



LiDAR and Photogrammetry

Compared and Combined

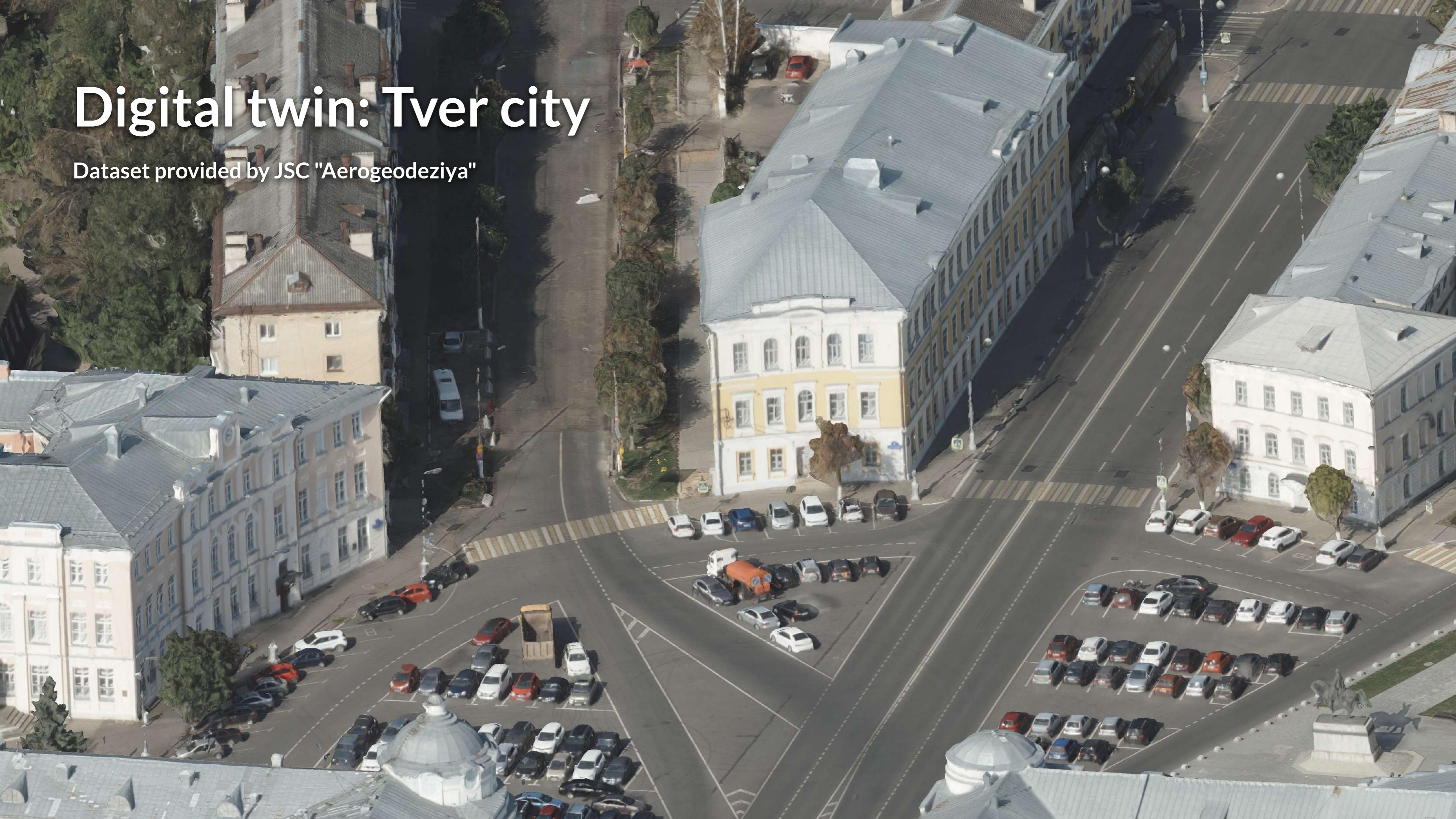


Nikolai Poliarnyi

info@agisoft.com

Digital twin: Tver city

Dataset provided by JSC "Aerogeodeziya"



Digital twin: Tver city

Altitude: 1150 m

Speed: 210 km/h

System: Leica CityMapper-2H

Tver city, dataset provided by JSC "Aerogeodeziya"



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Photos:

150 Megapixels

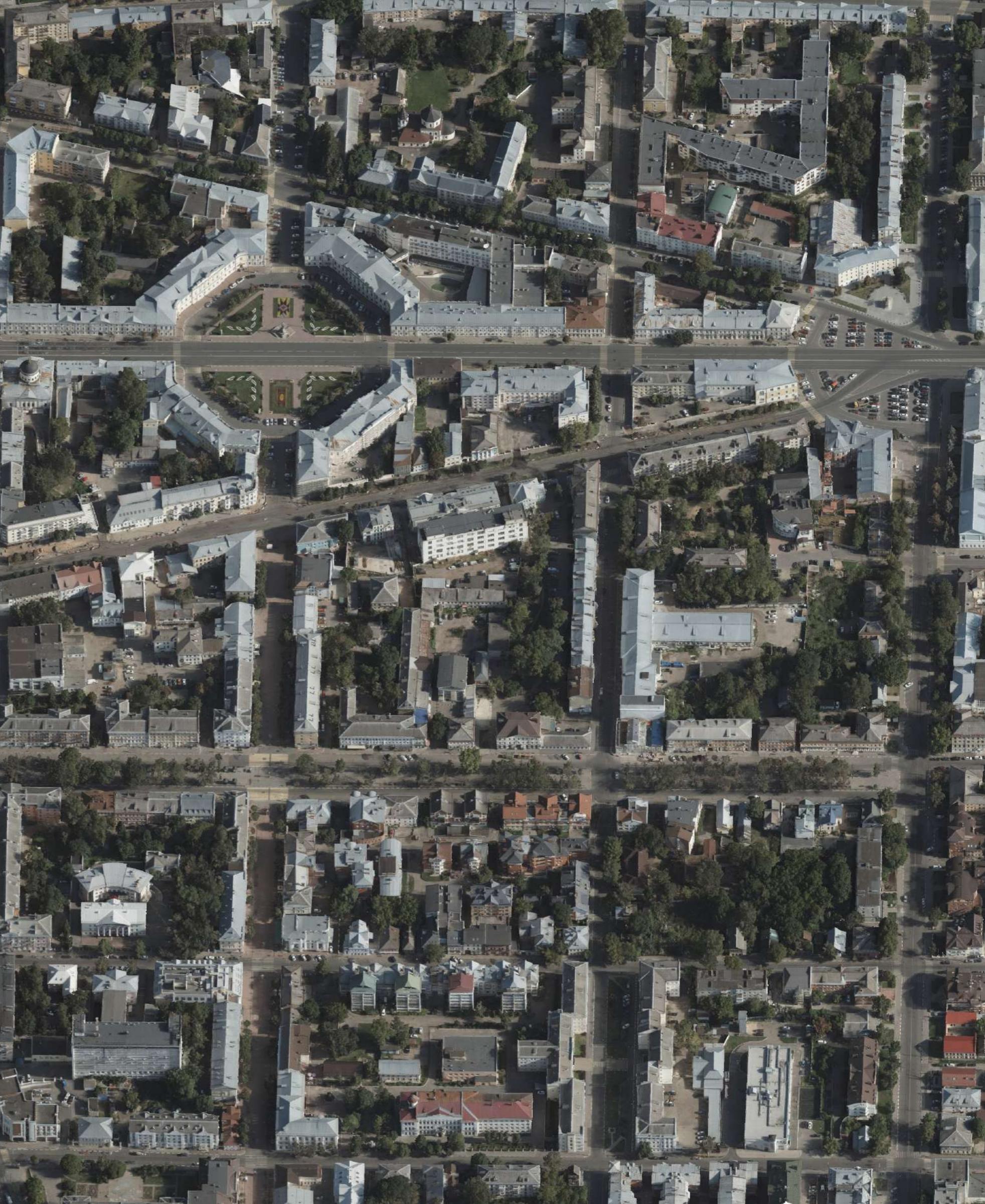
80/80% Overlap

1100 pixels/m²

Nadir: 3 cm GSD

Nadir

Tver city, dataset provided by JSC "Aerogeodeziya"



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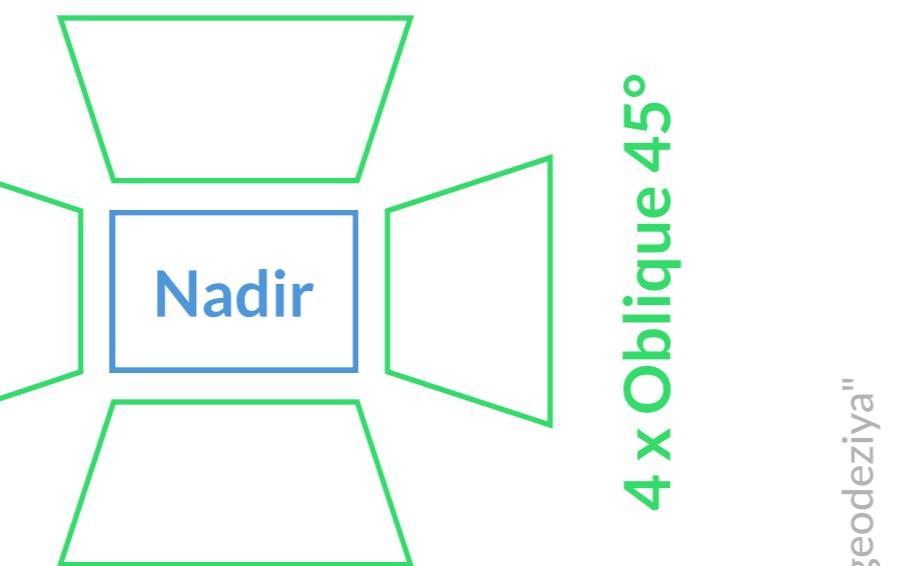
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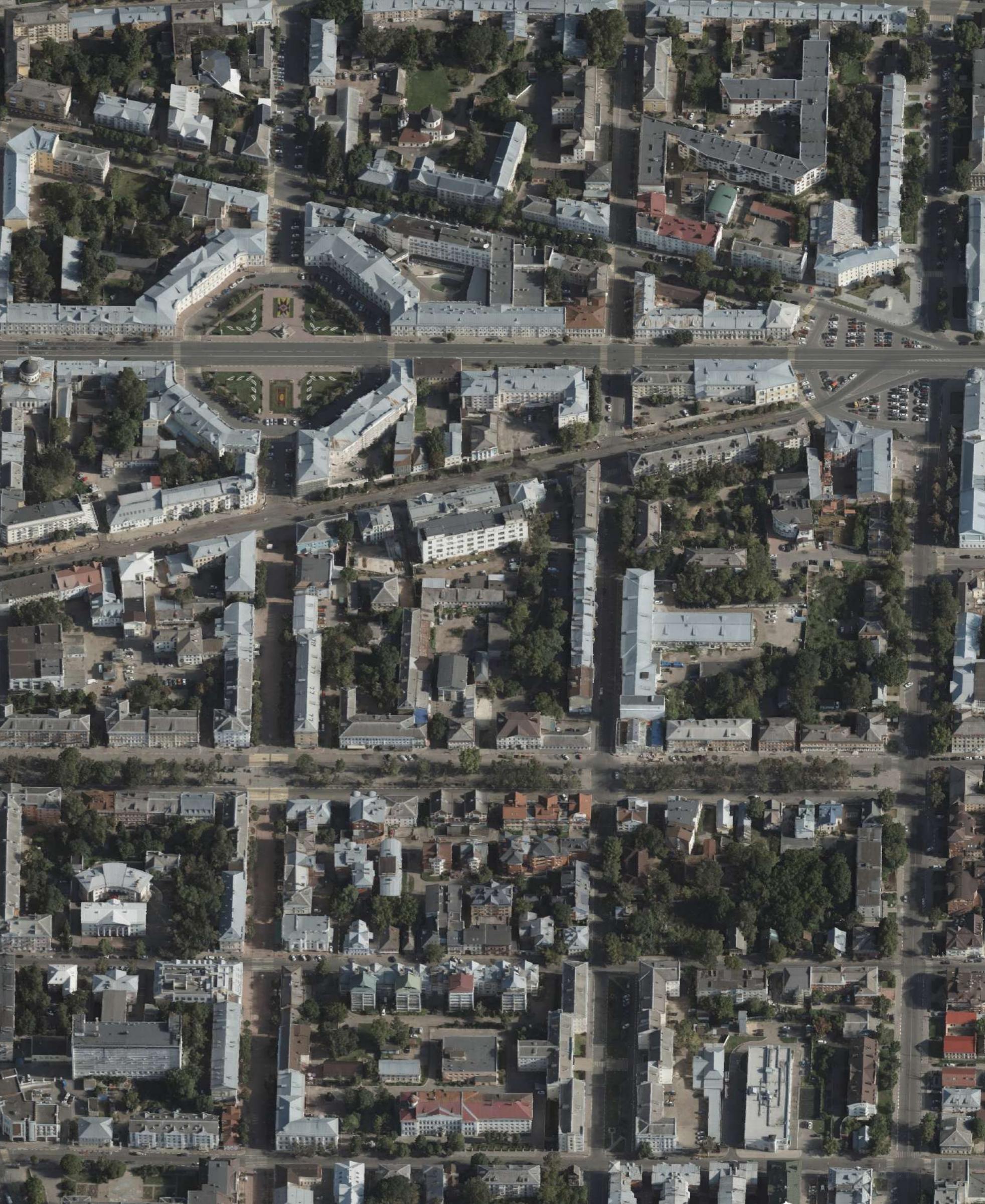
1100 pixels/m²

Nadir: 3 cm GSD

Oblique: 4 cm GSD



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Photos:

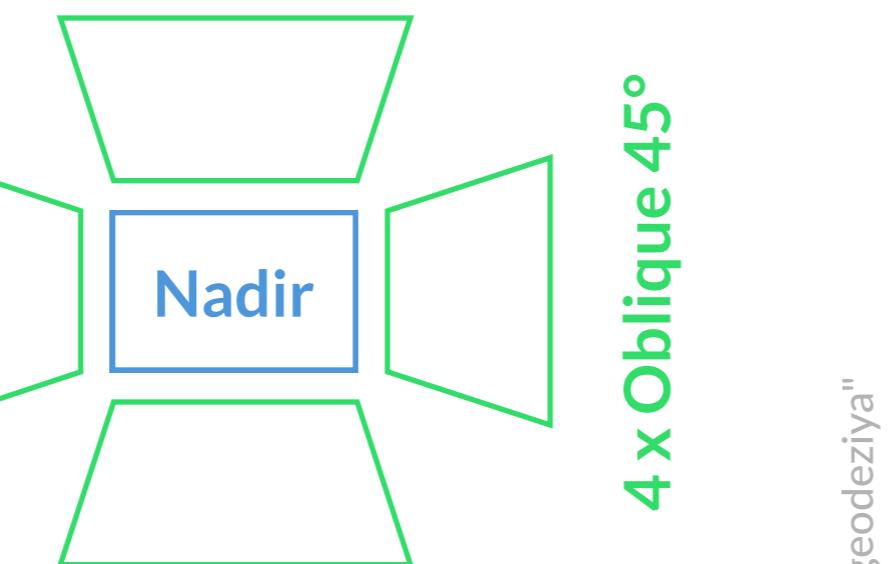
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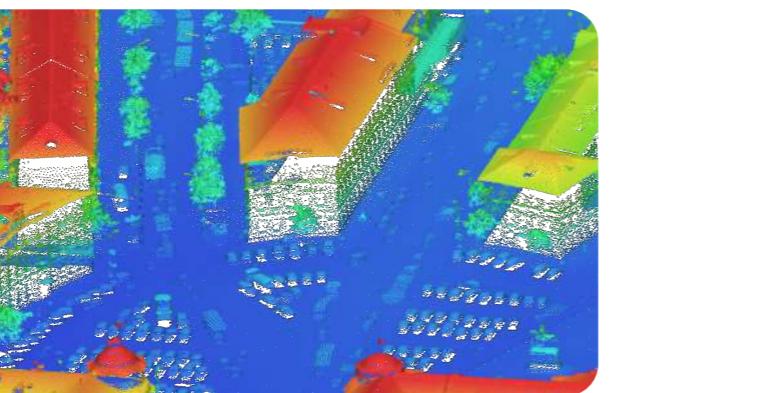


LiDAR:

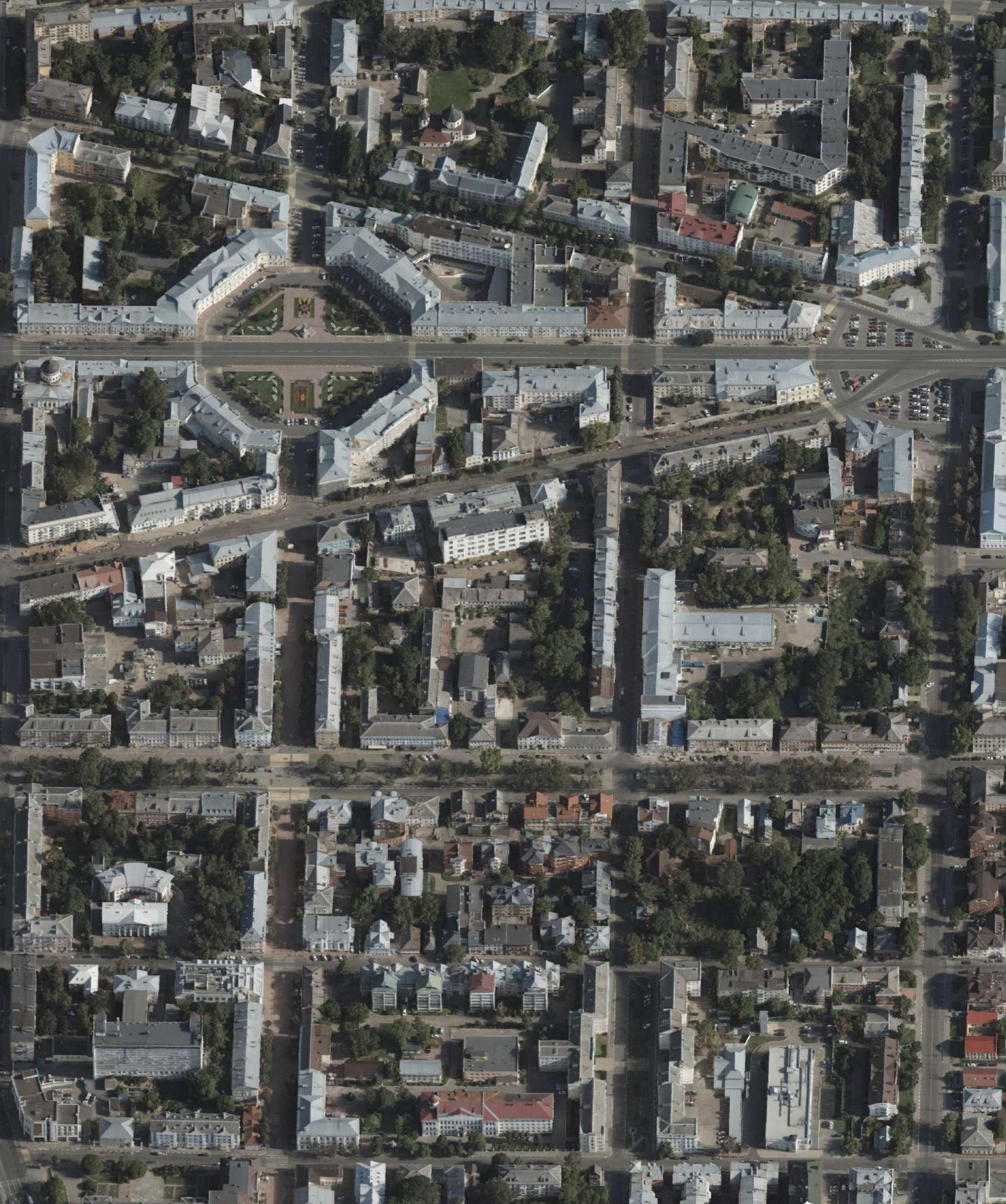
- Aggregated density:

120 points/m²

- Sensor trajectory

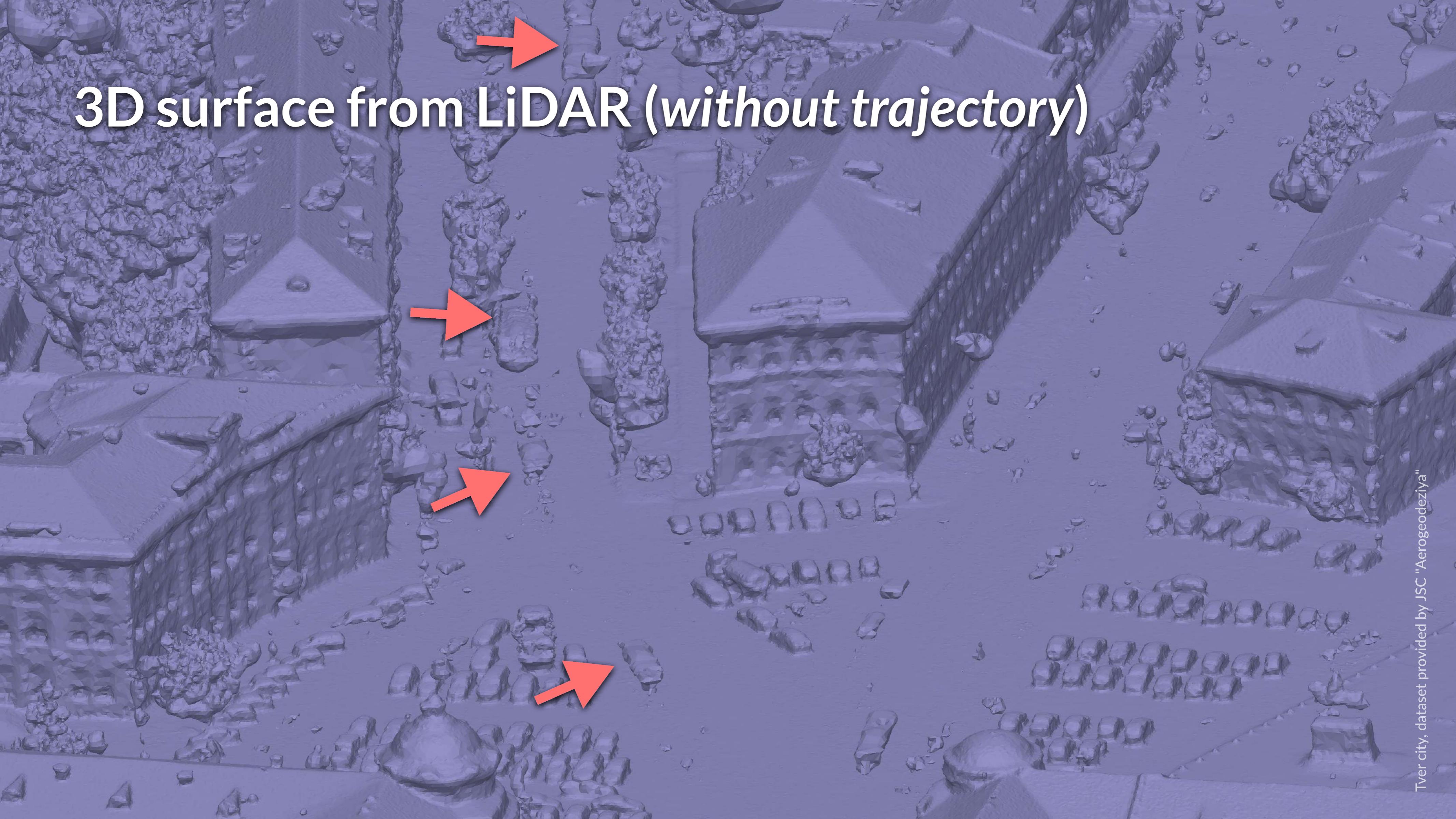


Tver city, dataset provided by JSC "Aerogeodeziya"



LiDAR point cloud



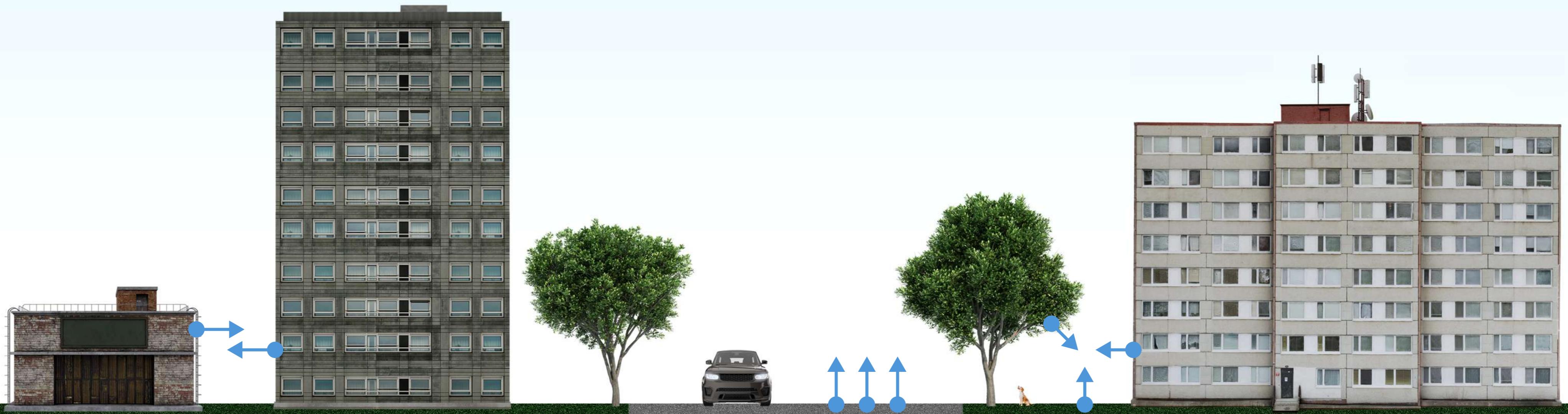


3D surface from LiDAR (without trajectory)

3D surface from LiDAR (with trajectory)

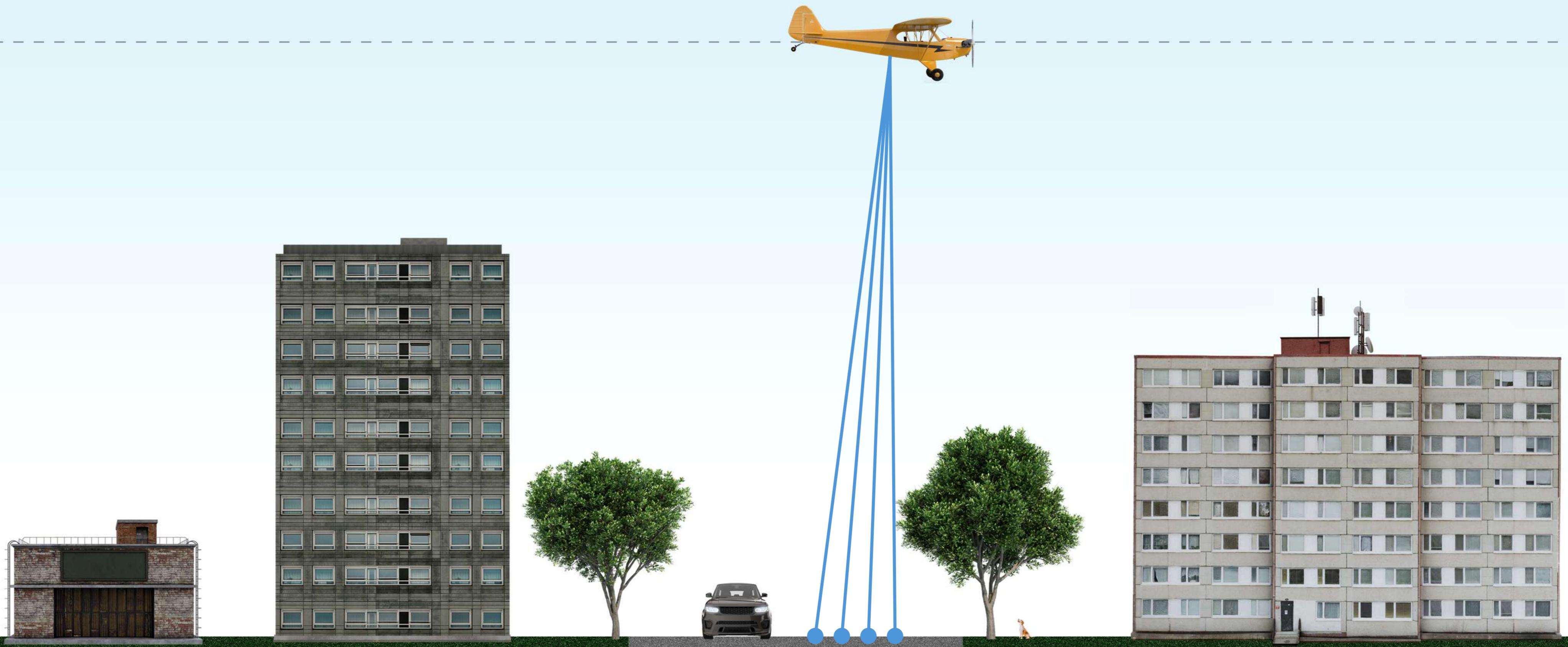


LiDAR points + normals (without trajectory)



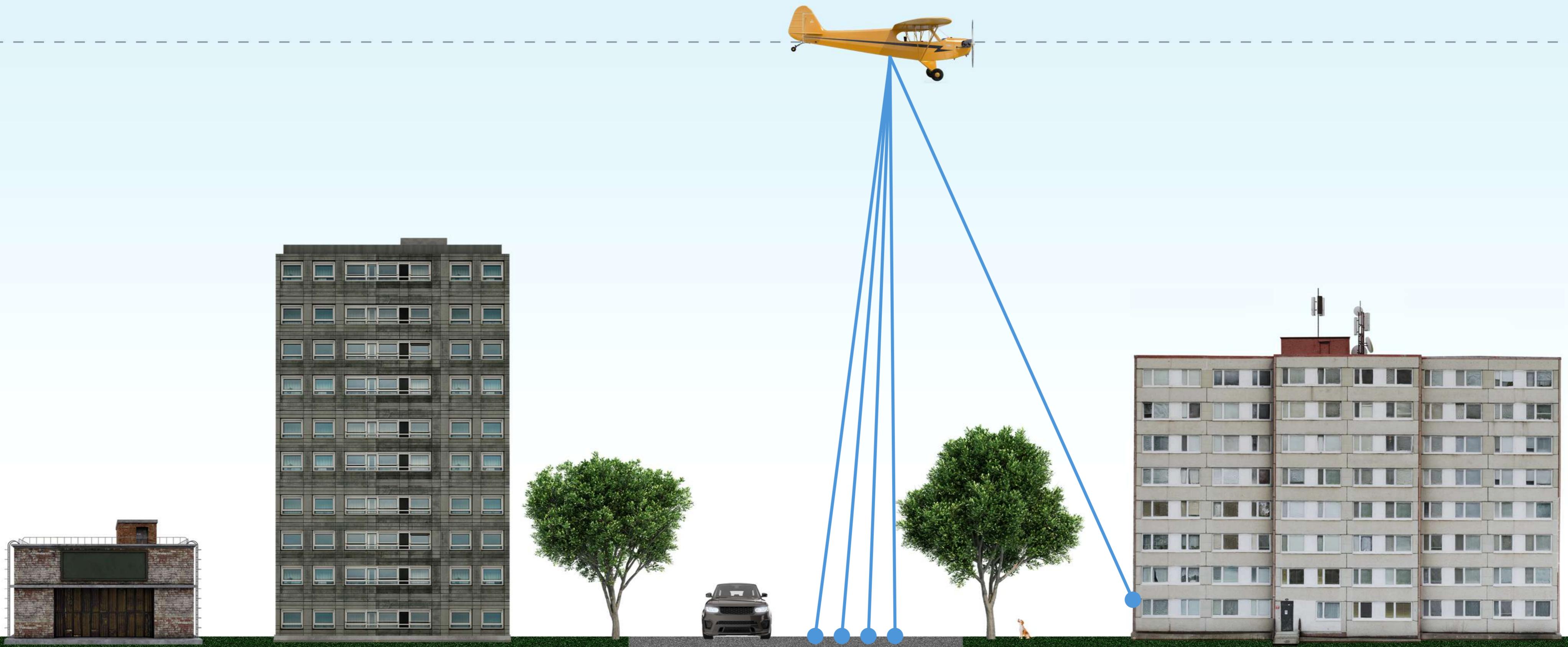
LiDAR points + trajectory

Visibility rays



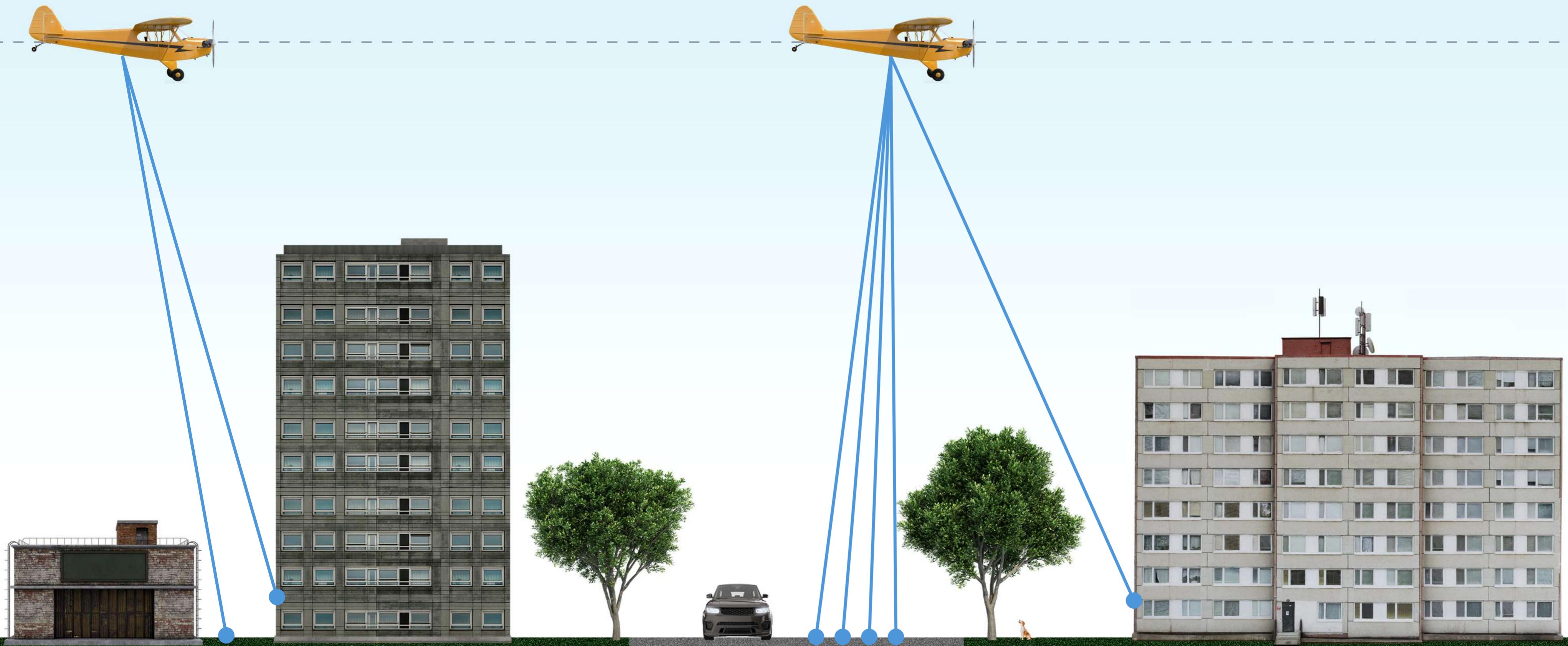
LiDAR points + trajectory

Visibility rays



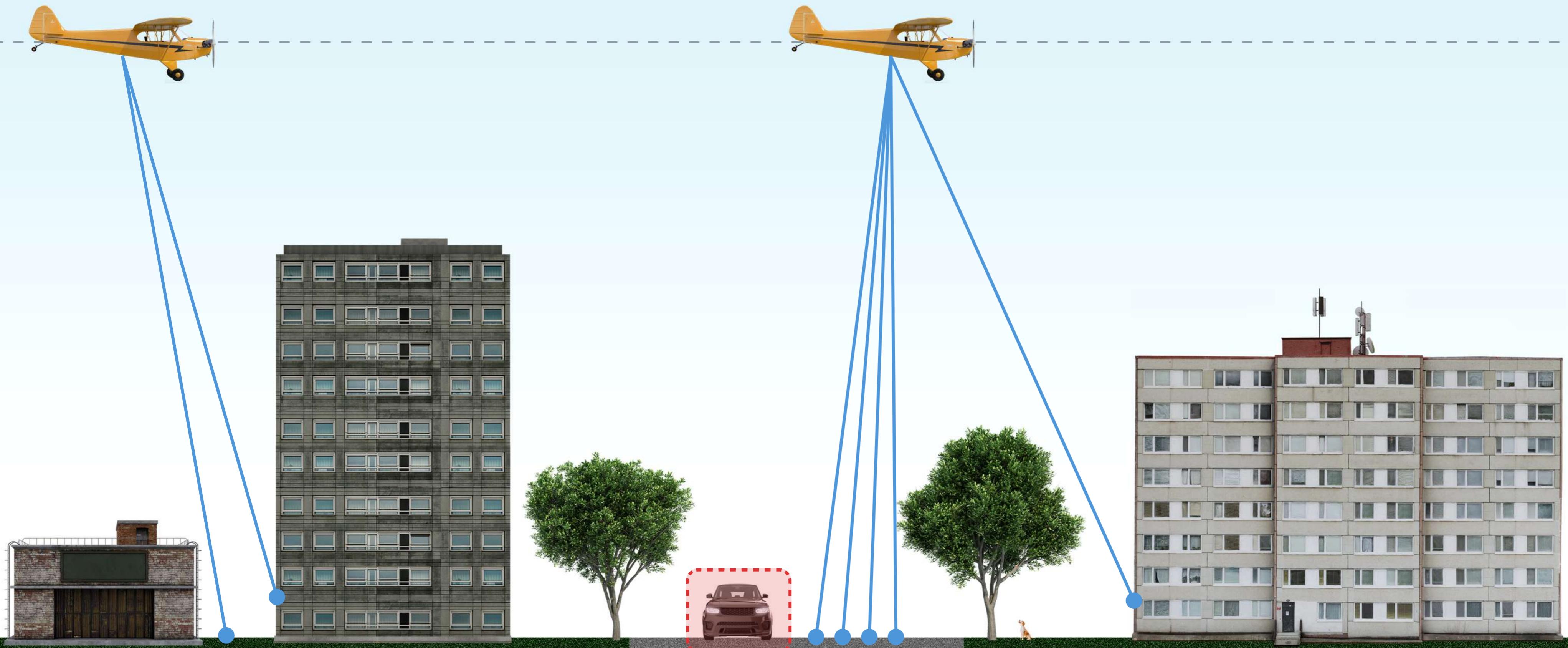
LiDAR points + trajectory

Visibility rays



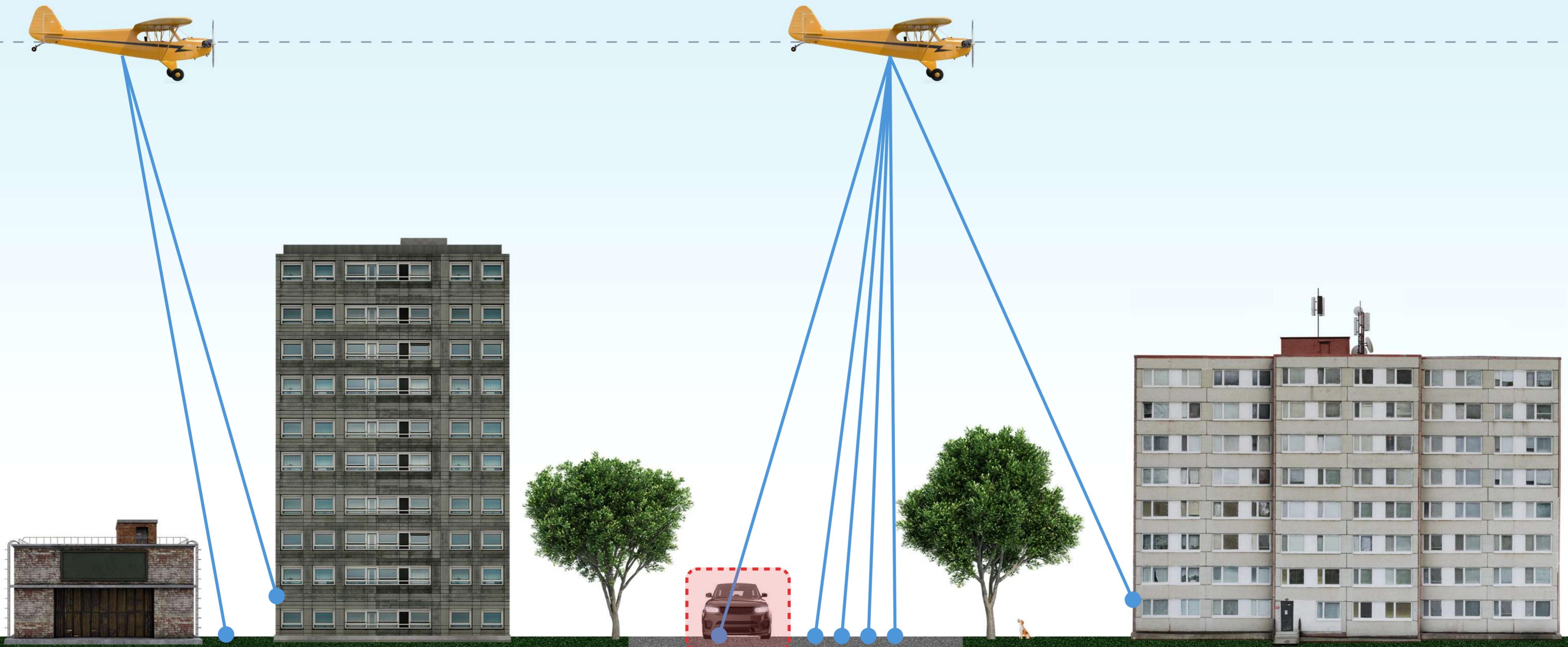
LiDAR points + trajectory

Visibility rays



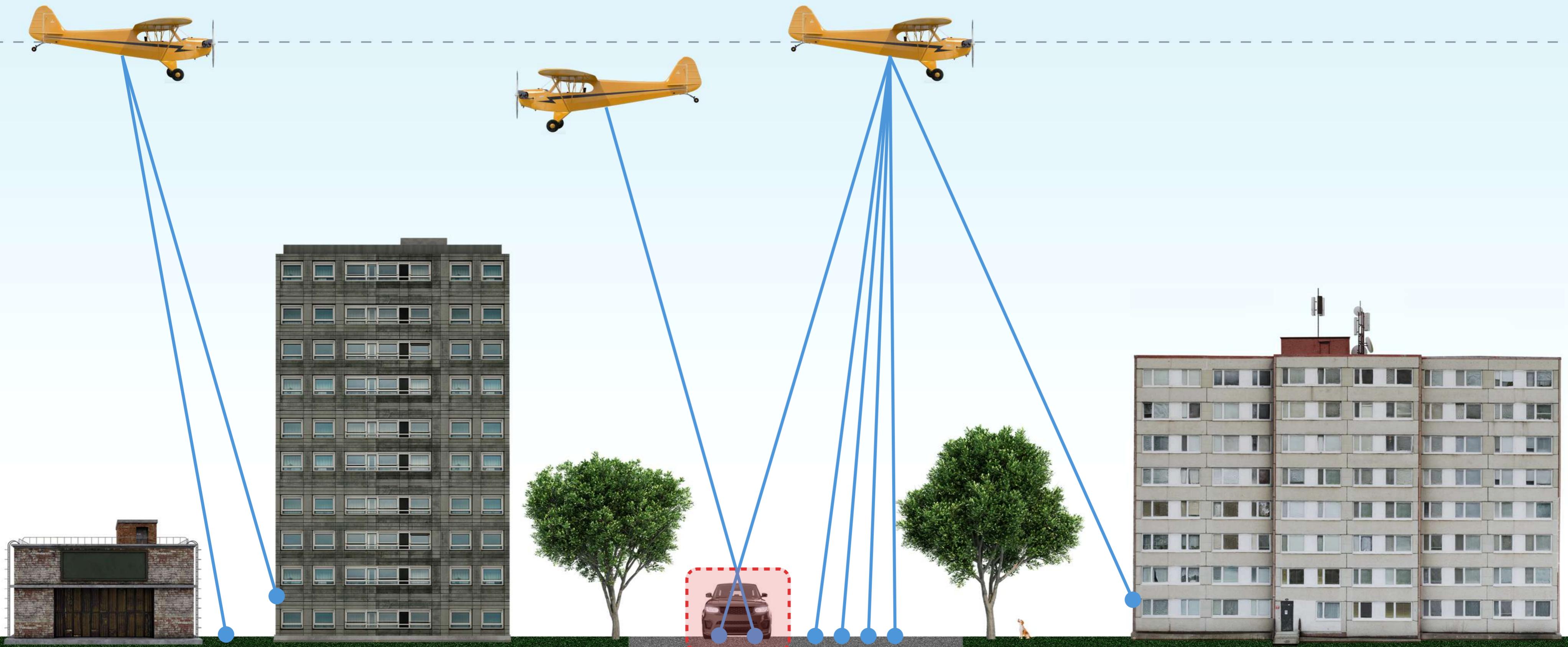
LiDAR points + trajectory

Visibility rays



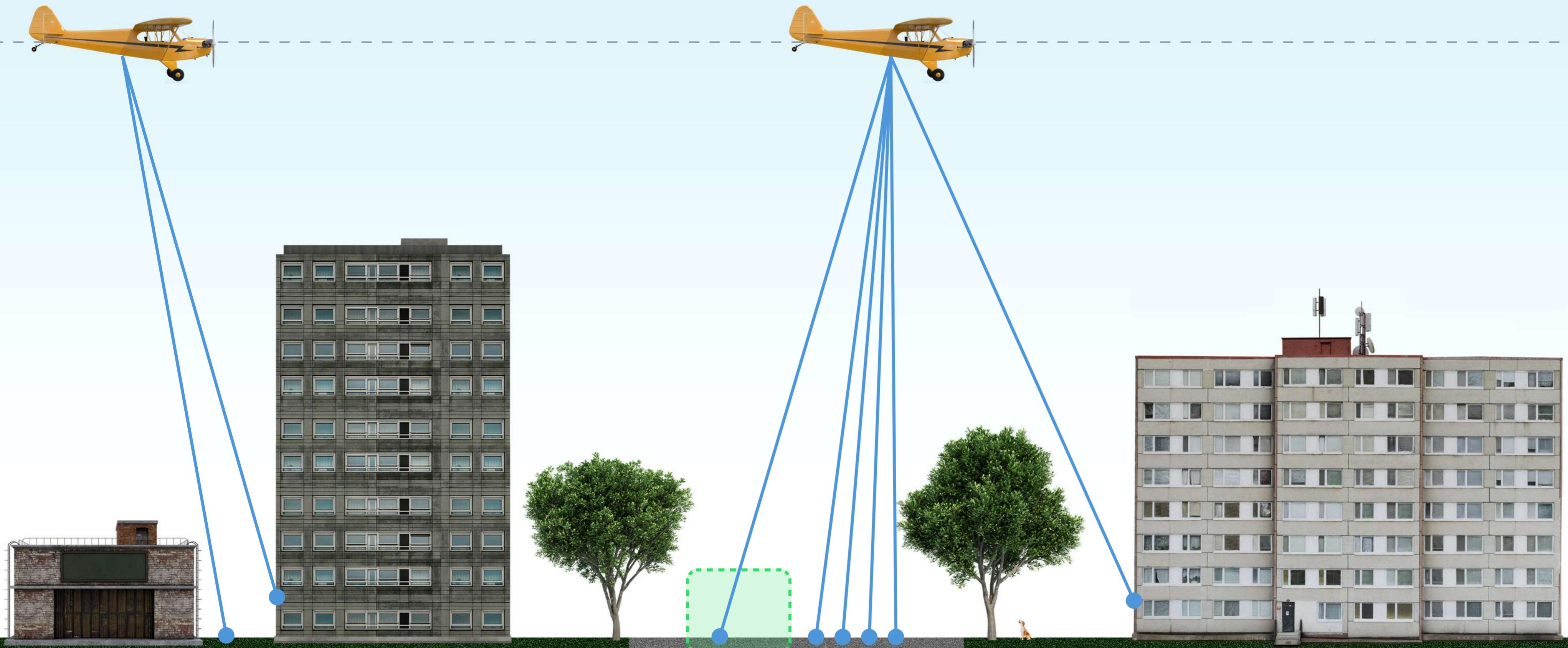
LiDAR points + trajectory

Visibility rays



LiDAR points + trajectory

Visibility rays

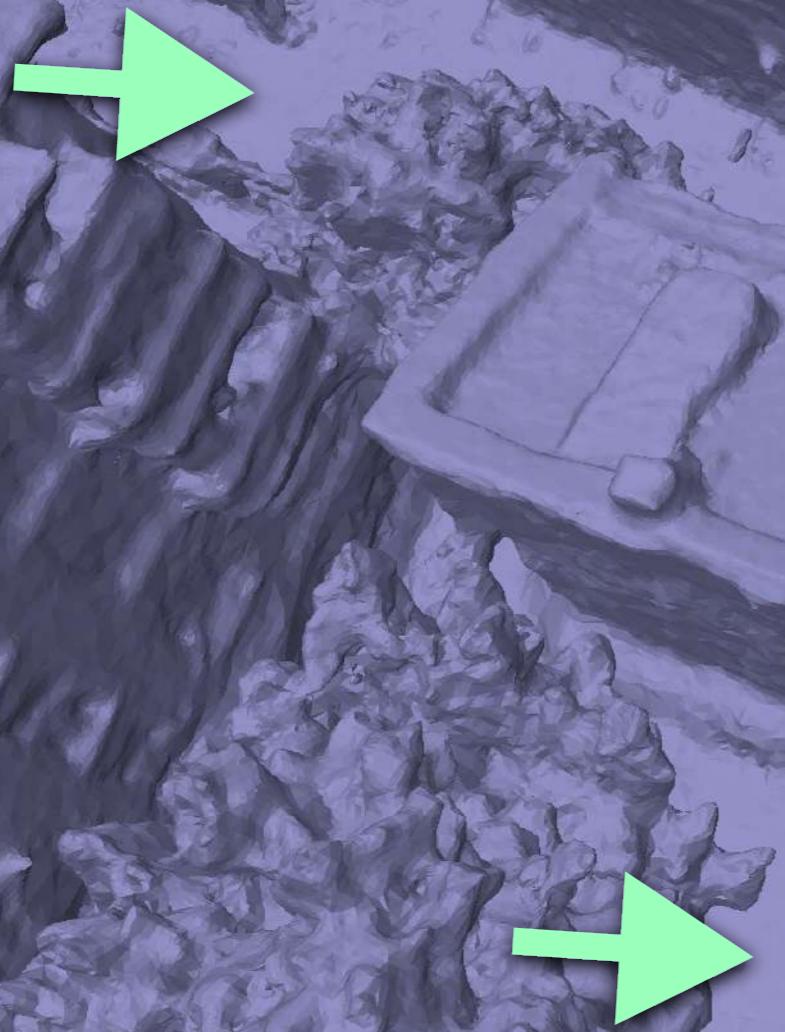


Tver city

Photogrammetry



Photogrammetry + LiDAR





Tver city

LiDAR

Photogrammetry

LiDAR (with trajectory)

Processing time: x1.0 slower
24 minutes
(baseline)

Photogrammetry

Processing time: x5.1 slower

2 hours 2 minutes



Photogrammetry

Processing time: x5.1 slower

2 hours 2 minutes

Photogrammetry + LiDAR

Processing time: x6.6 slower

2 hours 40 minutes

Tver city



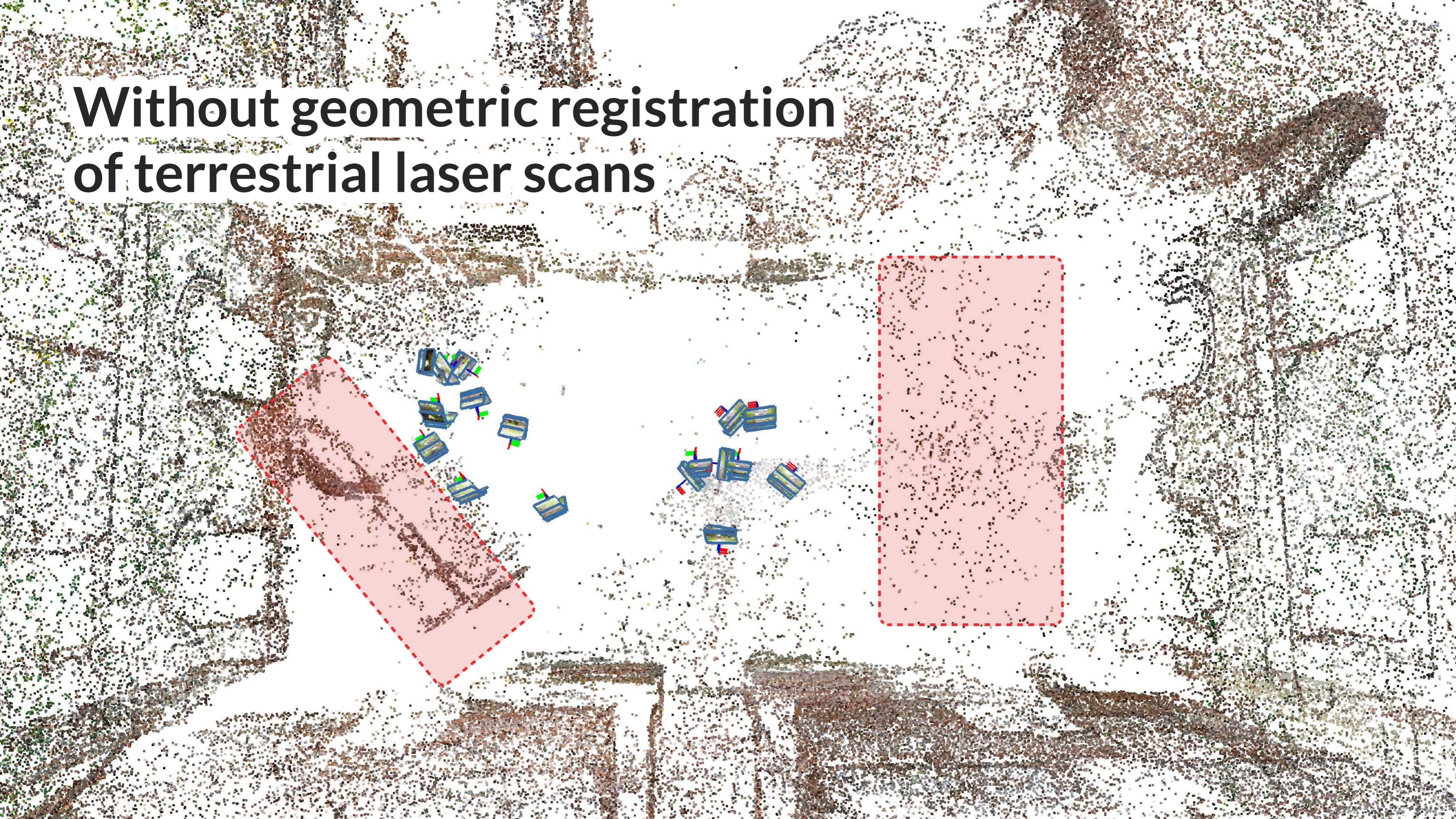
Potemkin's mansion



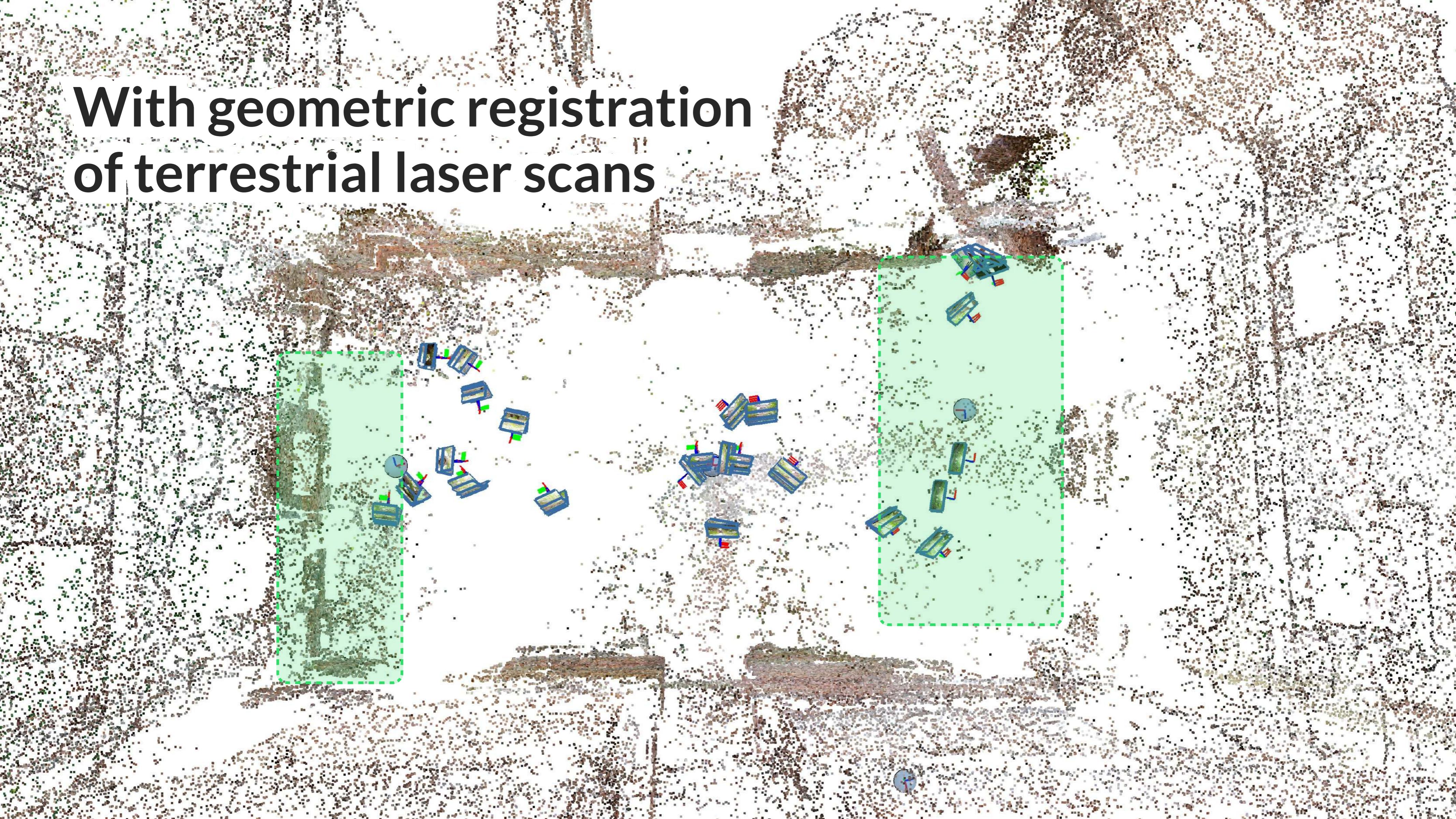
Potemkin's mansion



Without geometric registration of terrestrial laser scans



With geometric registration of terrestrial laser scans



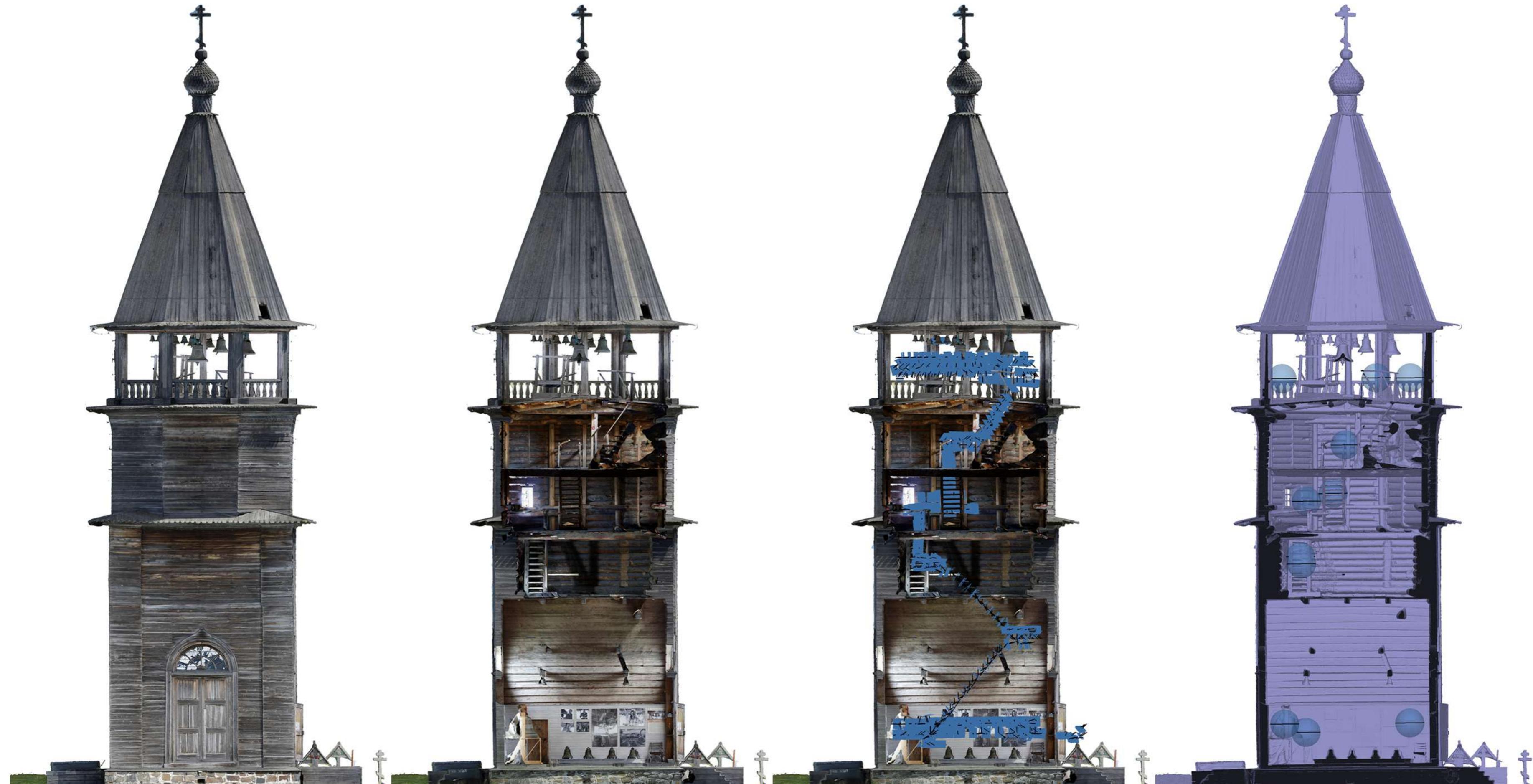
Combined: photos + terrestrial laser scans

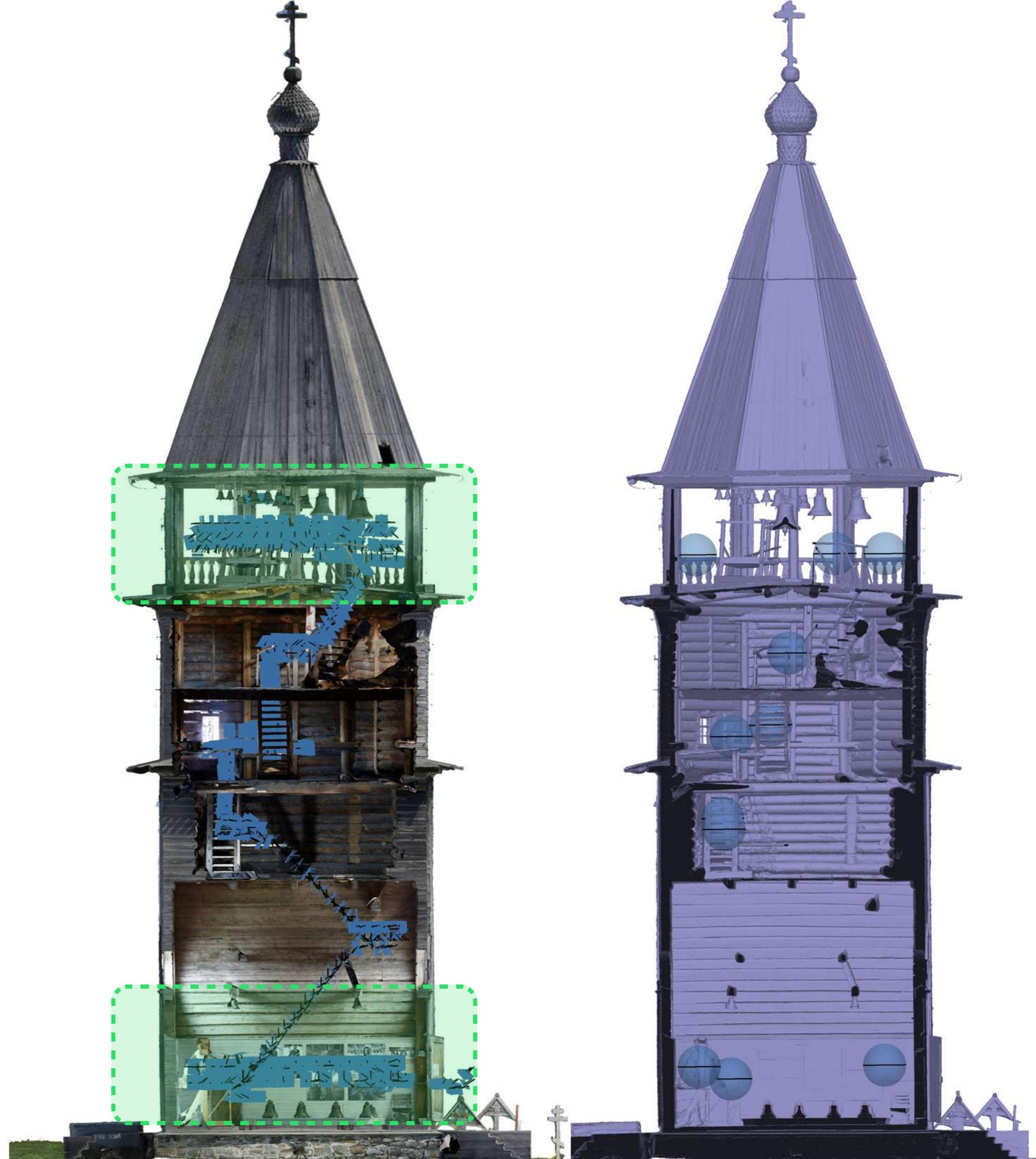


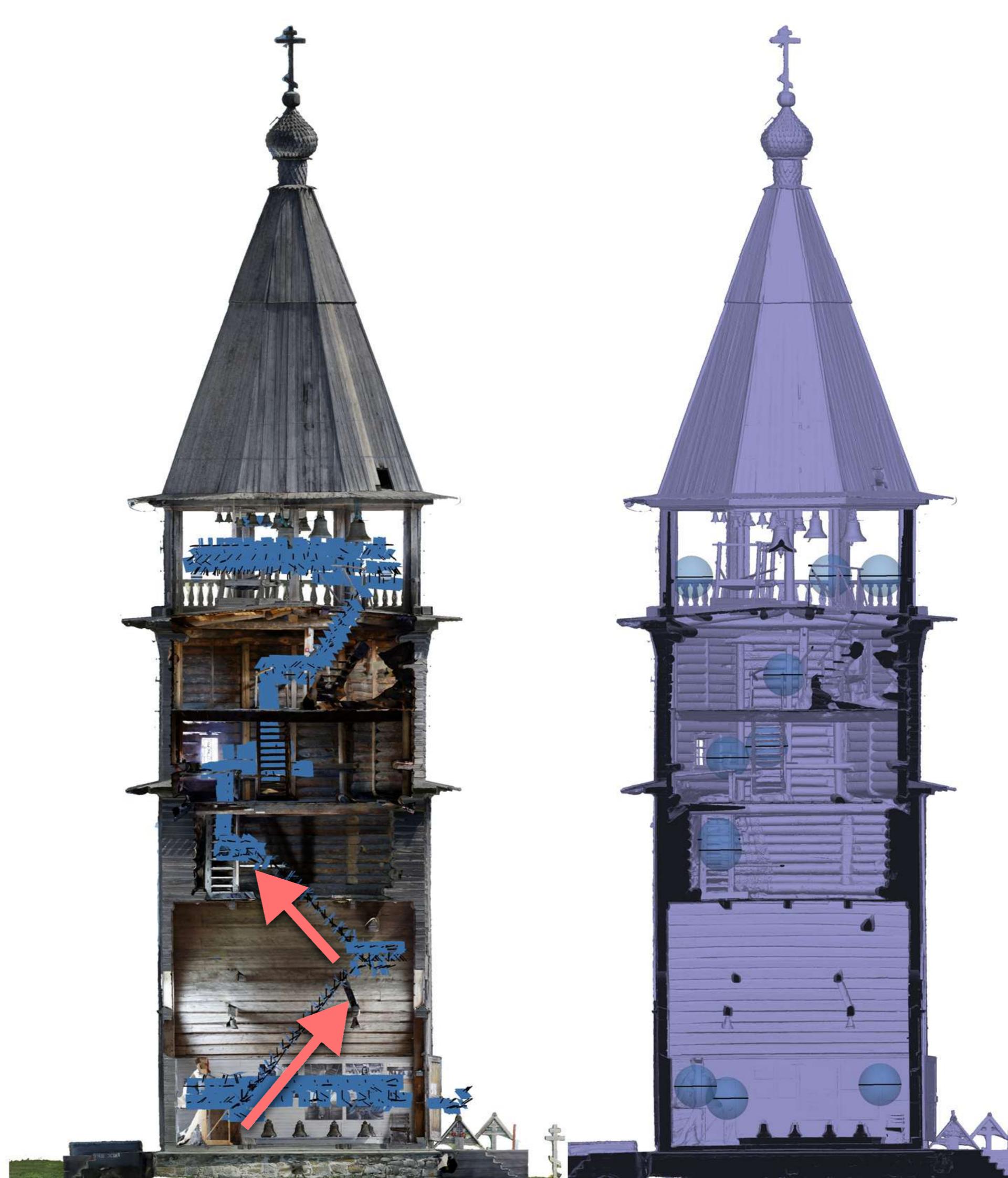
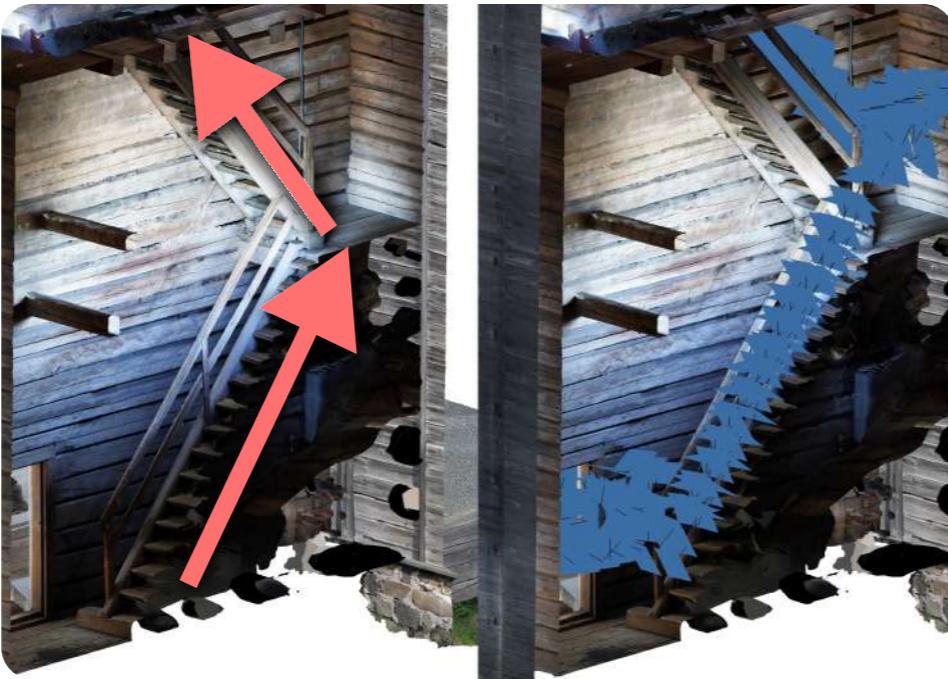
Combined: photos + terrestrial laser scans

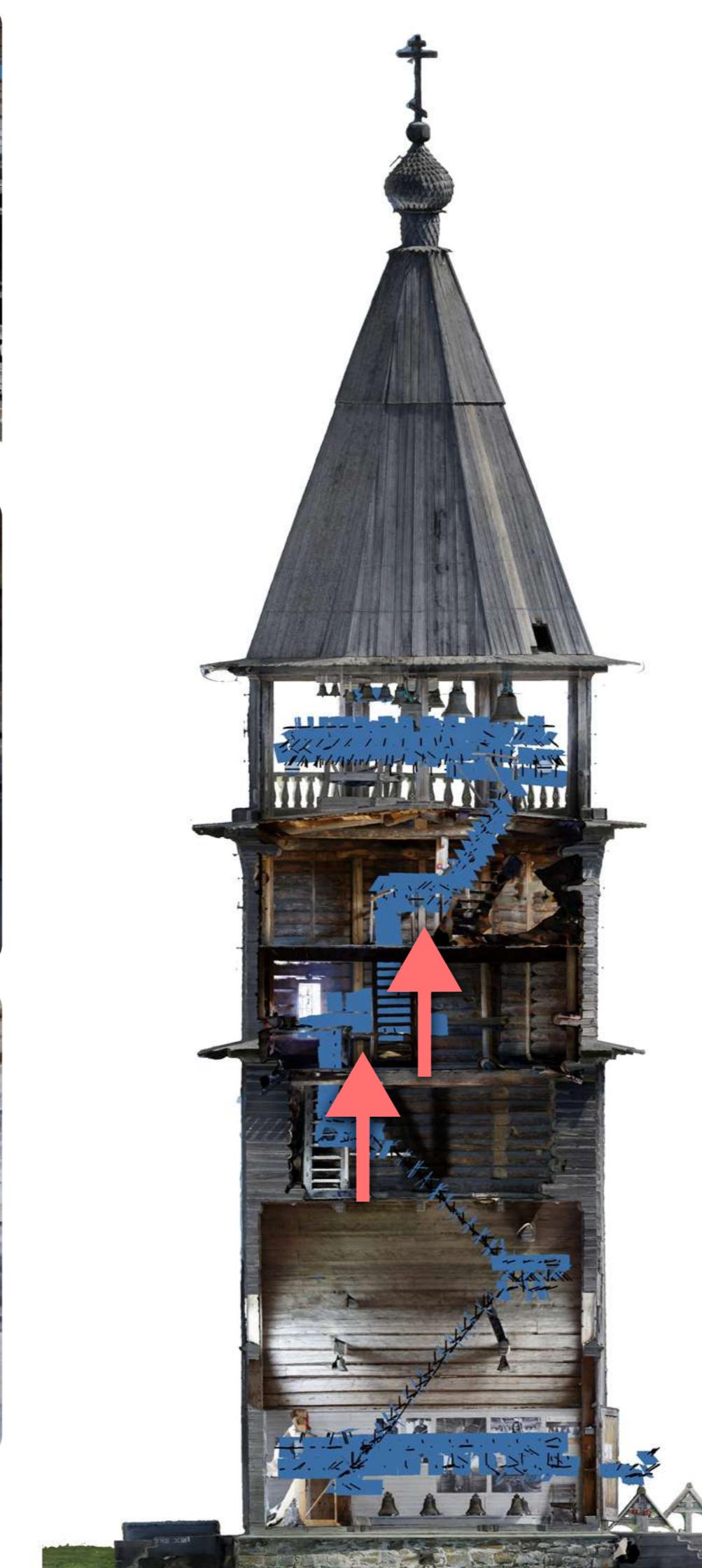
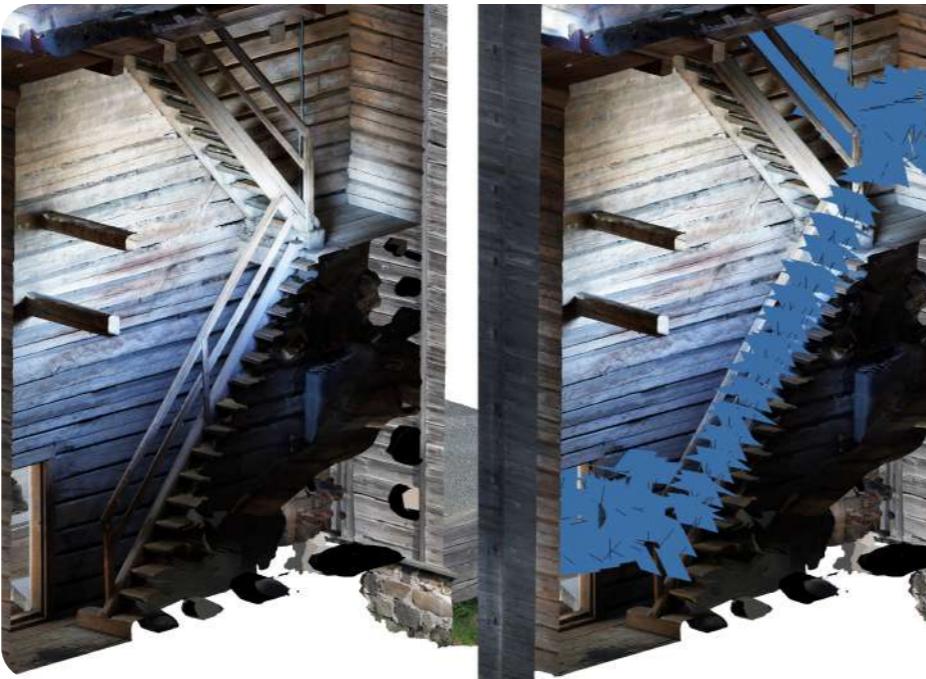


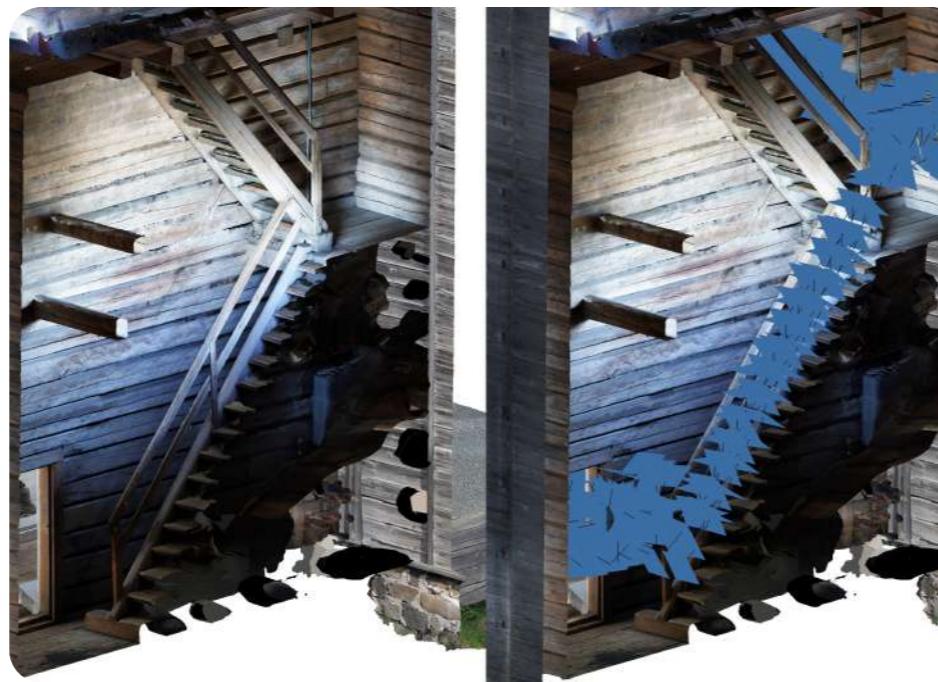
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LiDAR or Photogrammetry?

LiDAR data processing is faster

LiDAR is reliable in obscure areas:

- between facades and trees
- in narrow passages (especially interior)

Photogrammetry:

- more details where overlap is good



Best results achieved
with combined processing!

LiDAR and Photogrammetry

Compared and Combined

Metashape 2.0 (2023)

- combined surface reconstruction (aerial LiDAR, TLS, photogrammetry)
- combined alignment of TLS and photogrammetry

Metashape 2.1 (2024)

- geometric registration of point clouds (aerial LiDAR, TLS, photogrammetry)

Thanks for your attention!

Questions?



Nikolai Poliarnyi

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Visit us at booth 01