# Data Comparison
## Description

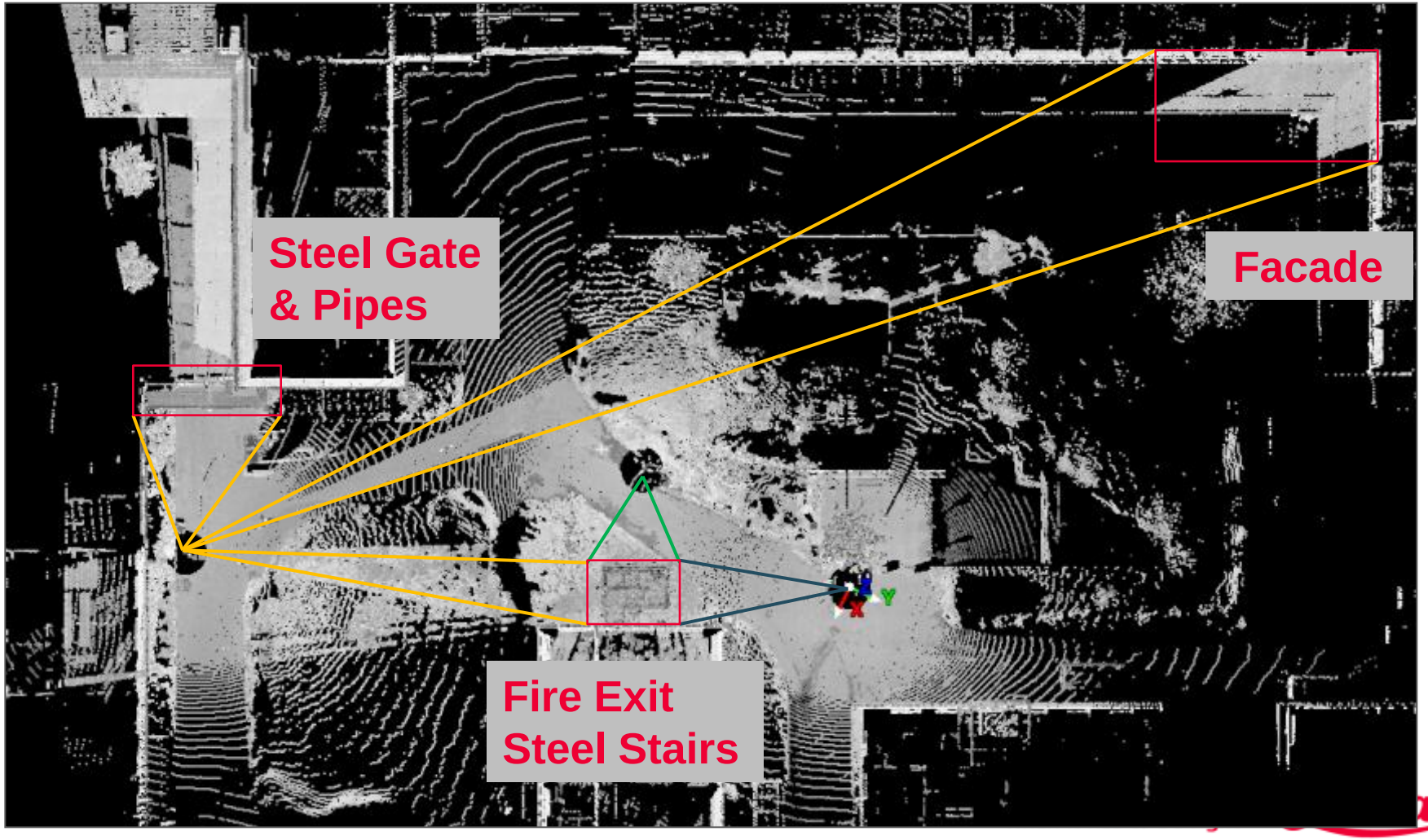
- **Comparison of several situations / objects scanned with:**
  - ScanStation C10
  - HDS6200
  - ScanStation P20
  - Z+F5010c
  - Faro Focus 3D





# Data Comparison

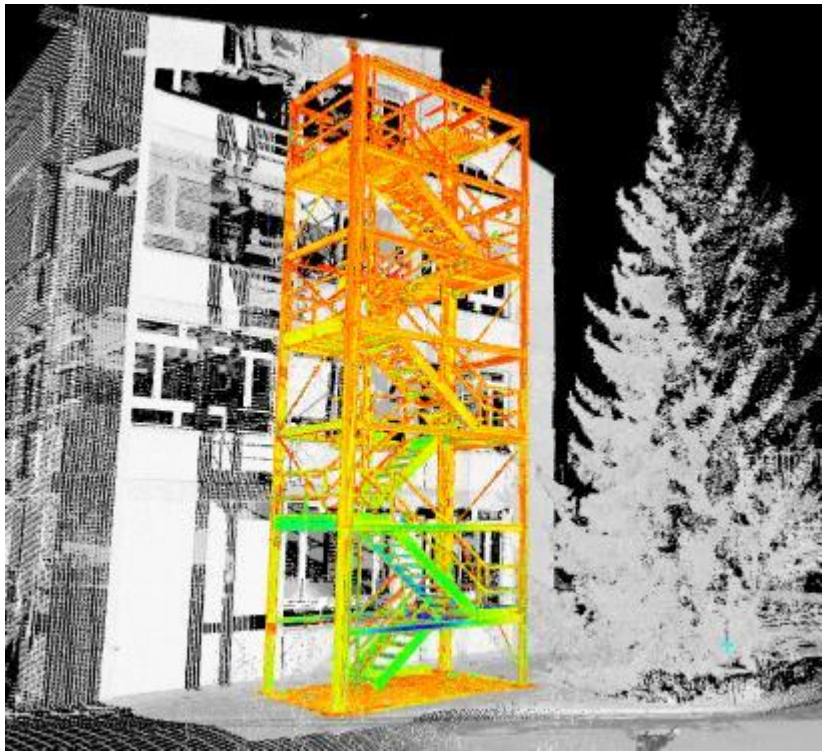
## Fire Exit Steel Stairs Overview




Geosystems

# Data Comparison
## Fire Exit Steel Stairs

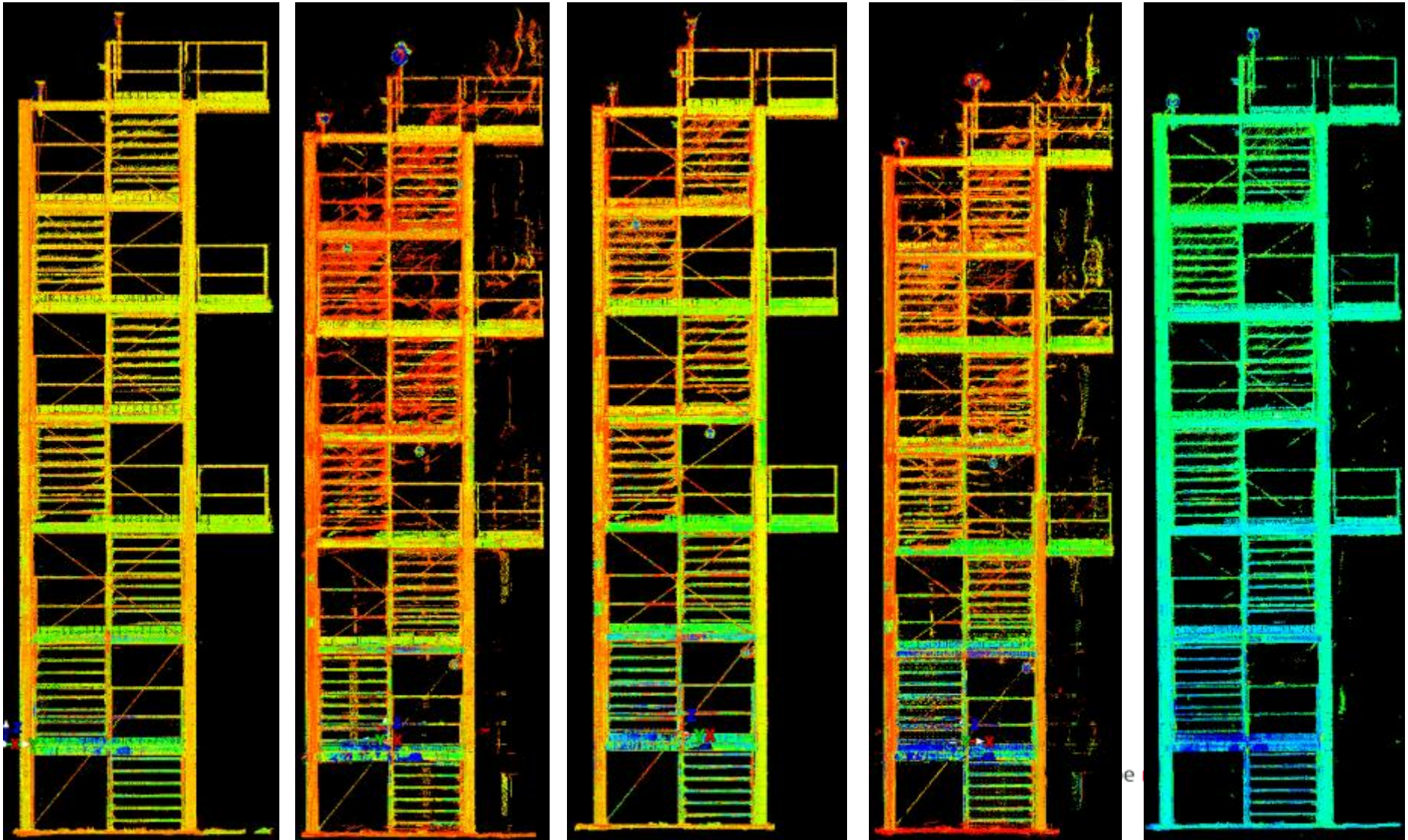
**Registered ScanWorlds from three setups (Cloud to Cloud registration)**



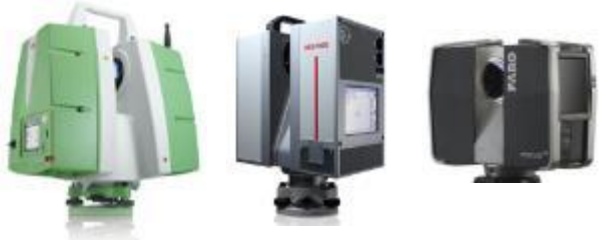
- **Scanners & Settings**
  - C10; 3mm@10m
  - P20; 3.2mm@10m – Q3
  - Z+F; Superhigh – High
  - HDS6200; Superhigh – High
  - Focus 3D; 3.0mm@10m – 4x
- **Default Cyclone Import Filter**
- **Data / Raw Data**
  - „*FireExitStairs*“

# Data Comparison

## Fire Exit Steel Stairs

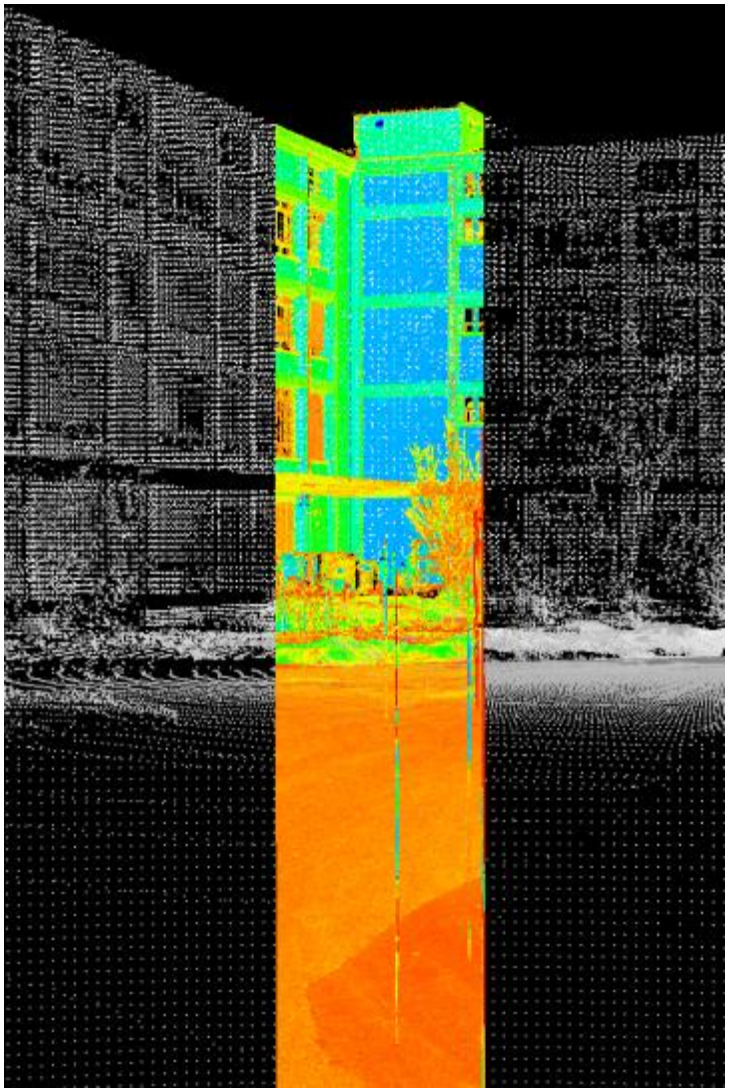


# Data Comparison
## Façade
## Distance to Object ~90m



### Single Setups

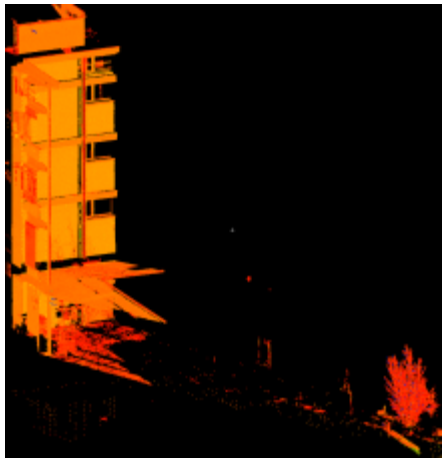
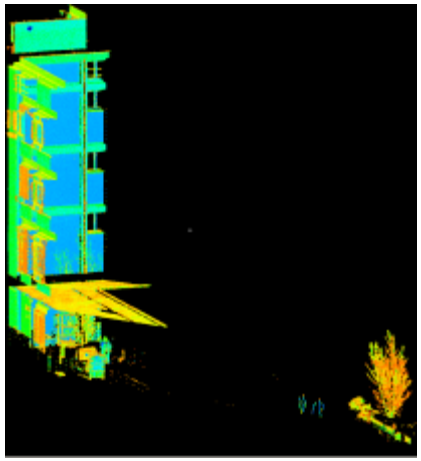
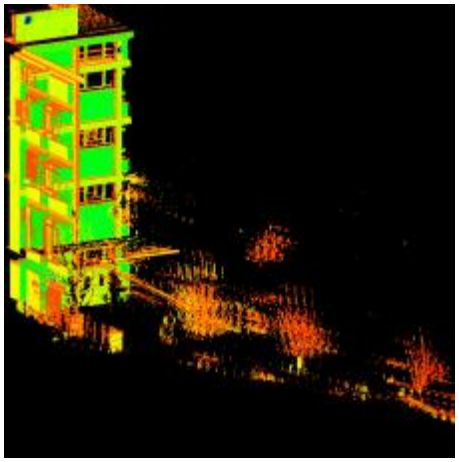
- **Scanners & Settings**
  - C10; 1mm@10m
  - P20; 0.8mm@10m – Q2
  - Z+F Extreme High – High
  - Focus 3D; 1/1 (1.6mm@10m) – 4x
  - No HDS6200 – due to distance
- **Default Cyclone Import Filter**
- **Data / Raw Data**
  - „*FireExitStairs*“

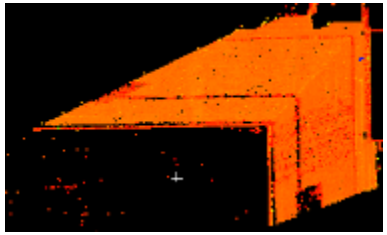
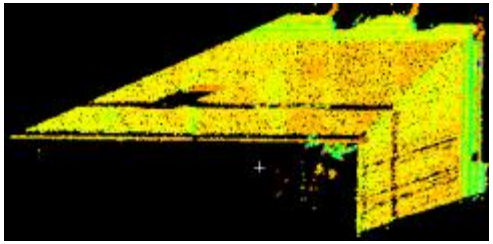
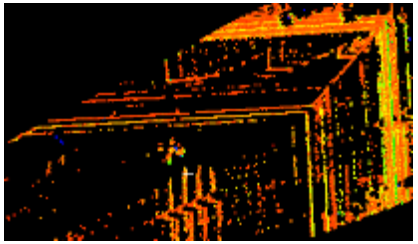
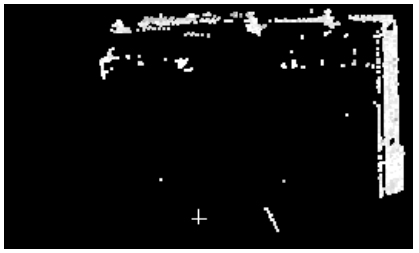


# Data Comparison

## Façade - 3D View & Top View



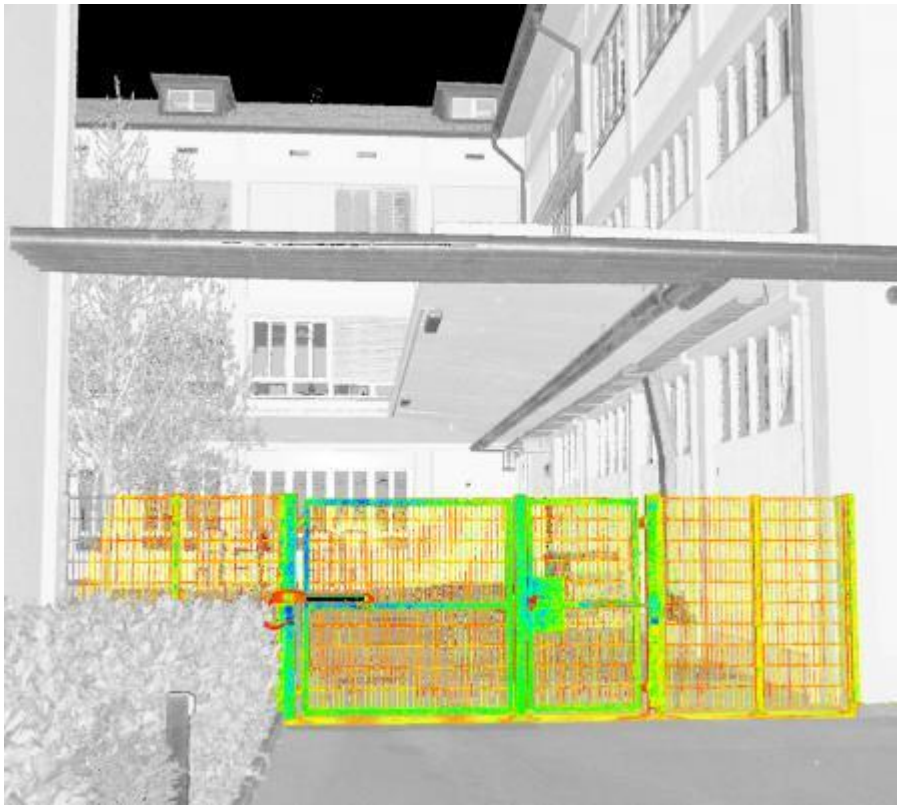





# Data Comparison
## Steel Gate
## Distance to Object ~12m

### Single Setups

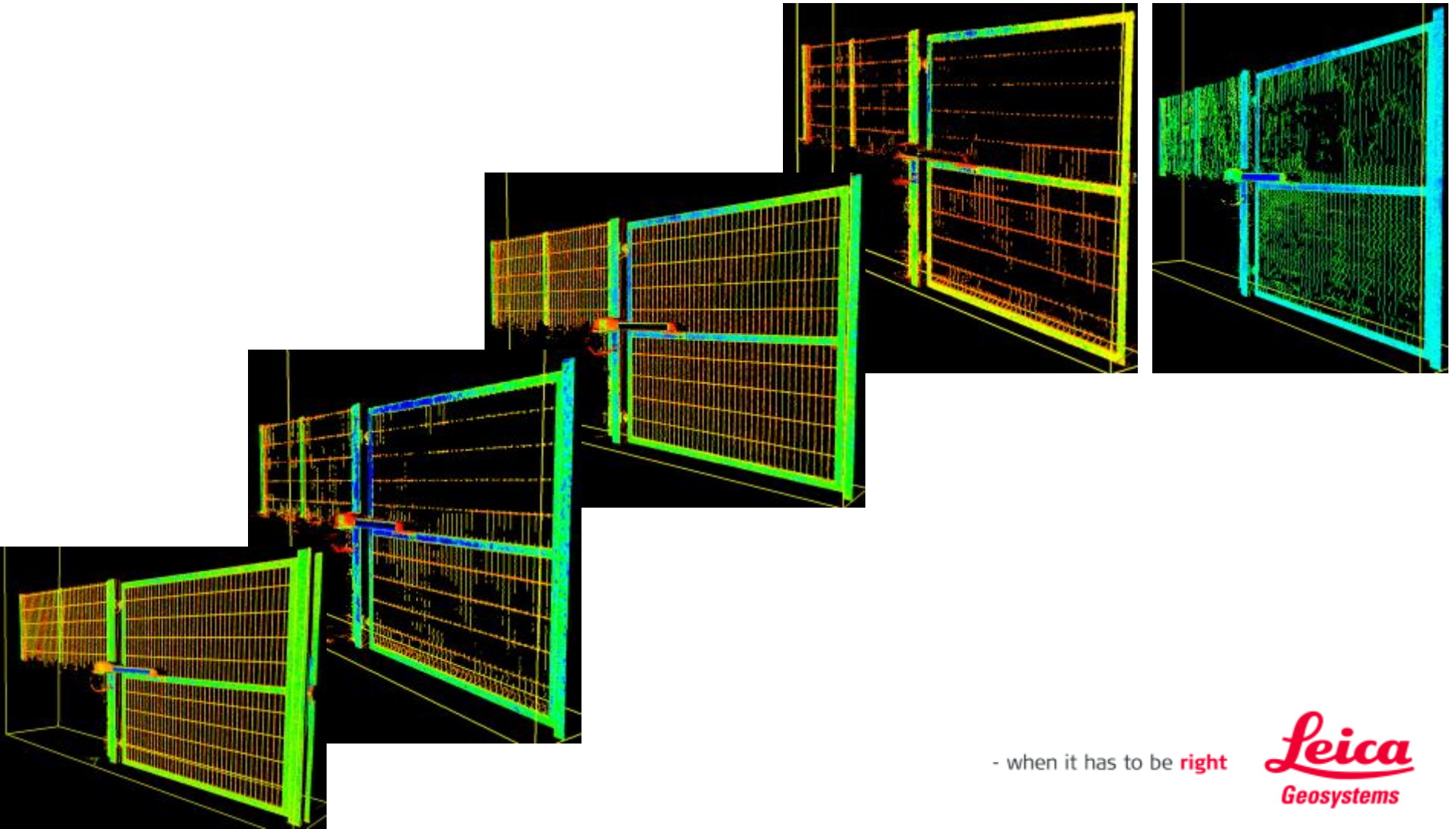
- **Scanners & Settings**
  - C10; 3mm@10m
  - P20; 3.2mm@10m – Q3
  - Z+F Superhigh – High
  - HDS6200; Superhigh – High
  - Focus 3D; 1/2 (3mm@10m) – 4x
- **Default Cyclone Import Filter**
- **Data / Raw Data**
  - „*FireExitStairs*“



# Data Comparison

## Steel Gate

## Distance to Object ~12m

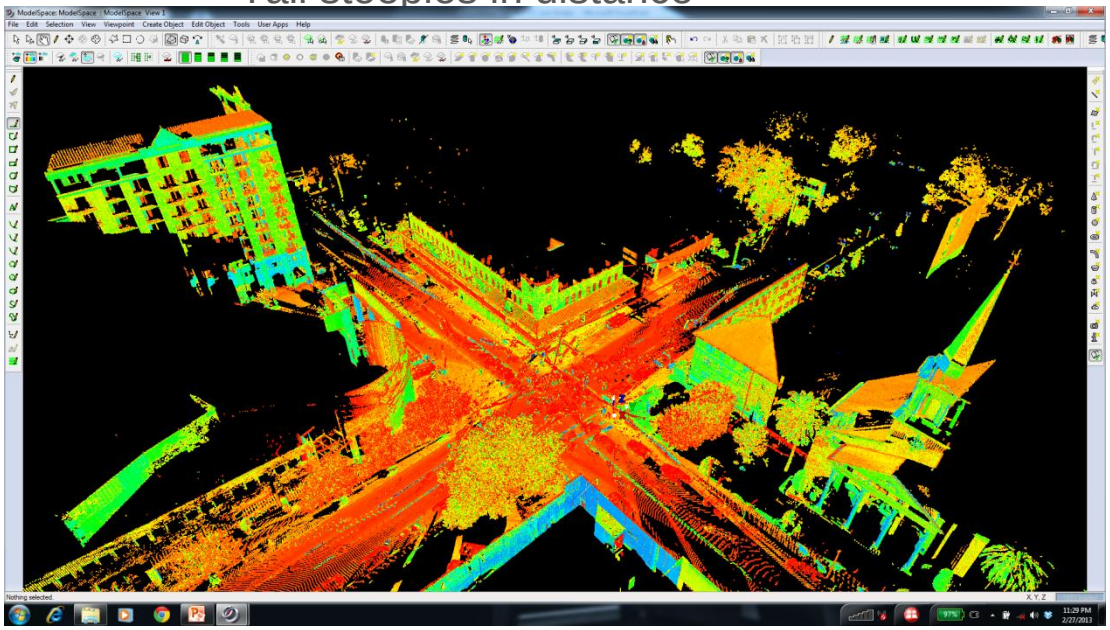


# Project 4 – Duval & College Street Intersection

Tallahassee, FL

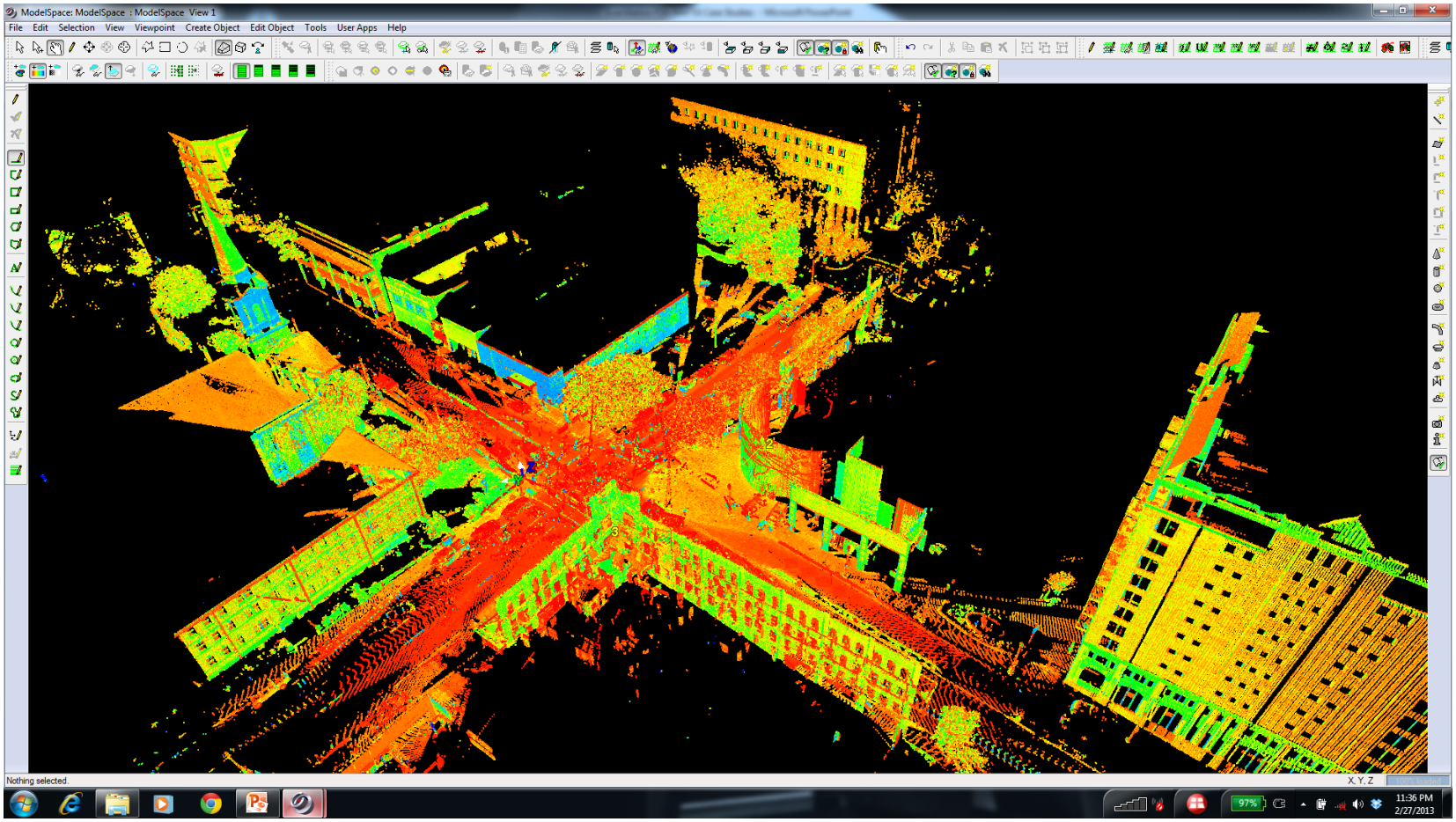
**Intersection has great characteristics to test range of scanner.**

- Intersecting roads have sloping in opposite directions
- Tall steeples in distance



# Project 4 – Duval & College Street Intersection

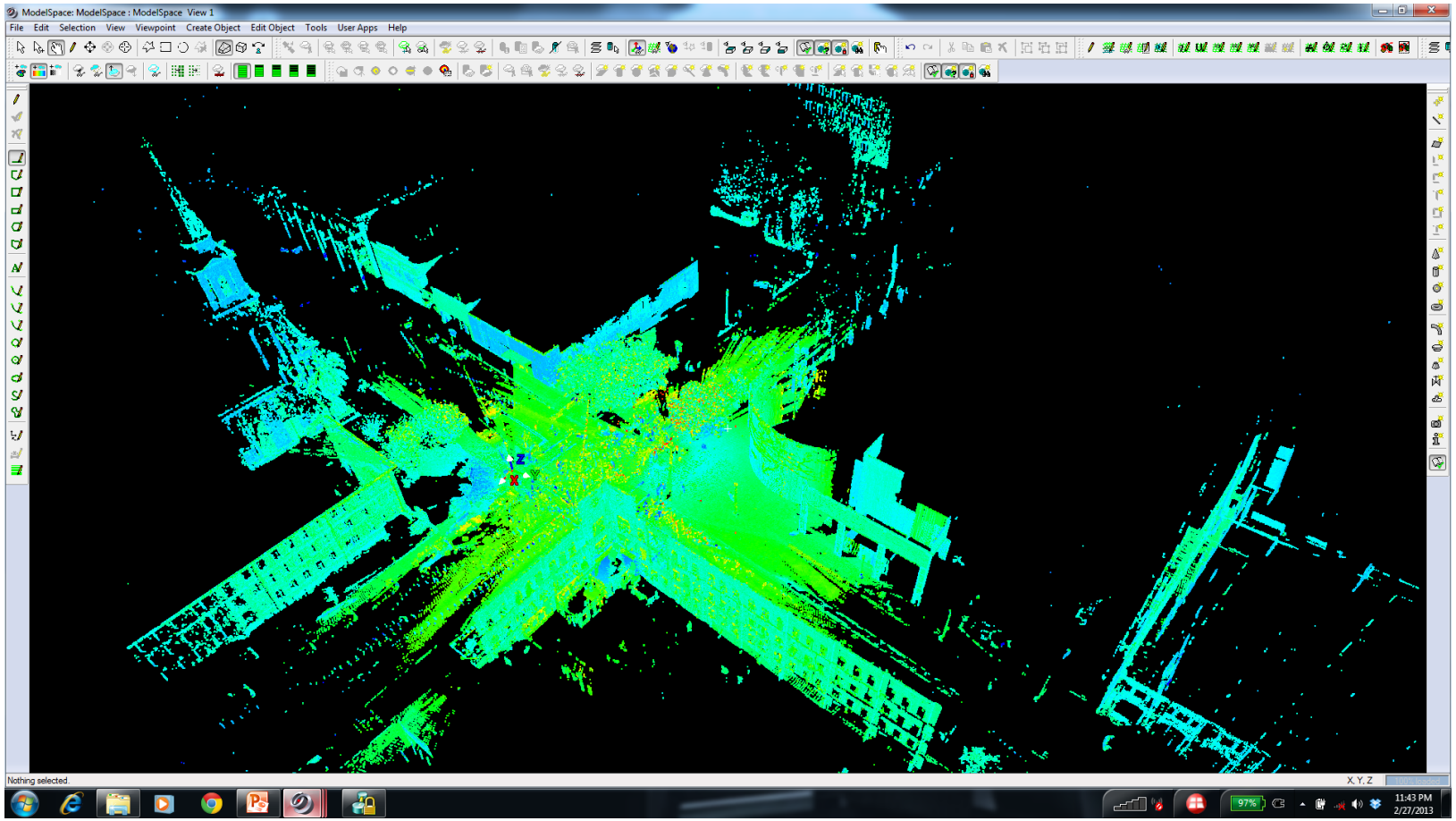
Tallahassee, FL




Overall P20 Registered Scan

# Project 4 – Duval & College Street Intersection

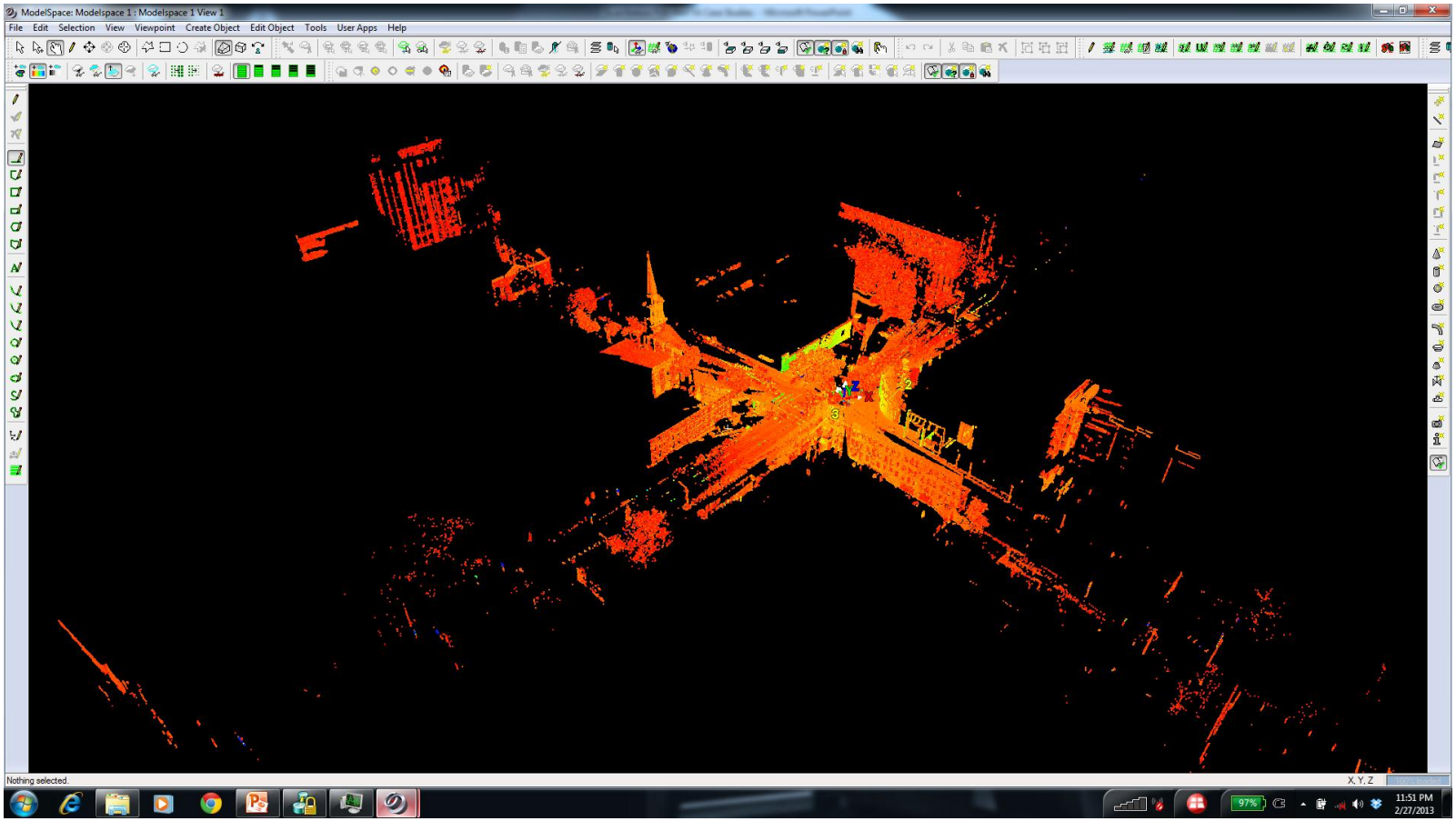
## Tallahassee, FL




Overall Focus3D Registered Scan

# Project 4 – Duval & College Street Intersection

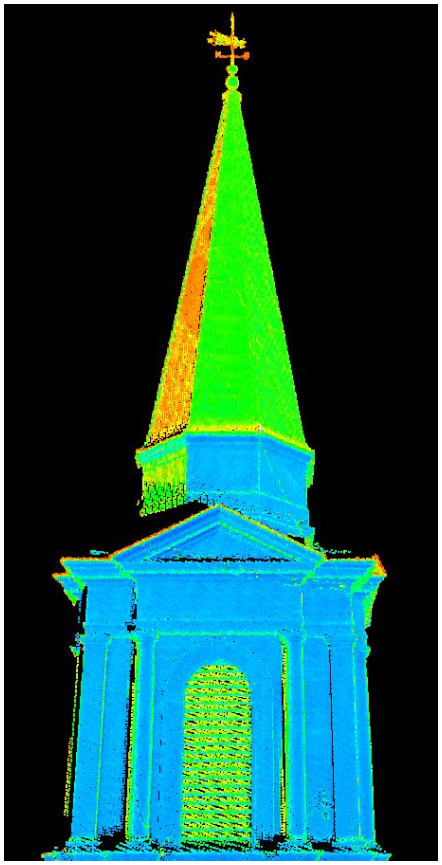
Tallahassee, FL



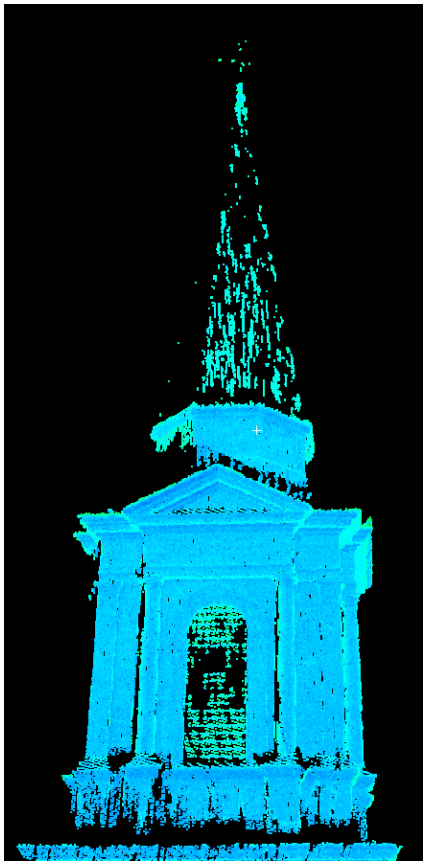

Single C10 Scan

# Project 4 – Duval & College Street Intersection

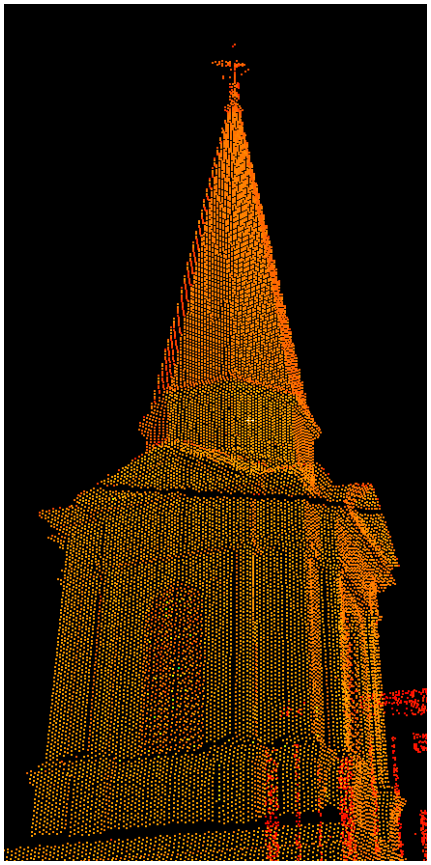
Tallahassee, FL



Overall P20
Registered Scans



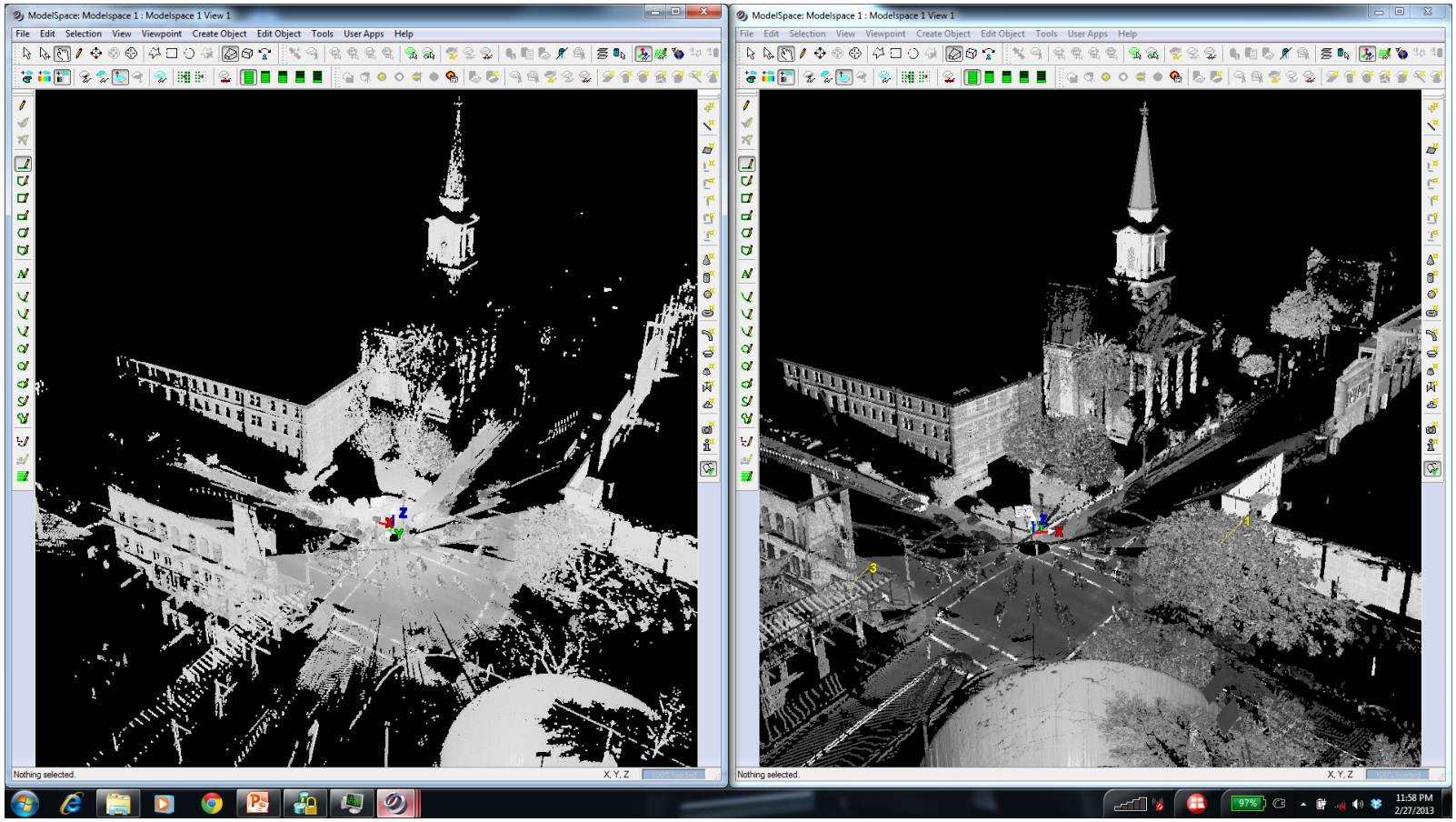
Overall Focus3D
Registered Scans



Single C10 Scan

# Project 4 – Duval & College Street Intersection

Tallahassee, FL



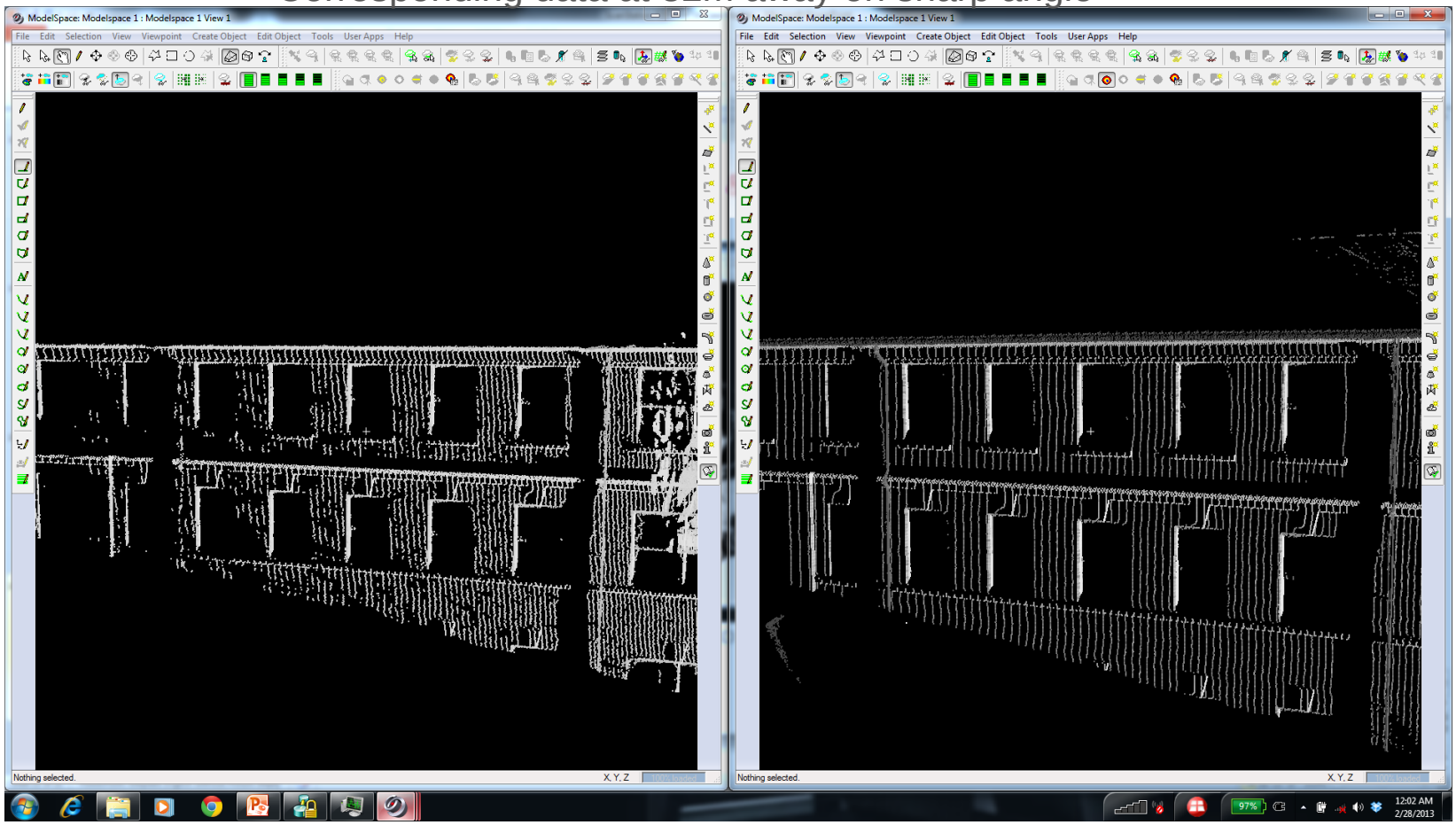

Single Focus3D Scan

Single P20 Scan

# Project 4 – Duval & College Street Intersection

## Tallahassee, FL

Corresponding data at 32m away on sharp angle




Single Focus3D Scan

Single P20 Scan



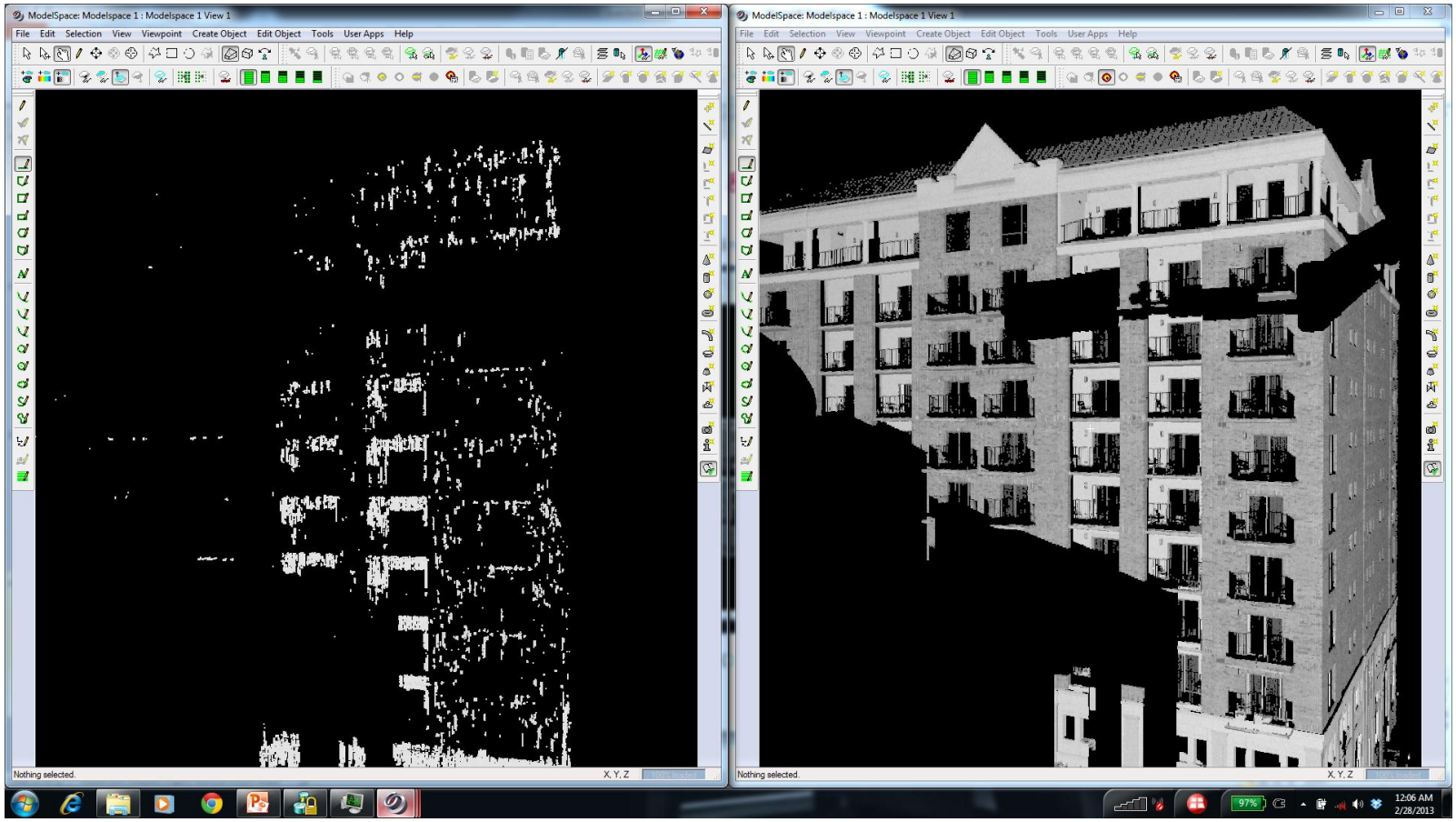
- when it has to be right

Leica Geosystems

# Project 4 – Duval & College Street Intersection

## Tallahassee, FL

Corresponding data at 86m away, nearly perpendicular to scanner




Single Focus3D Scan

Single P20 Scan

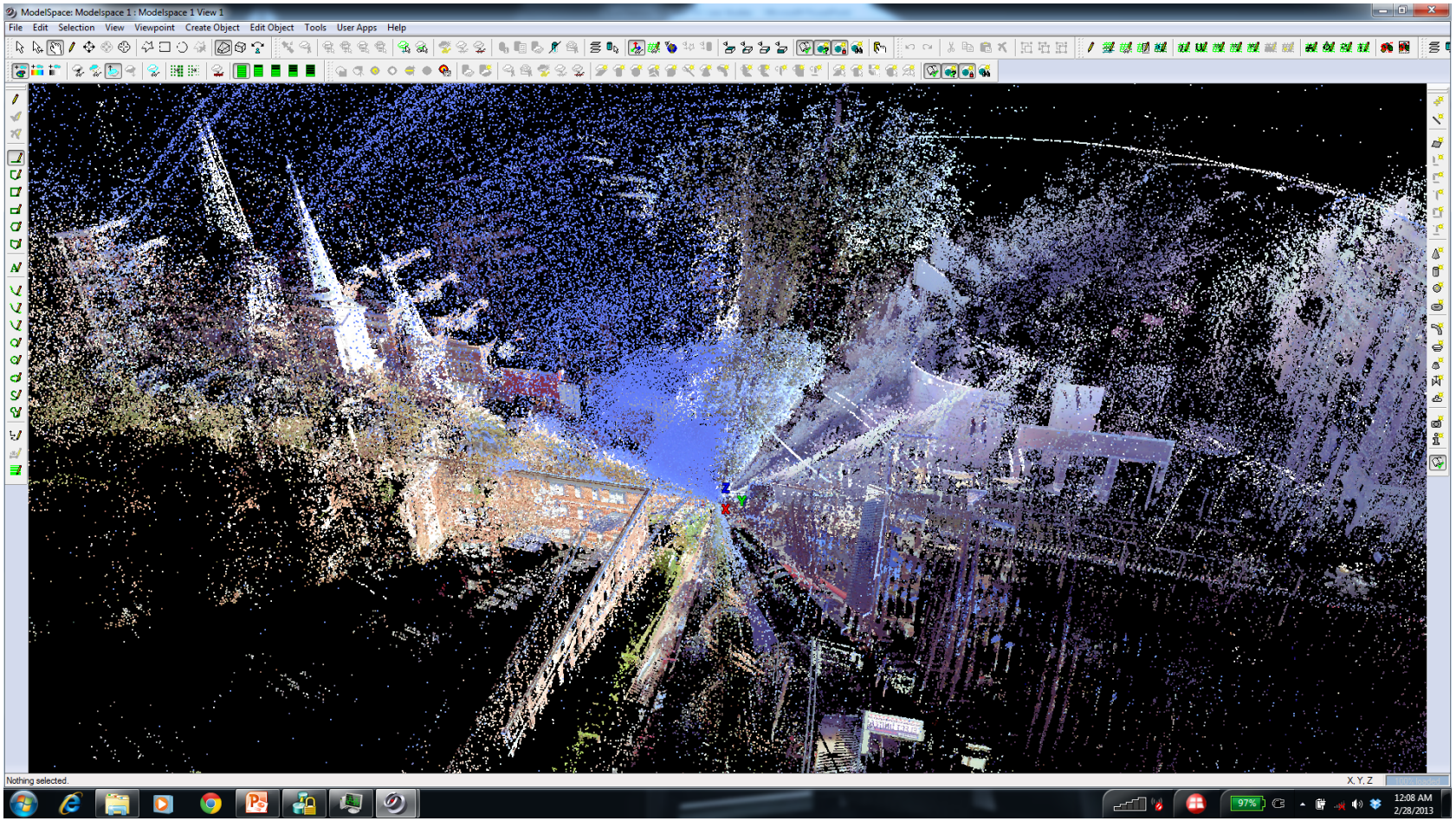


- when it has to be right

Leica Geosystems

# Project 4 – Duval & College Street Intersection

## Tallahassee, FL



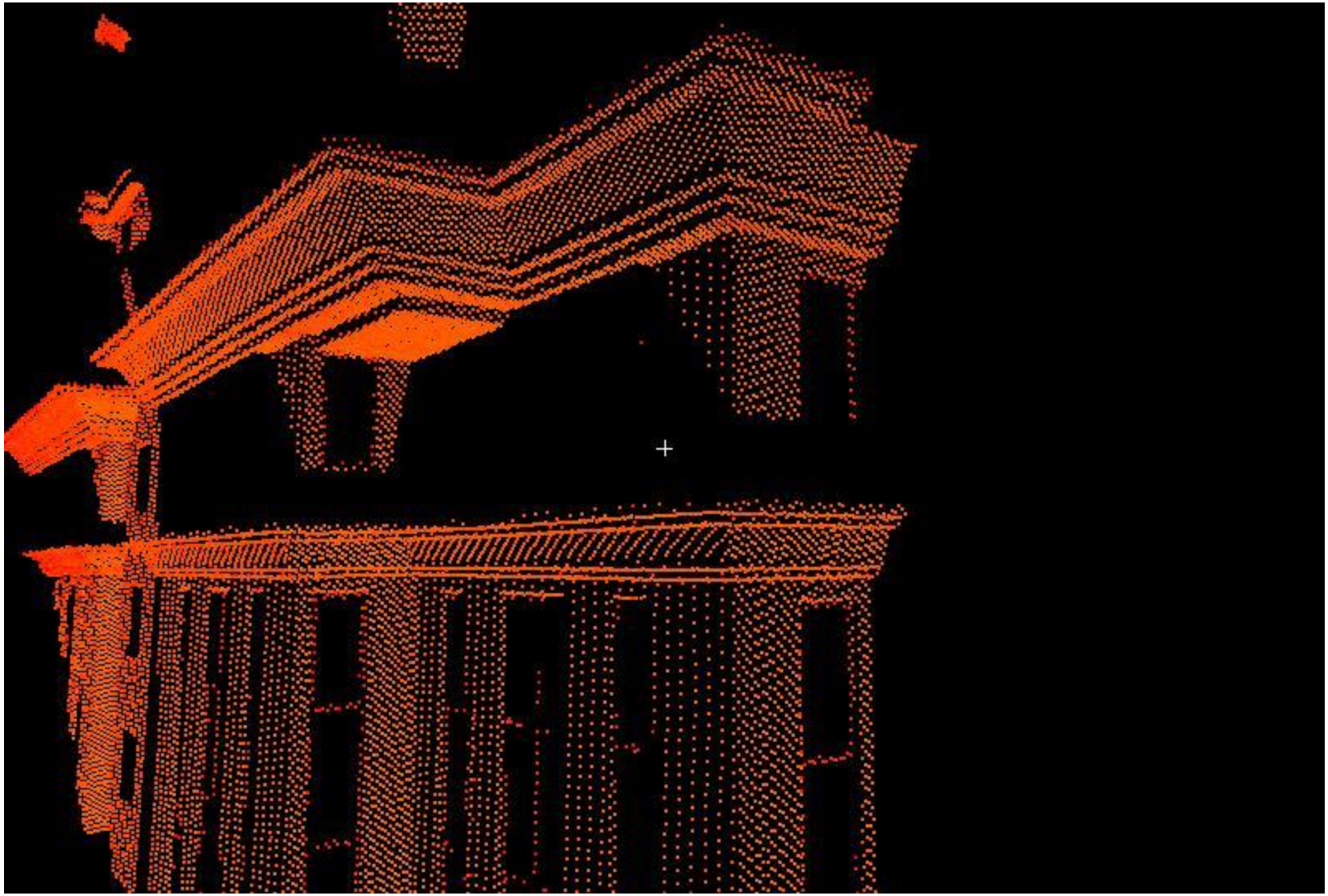

Single Focus3D Scan - Unfiltered



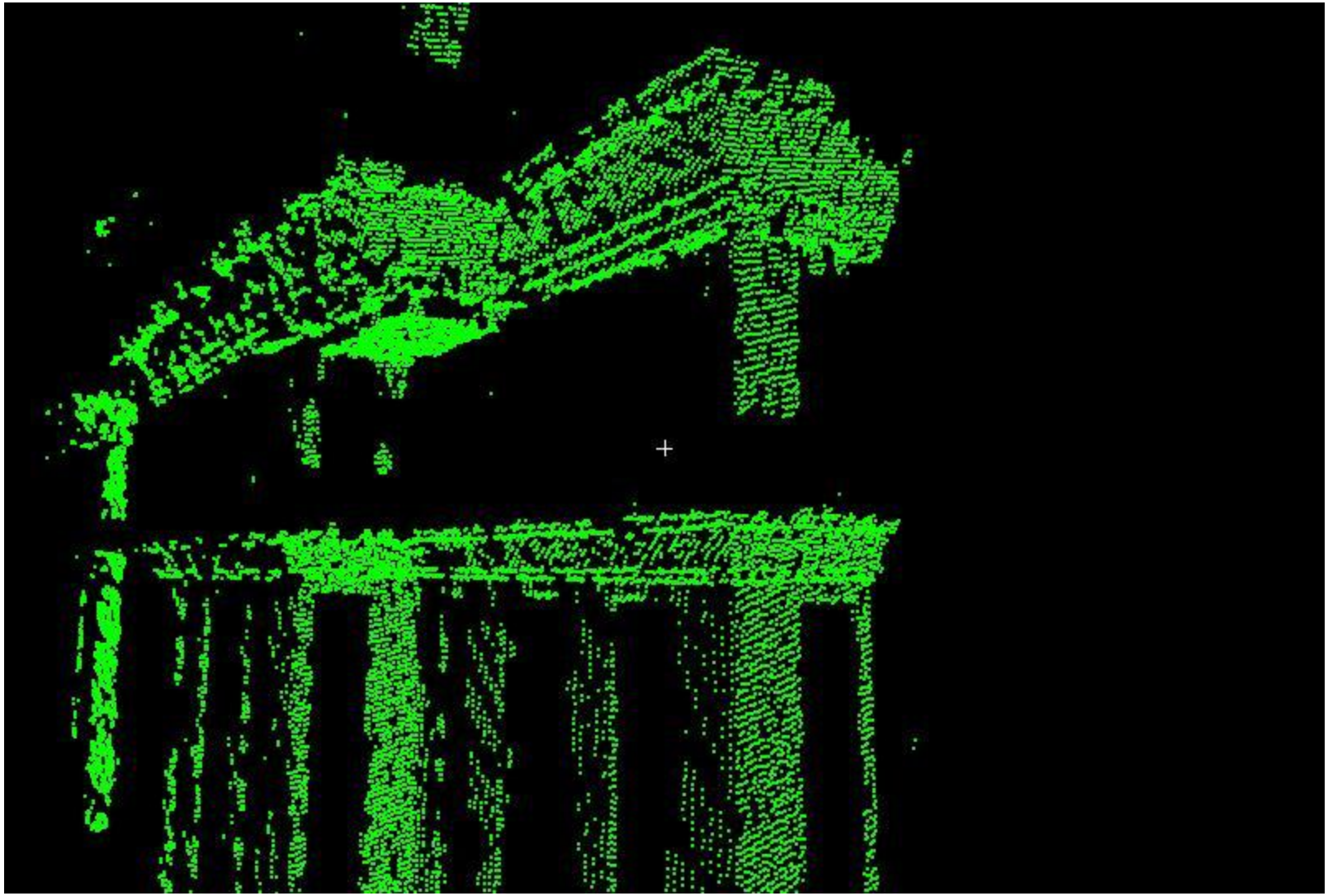
- when it has to be right

Leica Geosystems

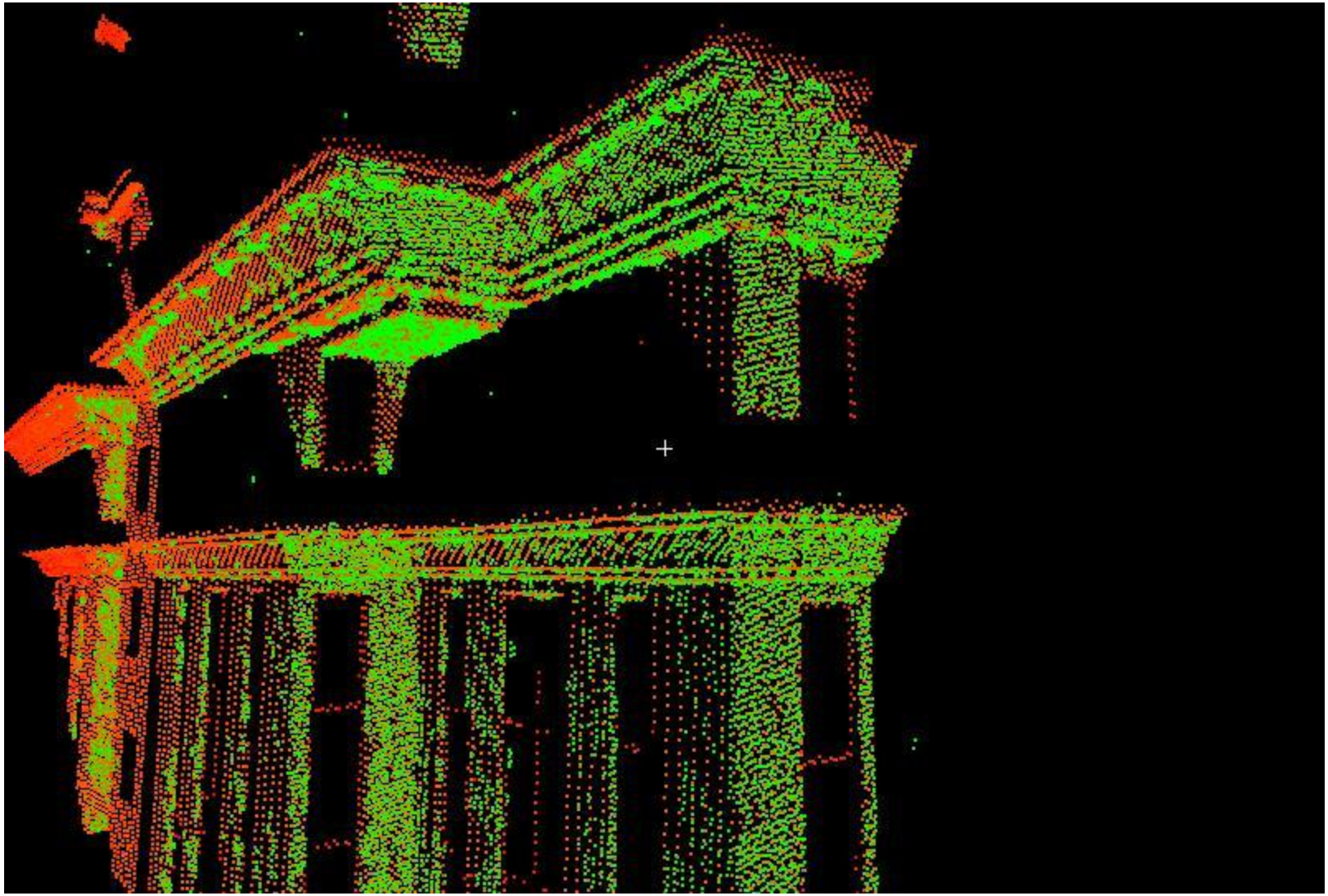
# Data Comparison: C10 Data vs. FARO



# Data Comparison: C10 Data vs. FARO

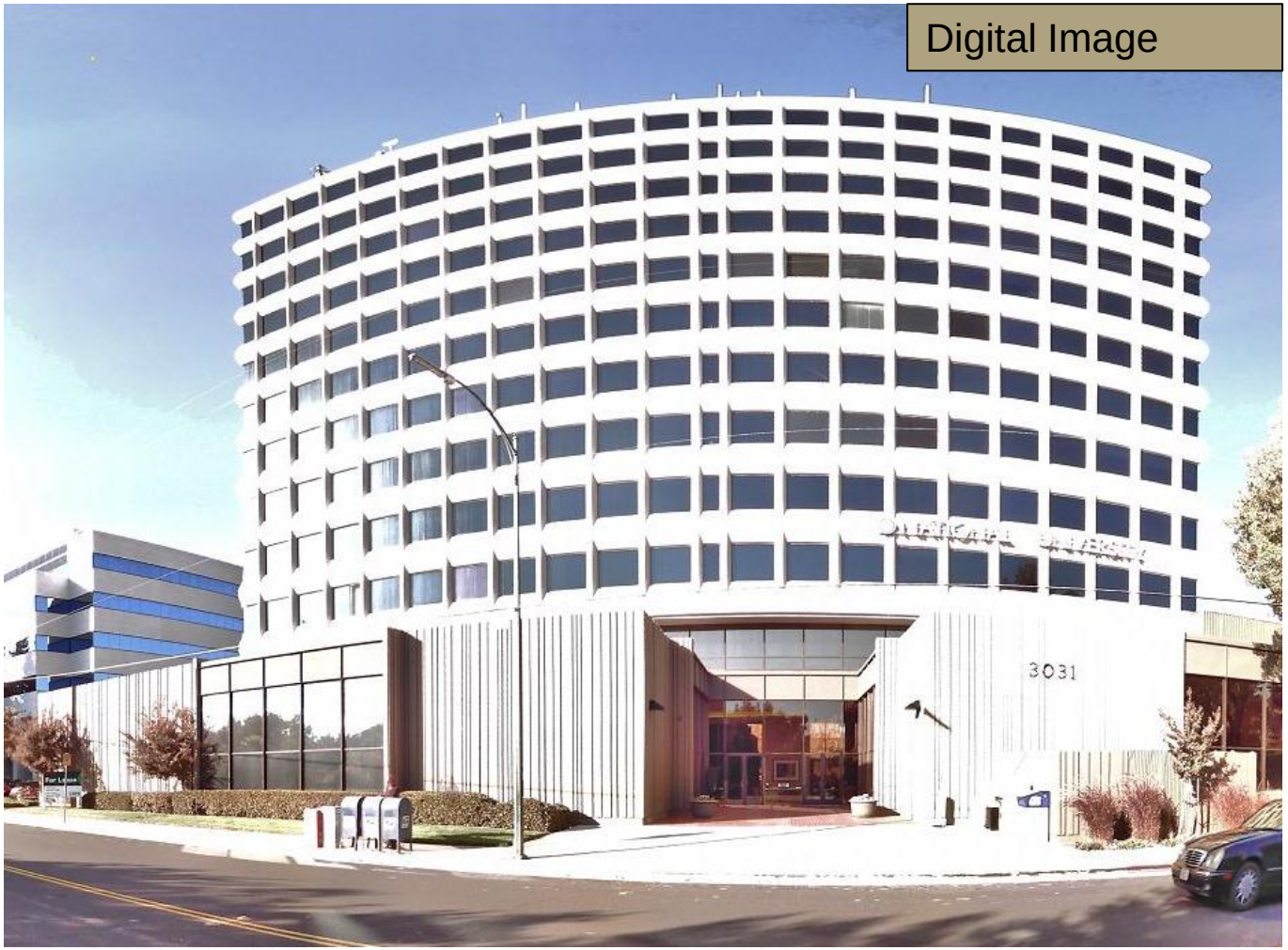


# Data Comparison: C10 Data vs. FARO



# Faro San Ramon Review

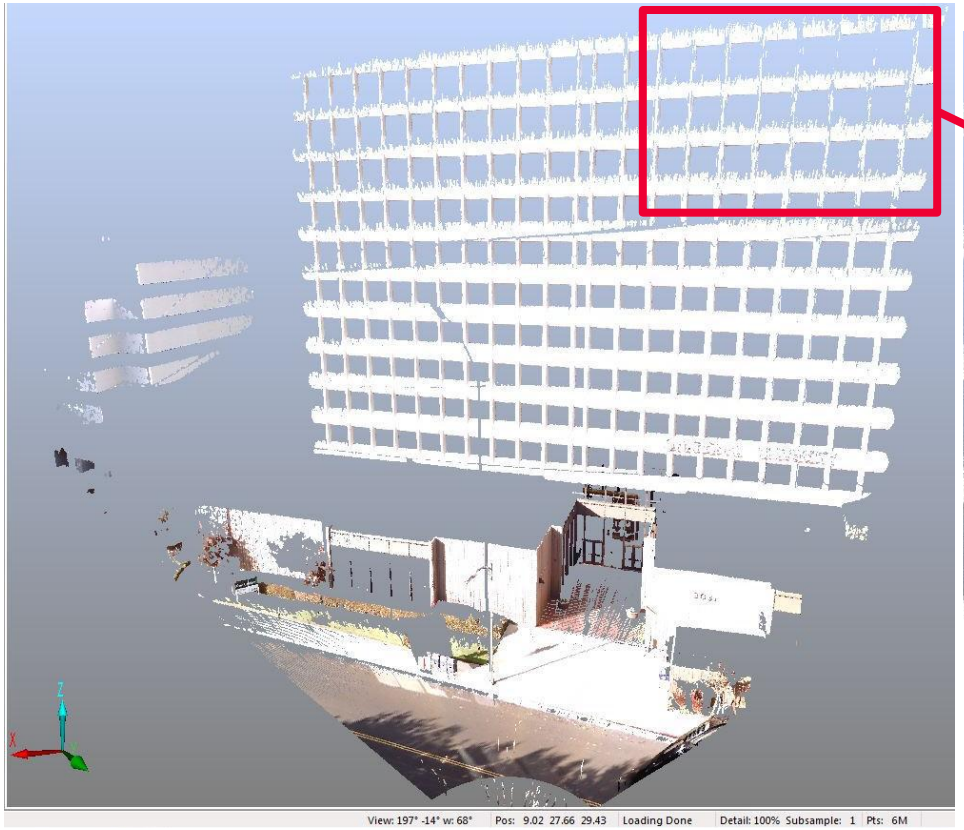
## Field and Office Testing

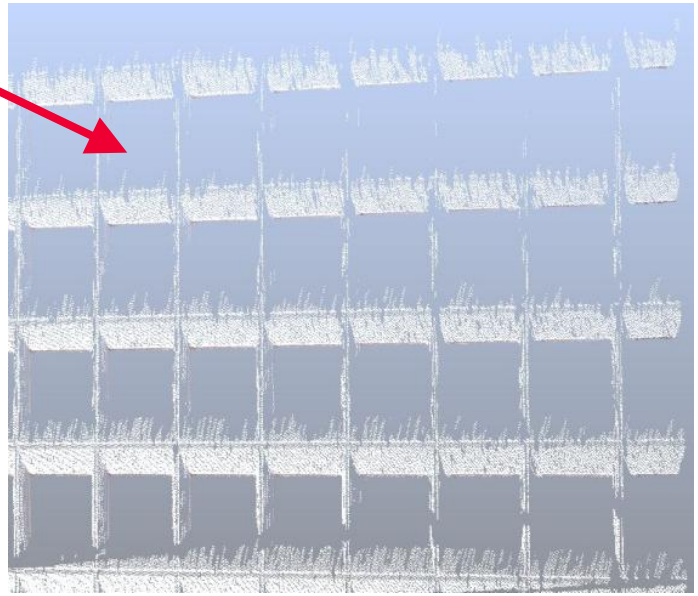


# Faro San Ramon Review

## Field and Office Testing

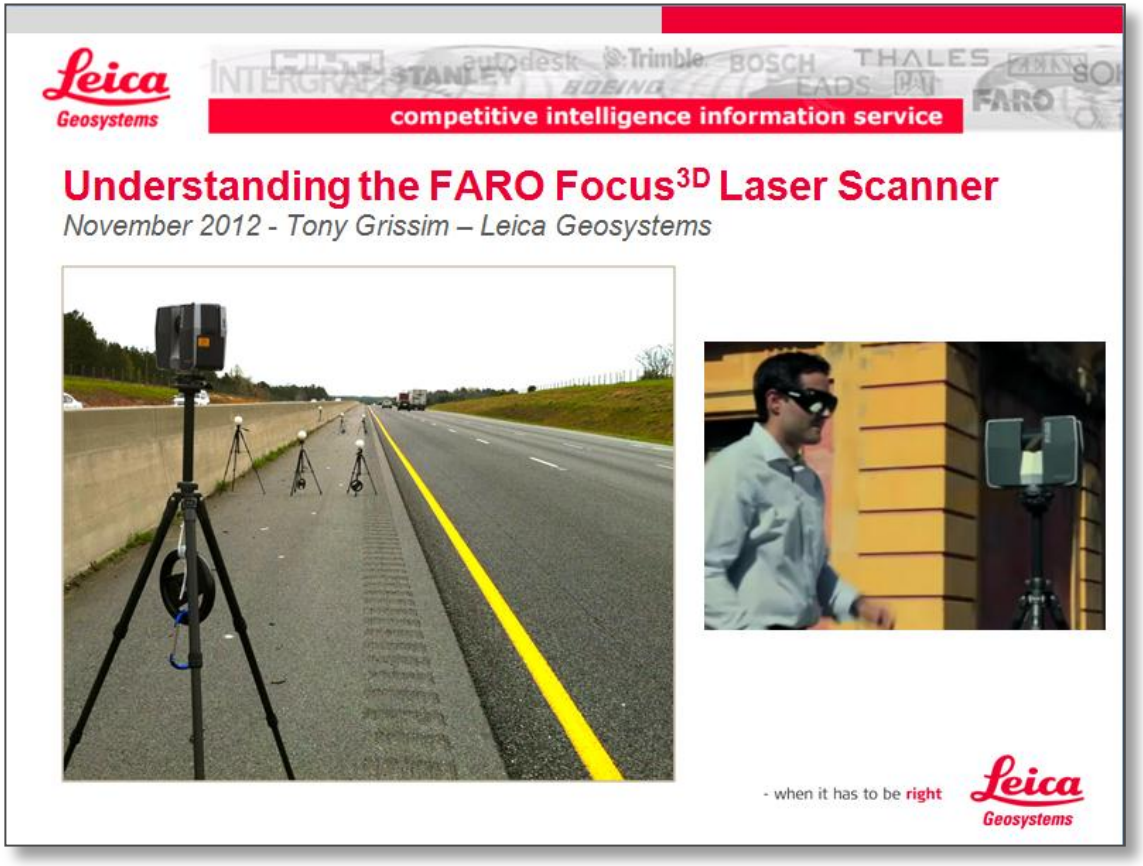
Point Cloud



# Faro In-Depth Competitive Presentation

## Forensic “Focus”



United States Department Of Commerce
National Institute of Standards and Technology
Safety, Health, and Environment Division

HEALTH AND SAFETY INSTRUCTION

Number 13
Issued: September 10, 2008
Supersedes: April 1996
Distribution:


**Subject: NIST LASER SAFETY PROGRAM**

8.2.3 Class 3 and Class 4 Lasers and Laser Control Areas (LCAs)

Class 3R lasers and laser systems require a reduced set of controls. ANSI Z136.1 recommends, but does not require, that the controls detailed below be applied to Class 3R lasers. Class 3R laser radiation is not generally a hazard, except when directly viewed for longer than 0.25 s. This policy does not require implementation of the controls below for ***visible*** Class 3R lasers or laser systems. Because unintentional exposure is possible, however, this policy considers ***invisible Class 3R lasers to be equivalent to Class 3B***, meaning all controls below should be implemented for ***invisible*** Class 3R lasers or laser systems. Appendix B gives a more complete description of classifications.

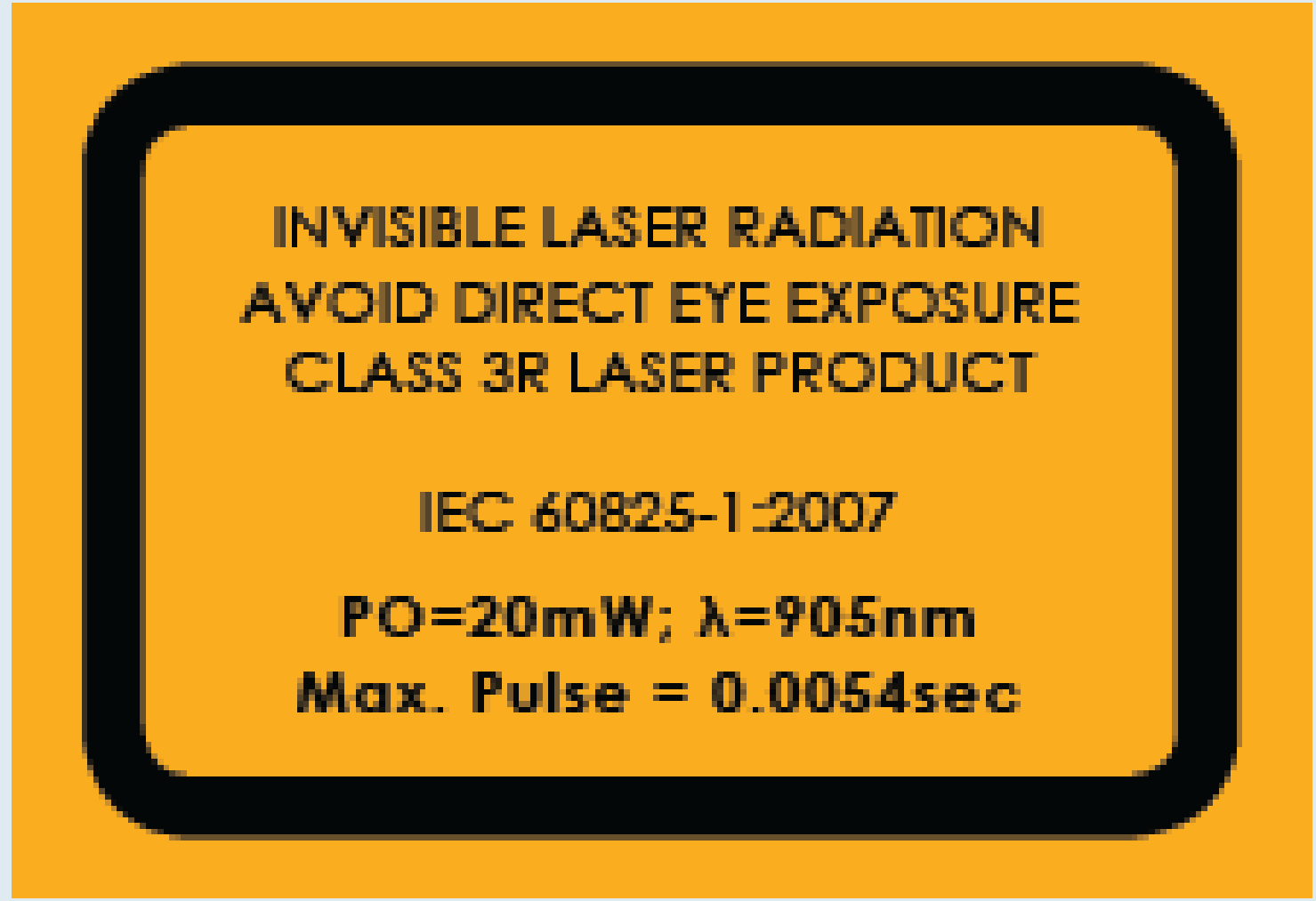
*Notice*

When an area not normally posted as a laser area contains temporary accessible Class 3B (or invisible 3R) or Class 4 laser radiation (such as in the case of servicing of a device with an embedded laser), a sign, giving notice of the temporary hazard, shall be posted, as shown in the following example. The word "Notice" with a blue background is used for this sign. The "notice" sign must accompany a "danger" sign with specific details of the temporary hazard.

# NIST Laser Safety Program

**Invisible Class 3R = Equivalent to Class 3B**

# The FARO has an invisible Class 3R Laser




FARO's laser warning label

# “There is a potential for eye damage…”

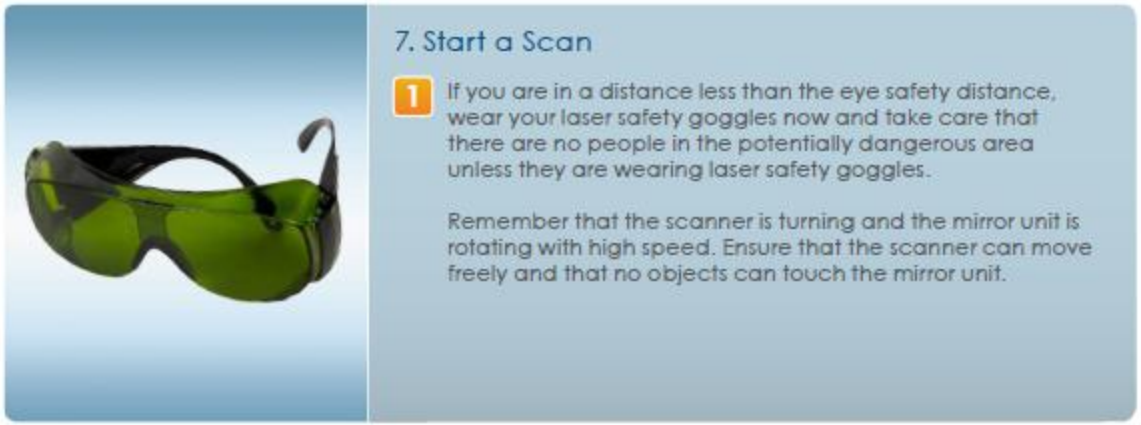
## Laser Safety

### Caution

This product employs a laser system. To prevent direct exposure to the laser beam, do not try to open the enclosure. The FARO Laser Scanner Focus$^{3D}$ should only be operated by trained personnel.

When operating the FARO Laser Scanner Focus$^{3D}$, you must adhere to the eye safety distance (nominal ocular hazard distance NOHD). Personnel working in distances shorter than the eye safety distance must wear laser safety glasses. Prevent people without laser safety glasses from entering this area (e.g. by using a safety fence).
There is a potential risk of eye damage when not correctly used.

The FARO Laser Scanner Focus$^{3D}$ is classified as class 3R but stays within the limits of laser class 1, if all instructions are obeyed, especially if no one is allowed to enter the minimal hazard distance unless equipped with laser safety goggles.



### 7. Start a Scan

1. If you are in a distance less than the eye safety distance, wear your laser safety goggles now and take care that there are no people in the potentially dangerous area unless they are wearing laser safety goggles.

   Remember that the scanner is turning and the mirror unit is rotating with high speed. Ensure that the scanner can move freely and that no objects can touch the mirror unit.

# …which is why it comes with laser safety goggles


FARO® Laser Scanner Focus$^{3D}$ Manual
November 2010

**Starting a Scan**

If you are in a distance less than the eye safety distance, wear your laser safety glasses now and take care that there are no people in the potentially dangerous area unless they are wearing laser safety glasses.

Remember that the scanner is turning and the mirror unit is rotating with high speed. Ensure that the scanner can move freely and that no objects can touch the mirror unit.

If eyes are not protected adequately when working with laser beams, severe damage can occur.

When operating the Focus$^{3D}$, you must **adhere to the eye safety distance** (nominal ocular hazard distance NOHD). The eye safety distance is dependent on the requested resolution (*see "Scanning" on page 39*) and on the laser power. Personnel working in distances shorter than the eye safety distance must wear laser safety goggles. Prevent people without laser safety goggles from entering this area (e.g. by using a safety fence). The Focus$^{3D}$ stays within the limits of


**Blinking red light warns user**

# What Happens During the FARO Scanning Process

**Eye safety distance is displayed**

# Laser Comparison – FARO vs. Leica

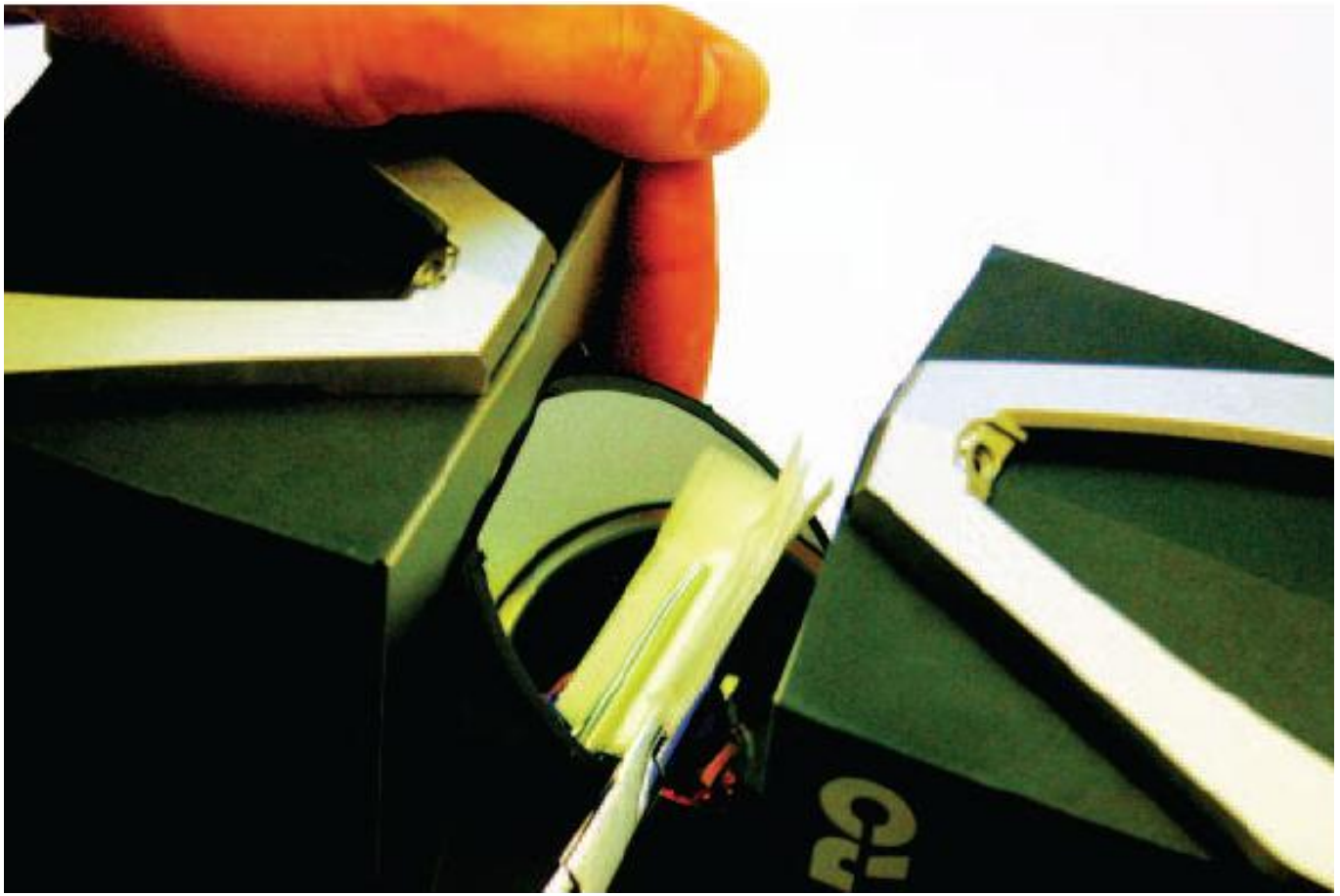

**Class 3R - Invisible**

**Leica ScanStations do not require laser safety goggles**


- when it has to be right

Leica Geosystems

# The FARO has a mirror which is completely unprotected and you are warned to do not expose the Focus to rain or moisture



# High humidity can damage it

FARO® Laser Scanner Focus$^{3D}$ Manual
November 2010

## Chapter 3: Safety Precautions and Maintenance

### General Safety Information

**WARNING:**

- Read this **User's Manual** carefully and refer to it. Pay close attention to all warnings and follow the instructions step by step.
- **Do not expose the Focus$^{3D}$ to rain or moisture**. For outdoor use, please use the PowerBlock battery as a power supply and ensure that the device is protected from rain or spray water. Do not use the product near water. Humidity must not be higher than 80%. Liquid in the product's enclosure can lead to severe damage, fire, or electric shocks.

# One FARO Customer's Solution…Plastic Wrap

# The Leica ScanStation has a rating of IP 54 and can operate in the dust and rain


| Environmental | |
|---|---|
| Operating temp. | 0° C to 40° C / 32° F |
| Storage temp. | -25° C to +65° C / -1 |
| Lighting | Fully operational betwe |
| Humidity | Non-condensing |
| Dust/humidity | IP54 (IEC 60529) |

| | |
|---|---|
| 5 | dust protected |
| 4 | splashing water |

- when it has to be **right**

Leica Geosystems