

Diana Ross Work Instructions

Olin College SCOPE Team

In collaboration with Volpe and the Santos Family Foundation

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Summary

This procedure will determine the visibility from the driver's seat of a vehicle and locate blind spots to understand and improve vehicle safety. A smartphone and a few measurement devices are required to conduct this test. A measurement stick, used as a scale, is placed in front of the vehicle. Next a panoramic photo is taken with a smartphone from the driver's seat that captures the visibility through the windshield and passenger window. The location of the camera and the measurement stick are recorded. With the photo and known location of the devices, it is possible to calculate the approximate visibility a driver may have for this particular vehicle.

Requirements

Image Capturing:

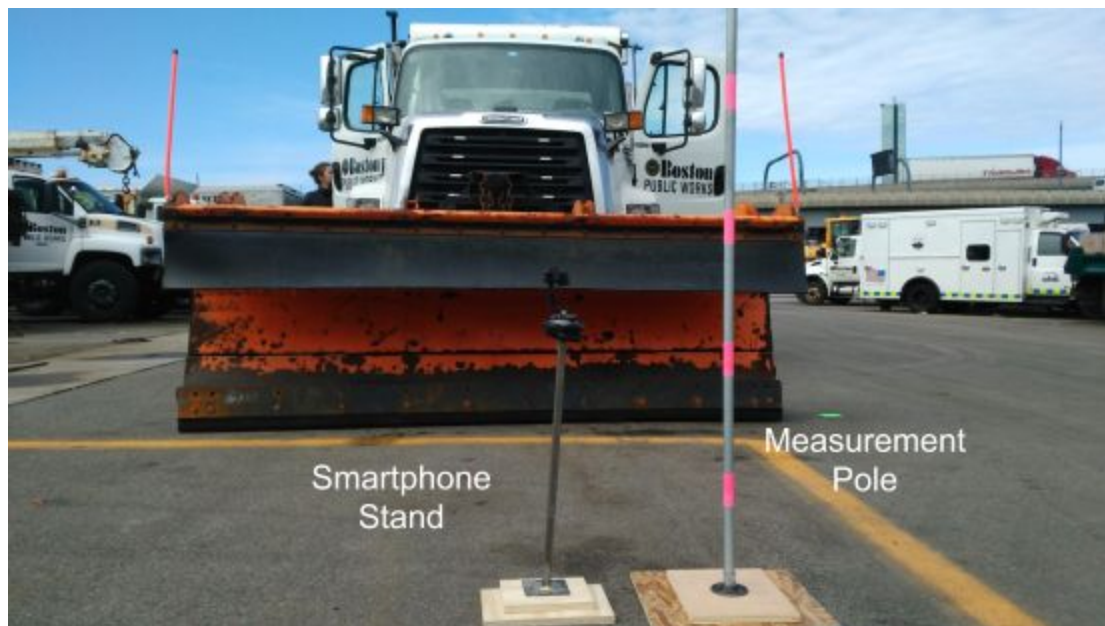
iPhone or Android smartphone with panorama photo capability.

Image Processing:

Computer with internet access.

Materials

- Vehicle
- Smartphone
- Measurement pole
- Camera stand with smartphone mount
- 2 Levels
- 3 foot long Bar
- 2 Tape measures
- Masking Tape
- Chalk



Environment

To perform this test, park the vehicle in a location where the ground is level and the driver has a line of sight to ground directly in front of them. There should be at least 10 feet of clear space in front of the vehicle as well as enough room to comfortably move around the vehicle and open doors. This will increase the accuracy of any measurements taken in the process.

Set Up

1. Place measurement pole on the ground in front of the vehicle. The pole should be in line with driver's seat as shown in the picture below. From the driver's perspective the base of the pole should not be visible. If the base is in view, move the pole closer to the vehicle until the first mark from the bottom is just visible.



Cab over truck with the measurement pole placed directly in front of the driver.



View from driver's seat with the measurement pole placed correctly. The base is not in sight, and the first mark from the bottom is visible.

2. Place the camera stand in the seat so the base plate is firmly against the backrest with the camera pointing towards the windshield.



Camera stand placed in the driver seat with the base firmly against the backrest.

3. Adjust the leveling table to center the bubble by unhinging the lever and rotating the ball joint. Push the lever closed to lock in place. The mount does not need to be completely level at this stage, a rough estimate will be satisfactory. Fine tune leveling will be done at a later step.



Leveling table with the bubble in the circle.

4. Place the phone vertically in the camera stand (avoid pressing the side buttons on the phone with the mount).

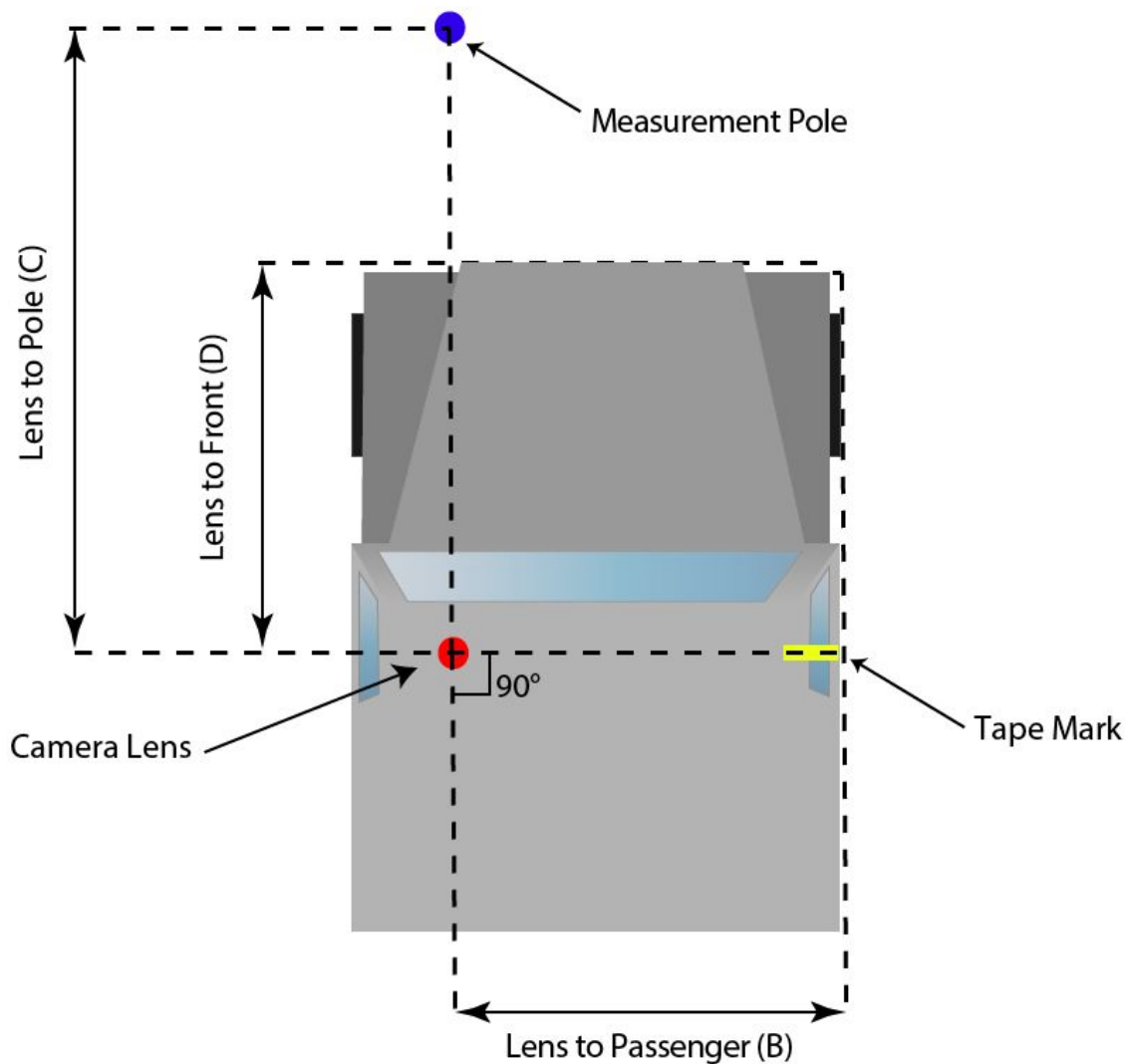


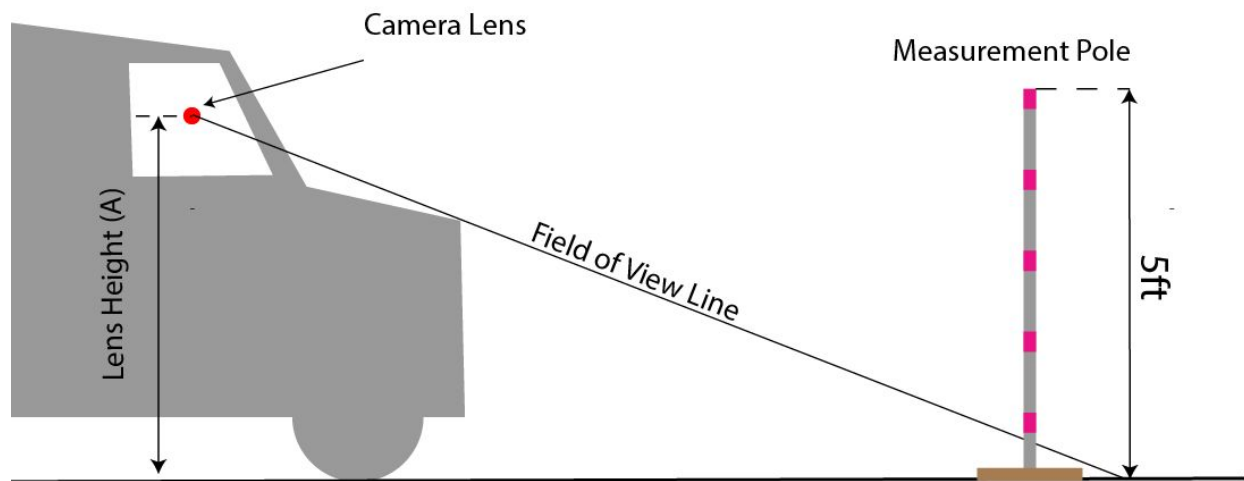
Smartphone in the phone mount in the portrait orientation.

Measurement & Recording

Now that the phone mount and measurement stick are in place. There are four measurements that are important to record along with the vehicle information. Each measurement will be taken starting from the camera lens on the smartphone. All lengths will be vertical or horizontal, do not record any diagonal measurements.

- A. Lens height
- B. Lens to passenger window
- C. Lens to measurement pole
- D. Lens to front of vehicle





Finally, it is important to mark a point on the passenger window that is directly to the right of the lens, a 90 degree angle.

5. Keep note of the vehicle type, and any modifications if present, along with the VIN or partial VIN number. (Optional)

6. This step requires two people. Stand on the driver side of the cab. Hold a 3' bar horizontally at the height of the camera lens. Hold a level with the bar to make sure the bar is level. Measure the height of the level from the ground. Mark the point on the ground with tape or chalk.



Two people taking the lens height measurement. One person holds the 3' bar level at the lens while the other measures the height of the bar. Mark the point on the ground with tape or chalk.

7. Measure the distance from the camera lens to the passenger window.
 - a. Measure the distance from the back window to the lens and use this to place the tape on the passenger side window as shown in the diagram below.
 - b. Next measure the distance from the lens to the tape along the dotted line.

8. Measure the distance from the lens to the measurement pole along the ground. Start at the tape/ chalk mark on the ground from step 7. Keep the tape measure parallel to the vehicle as shown in the image below.



Distance from the tape on the ground to the measurement pole.
Keep the tape measure parallel to the vehicle.

9. Measure the distance from the tape/ chalk mark in step 7 to the front of the cab (front bumper), record this for later.



Distance from the mark on the ground to the front bumper of the vehicle.

Panorama

10. Open the camera app on the smartphone and switch to the panorama setting.
Keep the phone mounted on the stand if possible.
11. Level the camera stand by adjusting the lever. Grab a bar level and place line it up with the top of the phone to check how level the phone is. If the phone is not level, use the knob on the back of the phone mount to rotate the phone until it is level.
12. Take a panoramic photo starting at the left edge of the front windshield. Swivel the phone around using the phone mount until the right edge of the passenger window is in view. Do not rotate the leveling table.



Start image capture at red line sweeping from left to right.



Example panorama of the windshield and passenger window.

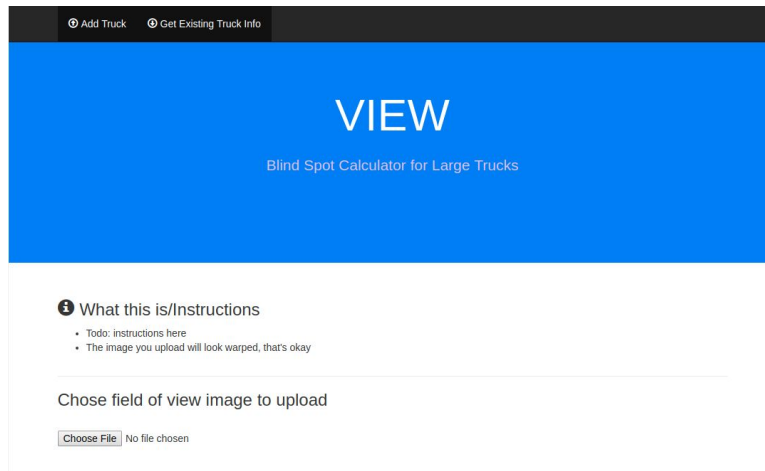
13. Save the photo.

This is the end of the image and measurement collection portion. Take care to save your image and keep track of the four measurements taken.

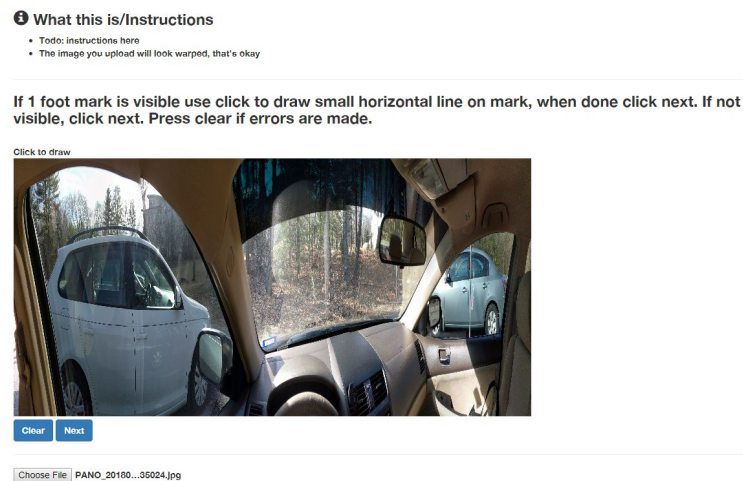
Processing documentation in progress.
More to come.

Processing

1. Navigate to the webpage.
 - a. <https://findyourblindspots.herokuapp.com/>
2. Or follow executable directions [HERE]



3. Choose File and navigate to the panoramic image.
4. Once the image is uploaded, locate the measurement pole.
 - a. If the one foot mark is visible on the measurement pole, click and the drag to the draw a line with the cursor at the mark.
 - b. If the one foot mark is not visible, click next.



5. Repeat step 3 for each foot mark.

- Click and the drag to the draw a vertical line at 90 degrees, directly to the left of the driver. Click next.

What this is/Instructions

- Todo: instructions here
- The image you upload will look warped, that's okay

Draw vertical line at 90 degrees (directly to the left of the driver out of driver window, should be where the measuring stick was placed).

Click to draw



Clear Next

Choose File PANO_20180...35024.jpg

- Click and the drag to the draw a vertical line at -90 degrees, directly to the right of the driver. Click next.

- Click and the drag to the draw a line along the bottom of each window. Select next in between identifying each window.

Draw line along bottom of driver side field of view.

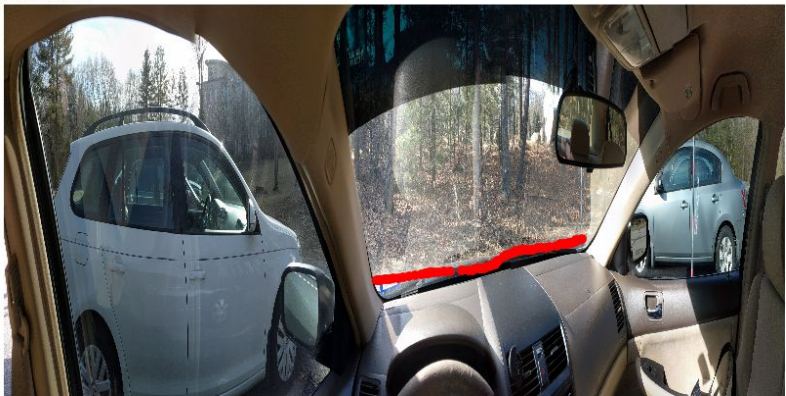
Click to draw



Clear Next

Draw line along bottom of front field of view.

Click to draw



Clear Next

Draw line along bottom of passenger side field of view.

Click to draw



Clear Next

9. Enter camera height and the location of the measurement pole.

Driver eye heigh above ground in inches:

Radial distance from driver to measurement stick in inches:

This is not the hypotenuse, but the distance along the ground.

Clear Next

Bill of Materials

Component	Quantity	Price
Standard 3/8"-16 Female to 1/4"-20 Male Tripod Thread Reducer Screw Adapter (Brass) Precision Made (2 Pack)	1	\$6.34
Qooltek Multipurpose Laser Level laser measure Line 8ft+ Measure Tape Ruler Adjusted Standard and Metric Rulers	2	\$14.98
Vastar Universal Smartphone Tripod Adapter Cell Phone Holder Mount Adapter, Fits iPhone, Samsung, and all Phones, Rotates Vertical and Horizontal, Adjustable Clamp	1	\$7.99
Manfrotto 438 Compact Leveling Head	1	\$91.88
3 ft Square Tube, part #: 6527K254	1	\$8.93
Base Plate, part #: 1388K17	1	\$30.85
1/4-20 Bolt, part #: 90128A241	1	\$4.39
Marine-Grade Plywood Sheet, part #: 1125T31	1	\$10.89
5' 1/2" OD Pipe	1	\$17.82
3/4" EMT Set Screw Connector	1	\$0.29
3/4" Floor Flange with 4 holes	1	\$6.09
Total:	9	\$200.45



Measurement Pole



Camera Stand