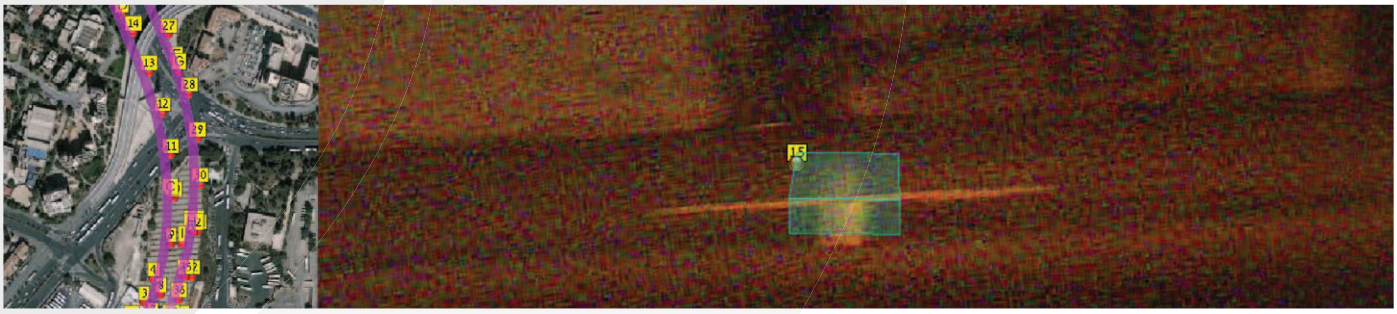
MOBILE MAPPING A 600M TUNNEL

APPLYING ACCURATE MEASUREMENTS INSIDE A TUNNEL USING CONTENT MANAGER TRAJECTORY ADJUSTMENT FEATURE.

Photogrammetry is one of the most fundamental task's Ofek Aerial Photography is doing on a daily basis. In almost every aerial mapping mission, there is a need in ground survey to complete the sampling of obscured objects.



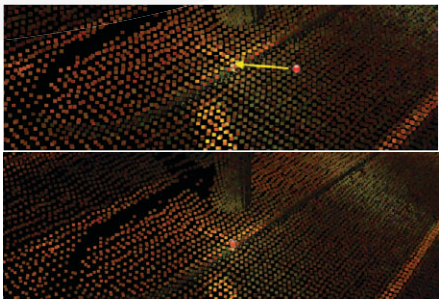
GCP's inside the tunnel: every second GCP was used for adjustment and the rest was used as check points. Marking the GCP with white "X" on the edge of the curbstone helps to identify its position even if the image is dark.

Mobile mapping is our preferred choice for doing such measurements, but what if the Area of Interest of the survey includes a 600m tunnel without GPS reception at all ?

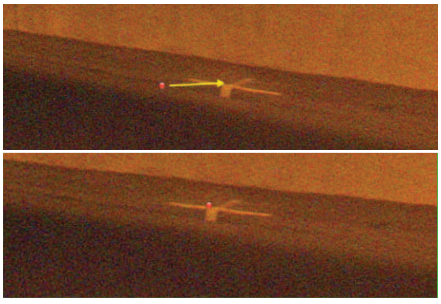
To solve this situation we used 40 high accuracy GCP from inside the tunnel acquired using total stations and applied the Trajectory Adjustment feature in Orbit's Content Manager.

The 40 GCPs were spread along the tunnels. Each one of them was measured on the edge of a curbstone and was marked with 10 cm white X. Every odd point was measured using the Orbit GCP extension, and every even point was kept as check point, and was not involved in the adjustment process.

The average deviation inside the tunnel before the adjustment was 75cm and reached a maximum of 1.22m for XYZ in



GCP on Curbstone, Before adjustment (Upper image) and after Adjustment (Lower Image) - Both Images in 3D view

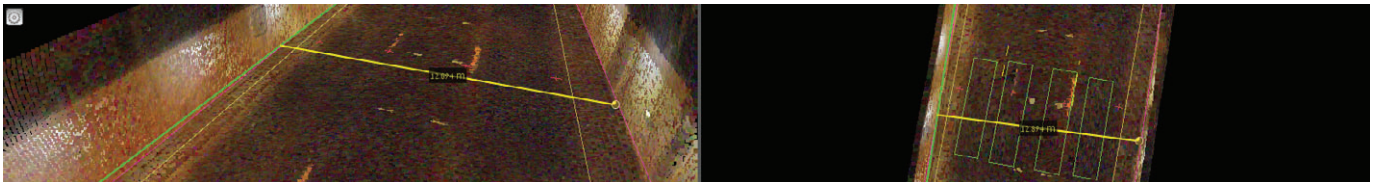


GCP on Curbstone, Before adjustment (Upper image) and after Adjustment (Lower Image) Both Images at Mobile Mapping View

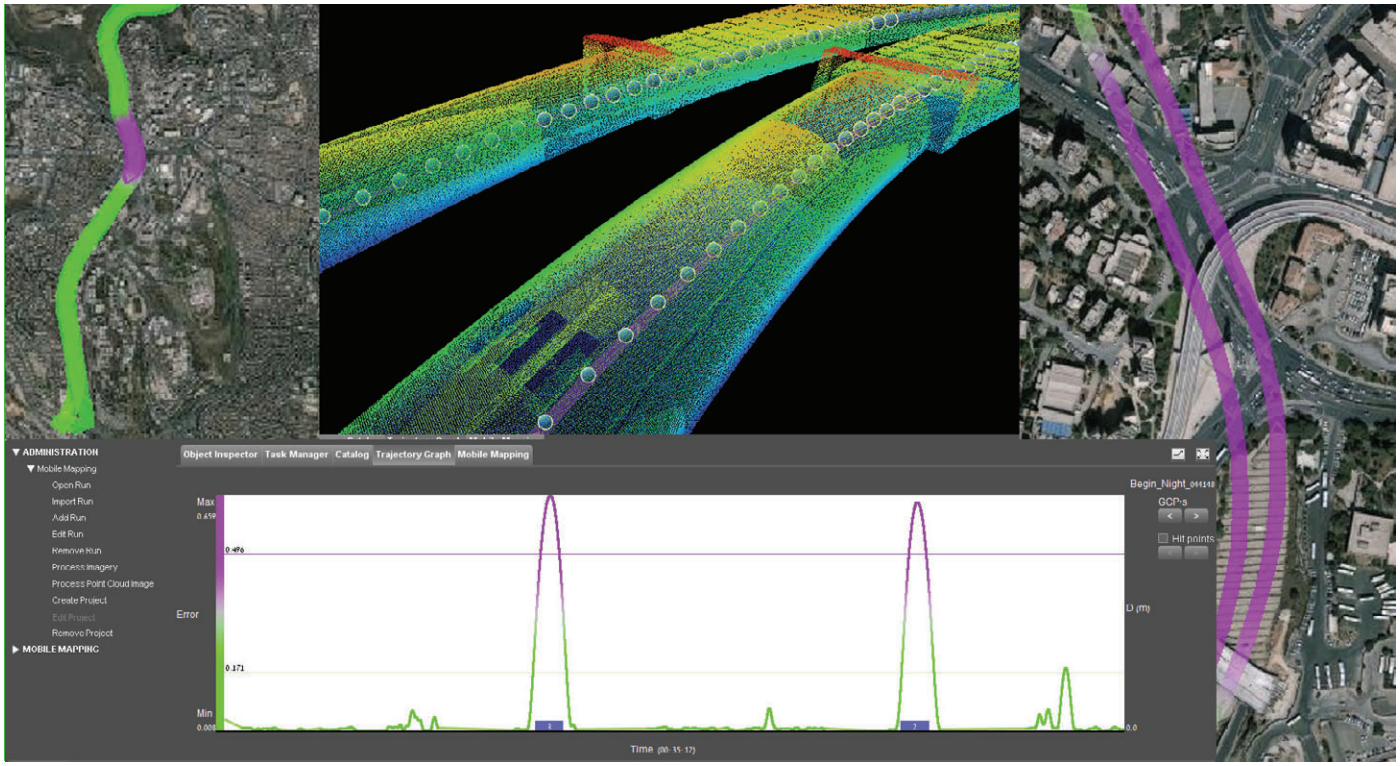
20 CHECK POINTS DEVIATION IN XYZ

before adjustment
0.75m (0.28 SD)

after adjustment
0.038m (0.03 SD)



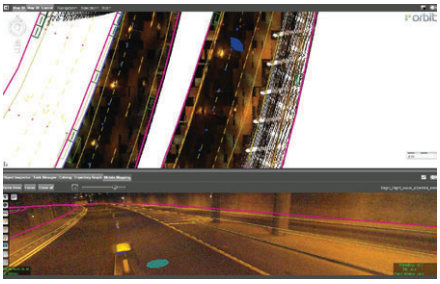
Clipped Tunnel Roof - In order to make the sampling work more clear, we removed the top of the tunnel. In that way we created an orthophoto of the inside of the tunnel. (right image)



Trajectory inspection- It is very clear from the run's trajectory profile that there are two areas with no GPS reception. Those are the two sides of the 600 m tunnel. On those areas no measurements can be taken without Trajectory Adjustment.

the middle of the tunnel. After applying the trajectory adjustment the average deviation was dropped to 3.8 cm! with maximum deviation of 10cm.

After Assuring the Trajectory Adjustment processing went well, we proceeded with extracting features from inside the tunnel. Eventually we merged the features from Photogrammetry and Mobile mapping from inside and outside the tunnel into single topographic map.



General look of extracted features from inside the tunnel

It took us just a few days to extract all necessary data, without stopping the traffic and without putting the surveying team at risk.

Combined view of contour lines from photogrammetry overlay the panoramic image and connected the lines from the tunnel.

About the author

Ori Isenberg is Head of the Mobile Mapping Department and Orbit Solutions specialist at Ofek Aerial Photo. He analyses projects. builds solutions and manages the use of and production with Orbit GT software within Ofek-air and for its customers. His expertise also includes Oblique Mapping and the Orbit Oblique solutions.

ABOUT OFEK AERIAL PHOTO

Ofek Aerial Photography is the largest company in Israel, and one of the leading companies in Europe, in the field of aerial and satellite mapping and geographical applications. Founded in 1987 and over 100 professionals strong, Ofek operates state-of-the-art mapping cameras, LiDAR, Thermal, Hyperspectral and other airborne sensors, as well as mobile and terrestrial sensors, supported by the most advanced data, image processing and GIS hardware and software tools.
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