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LiDAR
Light Detection and Ranging

WHAT IS LIDAR?

LiDAR - **Li**ght **D**etection **A**nd **R**anging is:

• a technology used to collect elevation data from ground or aerial based acquisitions

• used for efficient collections of accurate XYZ digital map data

• technology to be used to collect 2913 square miles of Area 1 within Los Angeles County, CA

• for this project will have an average collection spacing of one measurement every five feet

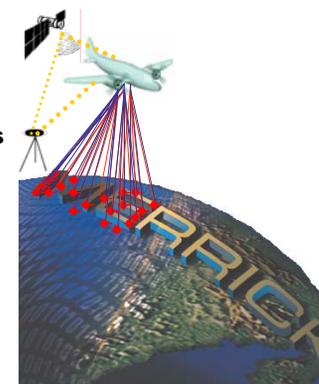• for this project will be accurate to better than one foot horizontal and half foot vertical

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LIDAR

LiDAR
Cost effective method for collecting millions to billions of elevation points

Technology includes:
Airborne GPS
Inertial Measurement Unit
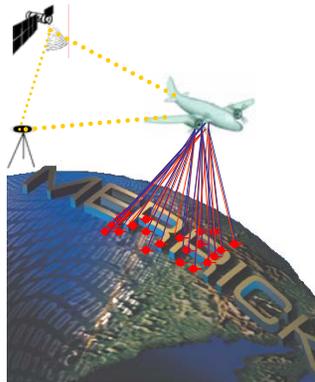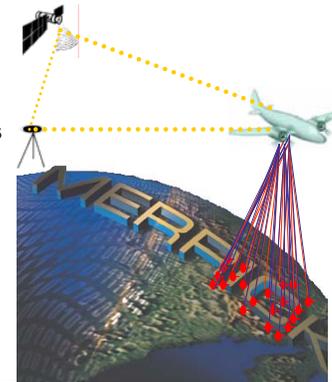Limited ground control
Pulsed laser detection technology

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LIDAR

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LIDAR

LiDAR

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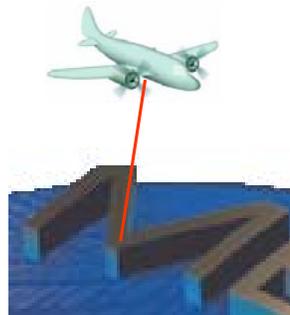
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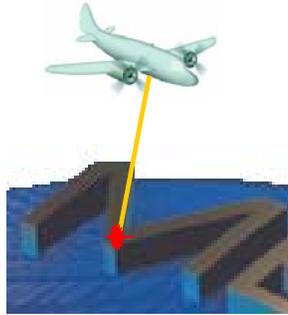
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HOW LIDAR WORKS

How points are created:

1. Laser pulse leaves plane

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HOW LIDAR WORKS

How points are created:

1. Laser pulse leaves plane

2. Pulse reflects off objects

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HOW LIDAR WORKS

How points are created:

1. **Laser pulse leaves plane**

2. **Pulse reflects off objects**

3. **Return pulses collected**

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HOW LIDAR WORKS

How points are created:

1. **Laser pulse leaves plane**

2. **Pulse reflects off objects**

3. **Return pulses collected**

4. **Time of laser shot "trip" is calculated and converted into range (i.e. distance)**

5. **Returns processed with GPS and IMU information to form very accurate XYZ data**

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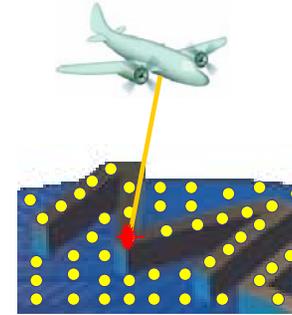
BENEFITS OF LIDAR

Traditional photogrammetric collection

- Angle of incidence

- Leaf-off preferred

- Few ground points in obscured areas

- Different contour accuracy specification (1/2 tree stand height)

| Stereo model | | Stereo model |

Ground points collected

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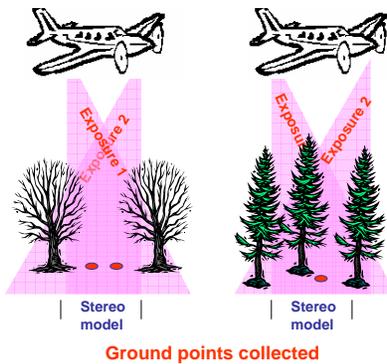
BENEFITS OF LIDAR

LiDAR Collection Advantages

- Angle of incidence

- Leaf-off not required

- Ground points in stand areas

- Above ground feature returns also collected for additional applications

| Laser swath | | Laser swath |

Ground points collected

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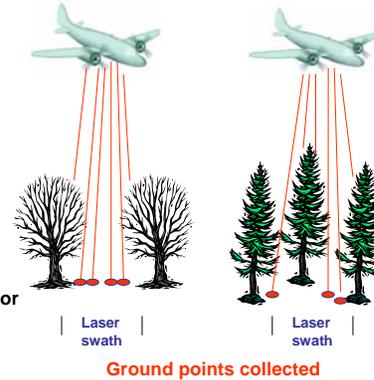
LIDAR SCANNER EQUIPMENT

LiDAR Advantage

Leica ALS50 laser system

**Swath width capable
of up to 75 degrees**

**Capable of up to 85,000
laser pulses per second**

**Capable of scanning up to
70 times per second**

**Altitudes up to 6100
meters AGL**
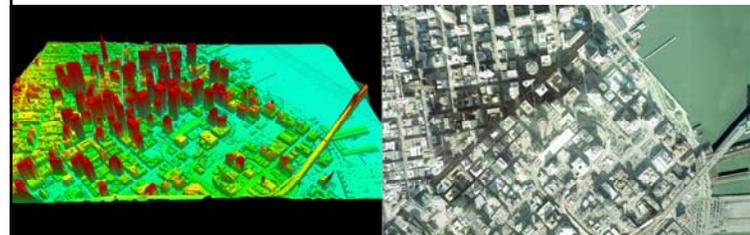

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USES FOR LIDAR DATA

- Floodplain management
- Topographic surveys
- Hydrological modeling
- Viewshed analysis
- All facets of 3D planning
- Pre or post construction visibility analysis
- Cell tower placement
- Forest management
- Powerline corridor obstruction management

- Supply surface to orthorectify imagery to and make as accurate as possible
- Ground elevation measurements which will be used to generate contour deliverables
- Building, tree, or any other vertical feature model with accurate elevation
- 3D data for modeling purposes to be used by police, fire, emergency management, defense, etc.
- Slope, erosion, landslide, etc. prediction modeling and analysis
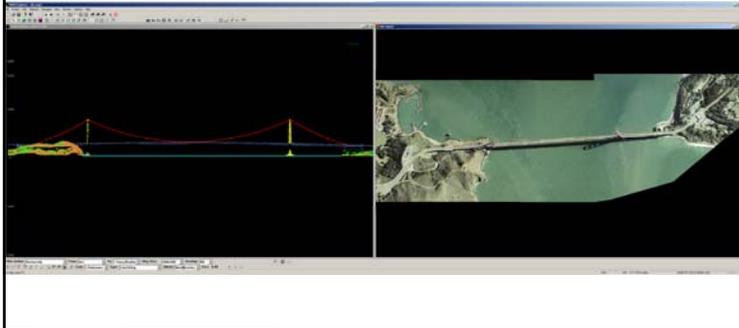- Building, vegetation, powerline, roadway, etc. inventory and assessment

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SAN DIEGO

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SAN FRANCISCO

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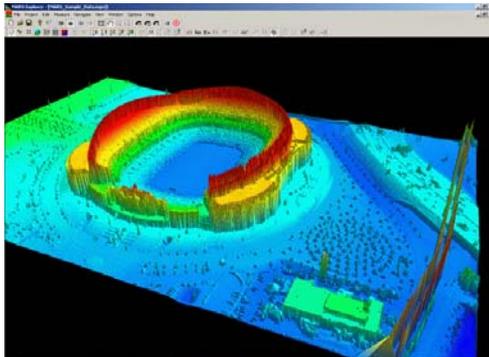
4
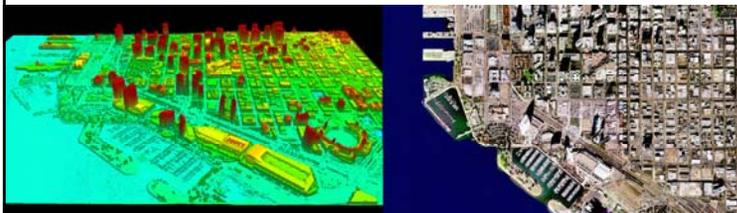
GOLDEN GATE BRIDGE

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IMAGERY – CLASSIFICATION - ELEVATION

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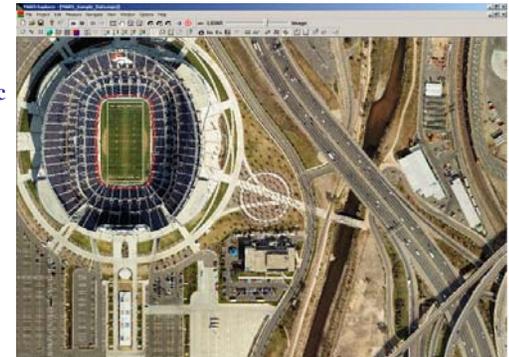## LIDAR COLOR VISUALIZATION

- Color by:
  - Elevation
  - Intensity
  - Classification
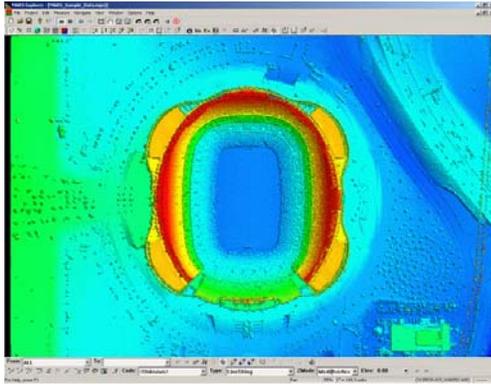 - Flightline

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LIDAR VIEWING CAPABILITIES

- View by:
  - Point cloud
  - 2D orthographic
  - 3D perspective
 - TIN rendered

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LIDAR CROSS SECTION & PROFILING

- **Orthographic display and a cross section window simultaneously**

- **The cross section can be switched to a line profile view**


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LIDAR AUTO CLASSIFICATION

- **Auto classification (a.k.a. batch filtering) is used to separate the ground from the above ground features**

- **Manual editing is used to clean up anything that the automated processes did not do correctly**
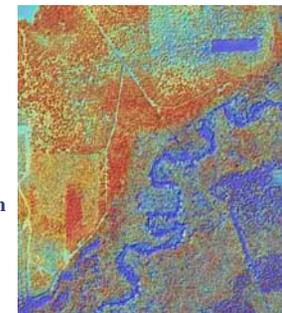

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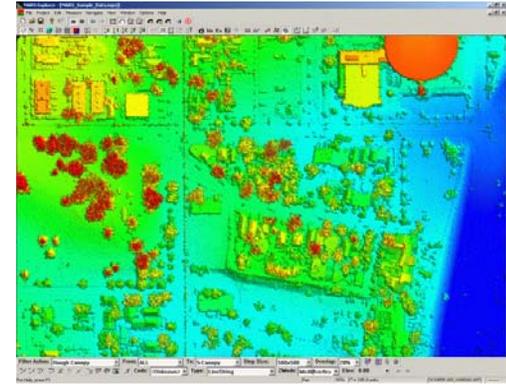
LIDAR MANUAL EDITING

- **Using a cross section view, data can be manually edited from one class to another**

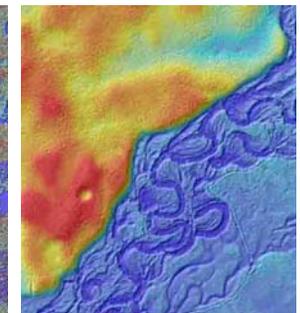- **Entire datasets can be easily reclassified from one class to another using a button click**

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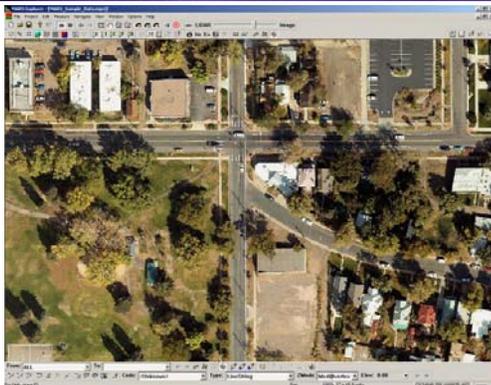
LIDAR VEGETATION FILTERING

- **Tallahassee, Florida**

- **10 foot DEM posting**

- **Chroma depth color**


- **Raw LiDAR data with trees and structures.**
- **Bald earth data with trees and structures removed.**
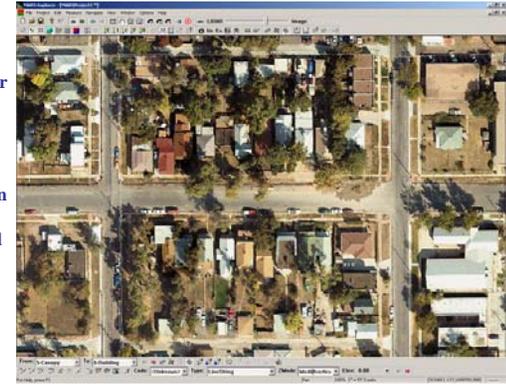
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LIDAR CONTOUR CAPABILITIES

- **Contour display tool**
  - **Renders with point, TIN, and/or ortho display in 2D or 3D**
  - **Selectable settings:**
    - * **Intervals**
    - * **Indexes**
    - * **Minimum contour lengths**
    - * **Contour by flightlines**
    - * **Classifications to use for contour generation**

- **Contours can be exported to CAD, GIS, etc.**
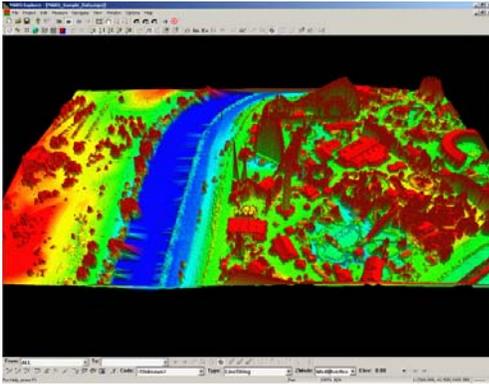
LIDAR AUTOMATED BUILDING CLASSIFICATION

- **Automated building classification will filter out structures from other canopy or above ground features**

- **The tool works with a from and to classification**

- **The result can be viewed in point or TIN form, with an ortho background, and in 2D orthographic or 3D perspective views**

3D DRAPED IMAGE OVER LIDAR

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