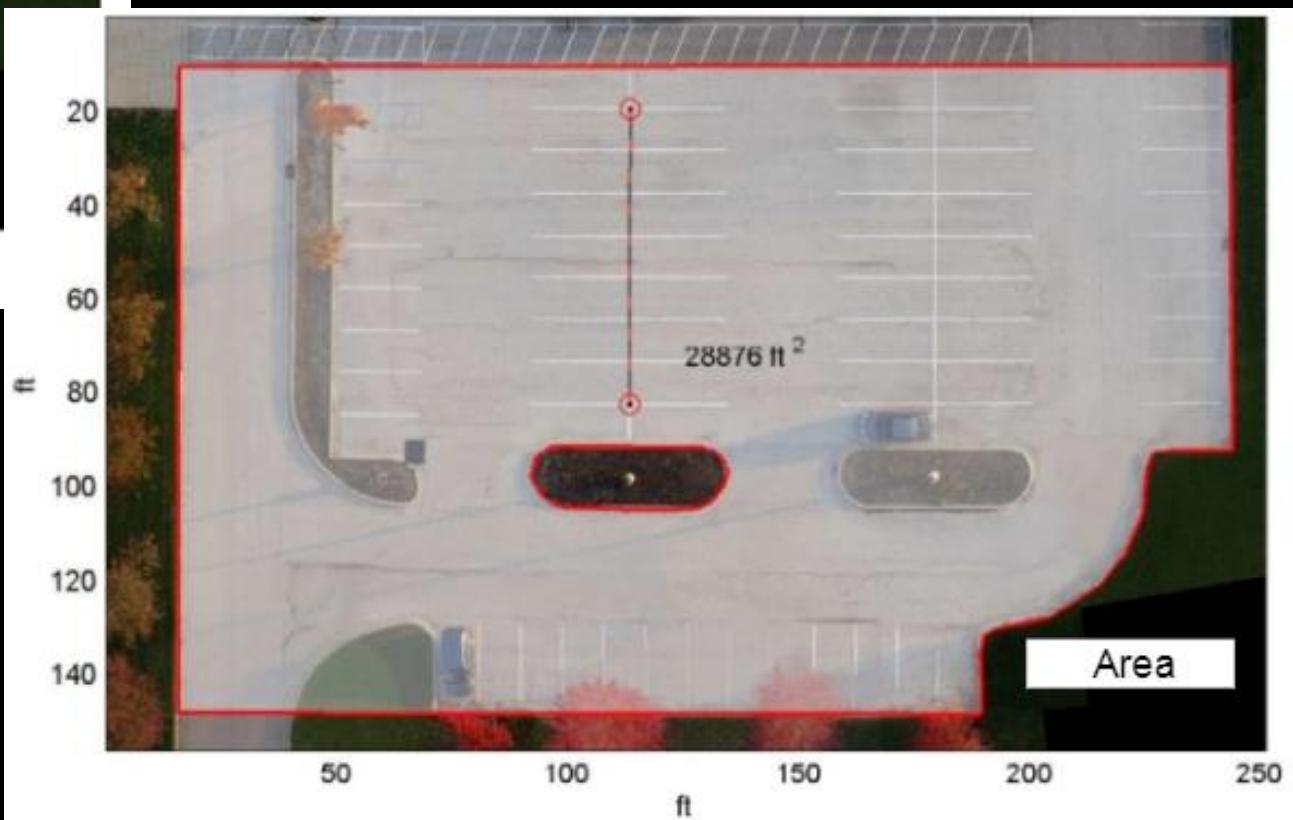
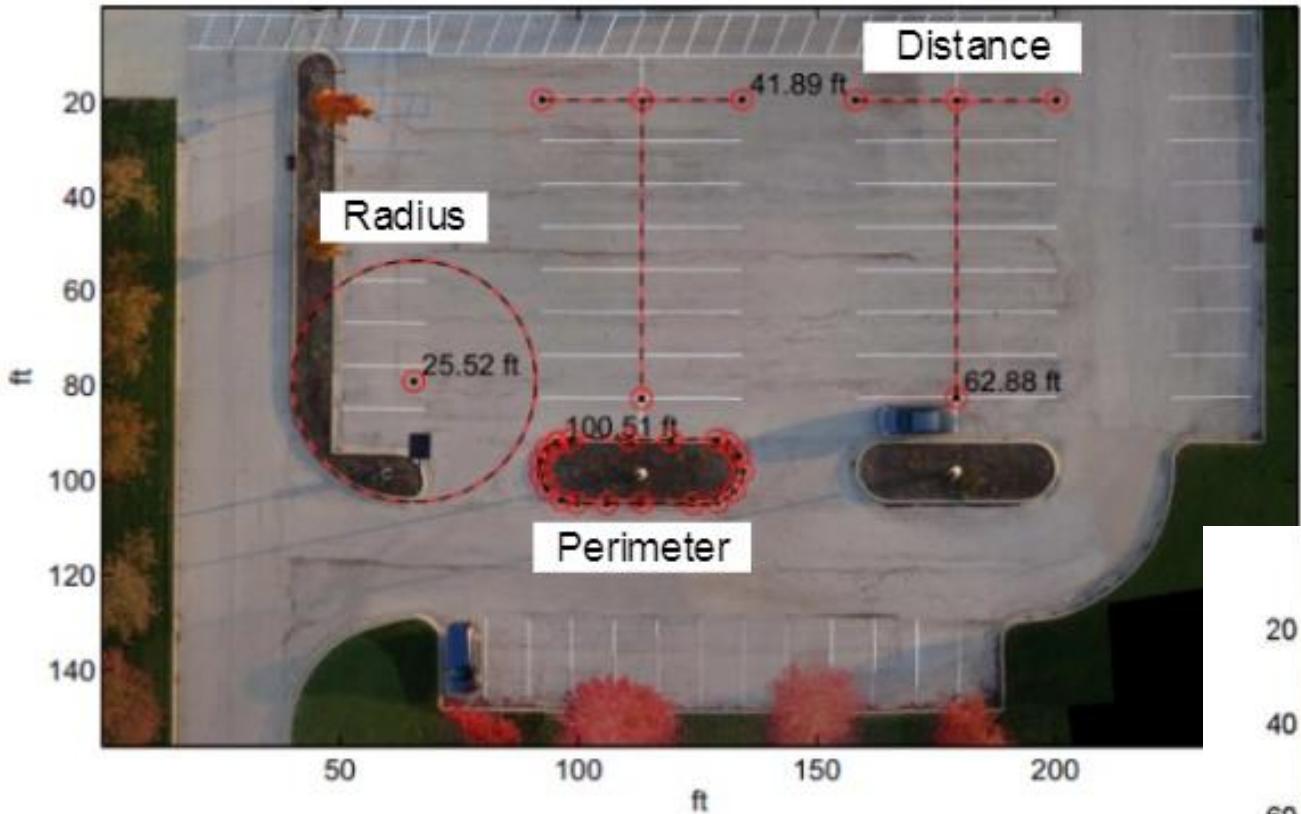
[6] Export as a pdf or png format

- Bridge abutment
- Two surveyors
- 15 min
- Measuring tape
- Measuring wheel









Conclusion

- **Image-based measurement software**
- **Safe and convenient**
- **Relatively accurate**
- **Easy and simple to use**

Acknowledgement

