



PRASHANT ADVANCED SURVEY LLP

(Advanced Land Survey & Geospatial Solutions)

Road and Railway Infrastructure projects using
Mobile LiDAR :

O-207, 2nd Floor, Bramha Boulevard Phase 1, Connaught Road,
Near Sadhu Vaswani Chowk, Pune -411001, Maharashtra, India.
M +91 98900 55670.

Email : prashant@prashantsurveys.com;
prashantadvsurvey@gmail.com
Website : www.prashantsurveys.com



Geospatial World Forum 2023;

02nd to 05th May 2023, Rotterdam, Netherlands.

04th May, 2023.

ISO 9001 : 2015





Geospatial World Forum 2023;

02nd to 05th May 2023, Rotterdam,
The Netherlands.

04th May, 2023.

Road and Railway Infrastructure projects using Mobile LiDAR :

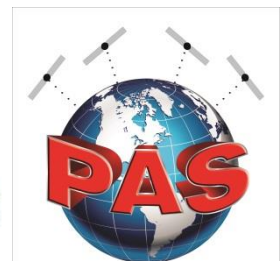
Prashant Alatgi, Designated Partner
Prashant Advanced Survey LLP,
Pune, India.

ISO 9001 : 2015



Agenda :

1. About “Prashant Advanced Survey LLP”.
2. About LiDAR technology (Mobile, Terrestrial & Aerial).
3. Data Captured by Leica ‘Pegasus Two’ Mobile LiDAR (Laser Scanning) system.
4. Mobile LiDAR Data Processing Methodology & software's used for generating outputs.
5. Use of LiDAR technology for Road & Railway infrastructure projects.
6. Use of Aerial / airborne LiDAR technology for greenfield alignments.
7. GNSS / DGPS Base Station/ Ground Control Point (GCP's).
8. Creating digital 3D As built Topographic Survey Maps & City Models.



1. About “Prashant Advanced Survey LLP” :

- We are a 30 years old professional Land Surveying & Mapping company based in Pune, India, (formerly Prashant Surveys), providing Complete 3D Geospatial Solution to our clients with Land Surveying, Mapping & GIS requirements.
- We use the 'state of the art' advanced technology of Survey grade 3D Mobile LiDAR Scanning / NSV (Network Survey Vehicle), UAV (Unmanned Aerial Vehicle) / Drone, GPR (Ground Penetrating Radar), dual frequency DGPS / GNSS (Differential Global Positioning System / Global Navigation Satellite System), High Resolution Satellite images, Aerial Photogrammetry & customized GIS solution.
- We offer our cost-effective quality services to Government, Semi Government, Private Organizations & Corporates all over the globe, with high speed and best in class accuracy.



TNV

CERTIFICATE OF REGISTRATION

This is to certify that the Quality Management System of

PRASHANT ADVANCED SURVEY LLP

204, Mayfair Arcade, 563 Nana Peth, Besides Chacha Halwai,
Laxmi Road, Pune -411002, Maharashtra, India

has been assessed and registered by TNV as conforming
to the requirements of:

ISO 9001:2015

For the following Scope

“Land Surveying, Mapping & Consultancy Works, Using Advanced
Mobile LiDAR / NSV, UAV / Drone, DGPS & GIS Technologies”

“IAF Group- 34”

*TNV is accredited by International Accreditation Services (IAS), Status of Certificate can be verified on
TNV's website www.tnvgroup.org*

Certificate Number :	210421019101
Initial Issue Date:	21 st Apr. 2021
Issue Date:	21 st Apr. 2021
Valid Until:	20 th Apr. 2024
1 st Surveillance Date:	21 st Mar. 2022
2 nd Surveillance Date:	21 st Mar. 2023
Revision:	00

IAS ACCREDITED Management System Certification Body
IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

Pragyesh Singh
CEO
TNV System Certification P Ltd.

Regd. Off: TNV Group, 107, 107-11, Andheri Vihar, Laxmi Road, Pune, India, Mail: info@tnvgroup.org
200, 200/1, 200/2, 200/3, 200/4, 200/5, 200/6, 200/7, 200/8, 200/9, 200/10, 200/11, 200/12, USA

Terms and Conditions:
1. Validity of this certificate is subject to the organization maintaining its system in accordance with respective Management System requirements.
2. This certificate remains the property of TNV System Certification P Ltd., to whom it must be returned upon request.
3. Use of Logo must be in accordance with the requirement of the TNV and Accreditation board (if any) failure to meet the requirement shall be
4. This certificate is not final evidence of certification results, status must be verified with current status as given in TNV's official website www.tnvgroup.org





ii) Our Management Team :

- **Mr. Prashant S. Alatgi +91 98900 55670**
 - Designated Partner; Head : Technical, BD, R&D
 - (Ph.D. Research Scholar, M.E. Civil, B.E. Civil; 24+ years of experience)
- **Mr. Shivanand A. Alatgi**
 - Founder, Chief Technical Officer
 - (Retired from 'Survey of India'; 49+ years of experience)
- **Mr. D. N. Jadhav**
 - Head : GIS & RS; Retired from Survey of India
 - (B.A. Hons., M.Sc. Geo-informatics; 49+ years of experience)
- **Mrs. Deepa P. Alatgi**
 - Head : Administration, Accounts & H.R.
 - (B.Com.; 18+ years of experience)



ISO 9001 : 2015





iii) About Speaker :

- **Mr. Prashant S. Alatgi (M +91 98900 55670)**
 - Designated Partner : Technical, R&D and Business Development
 - (Ph.D. Research Scholar, M.E. Civil, B.E. Civil; 24+ years of experience)
- Ph.D. Research Scholar in 'Advanced Surveying' from MIT – WPU, Pune, India.
- M.E. (Civil) 1st Rank MIT, Pune; 2nd Rank, University of Pune, India.
- Certified by ISRO in "Remote Sensing & GIS" from NRSC, Hyderabad.
- FMIE, Life member of IRC, ISRS, INCA, ISG, SAMA.
- Certified Subsurface Utility Engineer by Engineering Council of India & IndSTT.
- Having 24 years of experience in advanced Land Surveying & GIS technology.
- Speaker in 18 International Conferences on Advanced Surveying technologies.
- Specializing in advanced Land Survey techniques like 3D Mobile LiDAR, Network Survey Vehicle (NSV), UAV / Drones, DGPS, GPR, RS & GIS.



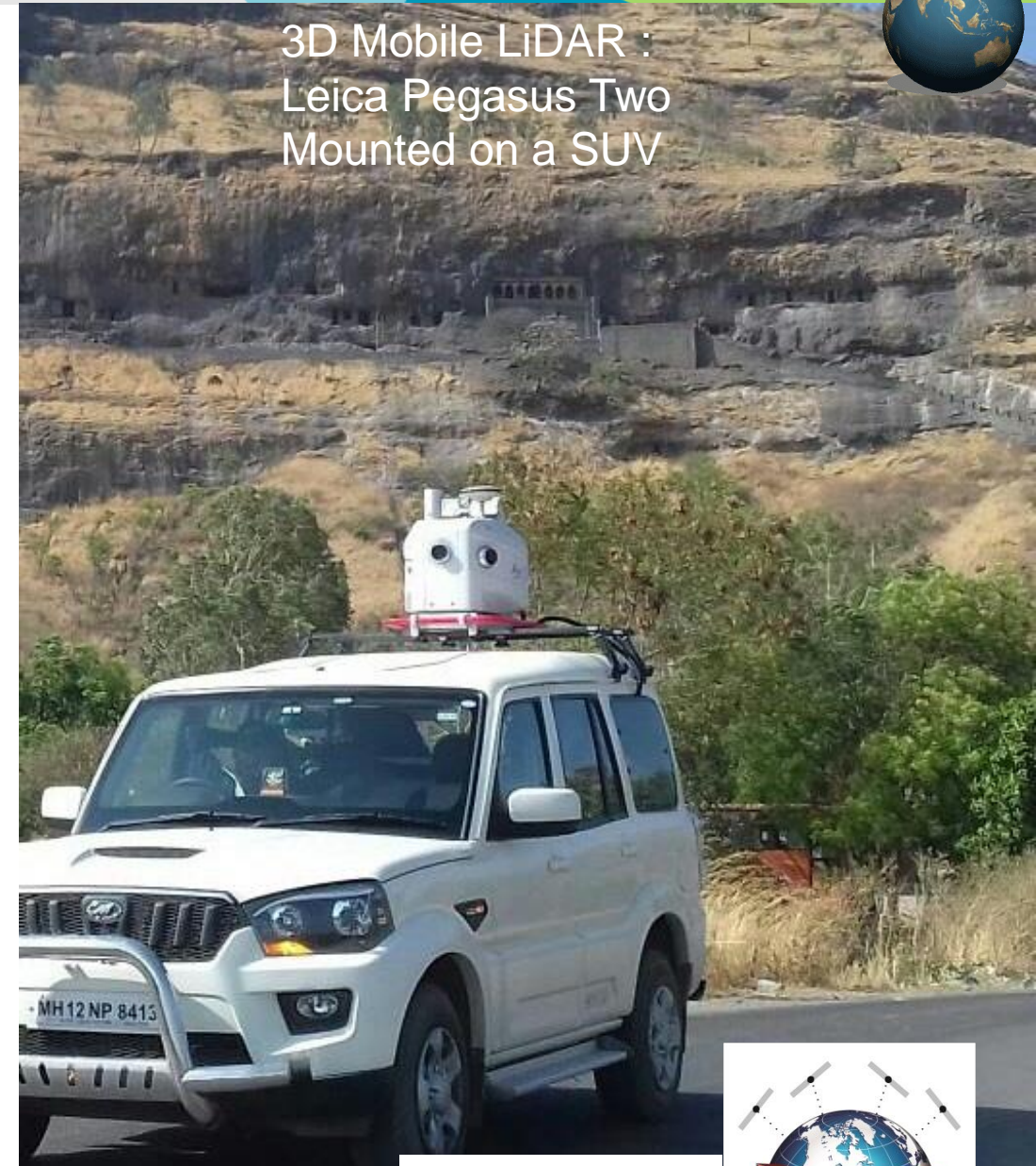
ISO 9001 : 2015



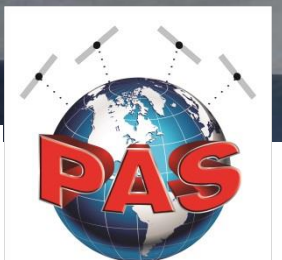


iv) Why Choose us :

- 30 years experienced & well reputed firms based in Pune, India, for providing complete 3D Geospatial Solution with Land Surveying, Mapping & GIS requirements.
- Continuously adopt the most Advanced Land Surveying & Mapping technologies viz. 3D Mobile LiDAR Scanning / NSV (Network Survey Vehicle), UAV (Unmanned Aerial Vehicle) / Drone, GPR (Ground Penetrating Radar), dual frequency DGPS / GNSS, High Resolution Satellite images, Aerial Photogrammetry & GIS solution.
- Have successfully completed more than 25,000 Km of highway & 2,500 Km of Railway Topographic surveys throughout India using 3D Mobile LiDAR technology since year 2015. Completed more than 100 prestigious projects of Land Surveying and mapping during past 30 years.



3D Mobile LiDAR :
Leica Pegasus Two
Mounted on a SUV





iv) Why Choose us : (Contd...)

- Founder, Mr. Shivanand Alatgi, (Retd. form Survey of India), having 49 years of hardcore experience in the field of Land Surveying & Mapping, assisted with Technical consultants and advisers retired from Survey of India with 40+ years of experience.
- Head : Technical, R&D and Business Development, Mr. Prashant S. Alatgi, (Ph.D. Research Scholar, MIT - WPU, Pune, India; M.E., Civil, C&M, 1st Rank MIT, 2nd Rank, University of Pune, India), having 24 years of experience in advanced Land Survey, Mapping & Geospatial Solution, using 'state of the art' 3D Mobile LiDAR / NSV, UAV / Drone, GPR, DGPS, ETS, RS & GIS technology.
- 1st Company in India to procure 'Leica Pegasus One' Survey grade Mobile LiDAR mapping system in March 2015 and the 1st private Company in India to procure 'Leica Total Station' (ETS) Electronic Total Station instrument, in the year 1998.



Network Survey Vehicle (NSV) :
'Leica Pegasus Two' with pavement Camera



ISO 9001 : 2015



iv) Why Choose us : (Contd...)

- 1st Land Surveying company in India to possess 2 numbers of 'Leica Pegasus Two' Mobile LiDAR Systems in the year 2017. Have the capacity to capture LiDAR data of highways for about 200 Kilometers per day using two instruments, with accuracy of about +/- 2 cm.
- Use DGCA UIN registered Survey Grade UAV / Drone 'Lookout VTOL' with onboard PPK NovAtel GNSS for data capture and 'Pix4D Professional Mapper' software to produce accuracy upto 10 cm in X, Y, Z coordinates.
- Strives to develop the innovative advanced Survey grade mapping technologies and provides the best geospatial solution for timely completion of large-scale Smart City & infrastructure projects, with required accuracy and optimum cost.



DGCA Type Approved UAV / Drone :
LookOut VTOL; with NovAtel GNSS.



ISO 9001 : 2015



v) List of Survey Equipment's & software's :

- Leica 'Pegasus Two' Mobile LiDAR systems. : 02 Nos.
- DGPS / GNSS Receivers (Leica & Trimble) : 15 Nos.
- UAV / Drone, Lookout VTOL (DGCA Type approved) : 01 No.
- Leica Electronic Total Stations (Leica). : 12 Nos.
- Leica Digital Levels 'Sprinter 150M' (Leica). : 02 Nos.
- Leica LGO / Infinity, TBC for GNSS data processing. : 08 Nos.
- Leica 'Mapfactory' licenses for Arc GIS. : 08 Nos.
- Leica 'Auto P' & 'Waypoint Inertial Explorer' licenses. : 02 Nos.
- Pix4d Professional & '3D Reshaper' license. : 03 Nos.





vi) List of Hardware's & Assets :

- Desktop Computers / Workstations, I 7 processors. : 15 Nos.
- Desktop Computers, Intel Pentium I 5 processors. : 10 Nos.
- Laptop Computers, Intel Pentium I 7 & I 5. : 06 No.
- Four-wheeler (Mahindra Scorpio) SUV. : 04 Nos.
- Four-wheeler (Maruti Eeco). : 01 Nos.
- Plotter 36 inch, Hp designjet T830 MFP colour. : 01 Nos.
- Scanner 36 inch, Hp designjet T830 MFP colour. : 01 Nos.
- Laser Printers A4, Hp 1020 / F4288, Epson L4160. : 06 Nos.
- Office space 2,500 Sq. ft in Pune, India. : 01 Nos.



vii) Services Provided :

- 3D LiDAR Survey of Expressways & Highways for DPR / FSR
- Network Survey Vehicle (NSV) Survey of 2/4/6/8 lane Highways
- Land Plan Survey of Highways by Mobile LiDAR
- Base Map Survey for Smart City & 3D City Mapping
- Optical Fiber Cable (OFC) Surveys by Mobile LiDAR
- PPK UAV / Drone Survey, Mapping & inspection
- Ground Penetrating Radar (GPR) Survey of Roads
- DGPS / RTK Survey for Ground Control Points (GCP's)
- Data Processing of Mobile LiDAR, Satellite Images & GIS

To some of our Clients :



STUP CONSULTANTS PVT. LTD.



ISO 9001 : 2015



viii) Events & Conferences :

Mr. Prashant Alatgi, Designated partner of 'Prashant Advanced Survey LLP', was a speaker / presenter on advanced 'Mobile LiDAR / NSV / GPR / UAV / Drone Technology' in various international & national conferences as listed below :

No	Name of Conference	Venue & Dates	Topic / Title	Role
1.	'HxGN live 2015', hosted by Leica Geosystems AG / Hexagon AB.	18 th to 20 th Nov., 2015, Hong Kong, China.	"First Mobile Mapping Project in India – 2,500 Km in High speed data acquisition".	Speaker
2.	"Geosmart India 2016", Division of Geospatial Media & Communications.	01 st to 03 rd March, 2016, India Expo Centre & Mart, Greater Noida, India.	"Mobile LiDAR Technology - High speed data acquisition".	Speaker
3.	'HxGN live 2016', hosted by Leica Geosystems AG / Hexagon AB.	13 th to 16 th June 2016, Anaheim, California, USA.	"2,700 Km of Highways Surveying in India with Pegasus: One".	Speaker
4.	"Survey India 2016", Survey And Mapping Association of India (SAMA).	07 th to 08 th Sept., 2016, Holiday Inn, New Delhi, India.	"Mobile LiDAR Technology – Leadership address".	Speaker





viii) Events & Conferences : (Contd...)

No	Name of Conference	Venue & Dates	Topic / Title	Role
5.	'HxGN live 2017', hosted by Leica Geosystems AG / Hexagon AB.	13 th to 16 th June 2017, Las Vegas, Nevada, USA.	"3,000 Km of State Highway Surveying in India, for DPR projects, using Leica Mobile LiDAR Pegasus Two".	Speaker
6.	'HxGN Local 2017', hosted by Leica Geosystems AG / Hexagon AB.	13 th October 2017, Hyderabad, India.	"4,000 Km of Highways Surveying in India, with Leica Pegasus Two".	Speaker
7.	'Leica M3D Road Show', hosted by Leica Geosystems AG / Hexagon AB.	07 th December 2017, Hyderabad, India.	"7,000 Km of Highways Surveying in India, with Leica Pegasus Two".	Speaker
8.	'HxGN live 2018', hosted by Leica Geosystems AG / Hexagon AB.	12 th to 15 th June 2018, Las Vegas, Nevada, USA.	"Leica 'Pegasus Two' a perfect Network Survey Vehicle (NSV) for Road Asset Management & pavement analysis for the Highways Infrastructure projects in India".	Speaker
9.	"Geosmart India 2019", Division of Geospatial Media & Communications.	11 th to 13 th Feb., 2019, Hotel Pullman, Greater Noida, India.	"Mobile LiDAR Technology for Highways & Smart Cities in India".	Speaker





viii) Events & Conferences : (Contd...)

No	Name of Conference	Venue & Dates	Topic / Title	Role
10.	“Geospatial World Forum 2019”, Division of Geospatial Media & Communications.	02 nd to 04 th April, 2019, TAETS Art and Event Park, Amsterdam, The Netherlands.	“Smart City Mission: Precise 4D asset mapping above and below the ground using Hybrid Technology of Mobile LiDAR & GPR systems along with Drones”.	Speaker
11.	“HxGN live 2019”, hosted by Leica Geosystems AG / Hexagon AB.	10 th to 14 th June 2019, Las Vegas, Nevada, USA.	“Smart City : Precise asset mapping above and below the ground using Leica Pegasus: Stream, Mobile LiDAR and GPR system along with PPK UAVs / Drones”.	Speaker
12.	“INTERGEO 2019”, HxGN Live TV interview.	18 th Sept 2019, Stuttgart, Germany.	“Generating high precise base maps for smart city projects”.	Speaker
13.	“Geosmart India 2019”, Division of Geospatial Media & Communications.	03 rd to 05 th Dec., 2019, HICC, Hyderabad, India.	“Lidar Survey for Infrastructure Projects”.	Speaker
14.	“Geospatial World Forum 2021”, Division of Geospatial Media & Communications	20 th to 22 nd Oct., 2021, TAETS Art and Event Park, Amsterdam, The Netherlands.	“Use of LiDAR Technology in preparing digital 3D maps for smart City projects”.	Speaker





viii) Events & Conferences : (Contd...)

No	Name of Conference	Venue & Dates	Topic / Title	Role
15.	“National Conference on Innovative Global Trends in Art, Design Technology and Management”.	04 th May to 06 th May 2021 at MIT Art, Design & Technology University, Pune.	“Topographic Survey using Advanced LiDAR / UAV technologies”.	Speaker
16.	“Geosmart Infrastructure 2022”, Division of Geospatial Media & Communications.	05 th to 06 th Sept. 2022, Holiday Inn, Aerocity, New Delhi.	“Unlocking Opportunities in Transport Infrastructure with Reality Capture Technologies (LiDAR / Laser Scanning)”.	Speaker
17.	“RIDE 2022”, (Research, Innovation, Design, Entrepreneurship) MIT-World Peace University, Pune.	23 rd Sept 2022, MIT-MIT-World Peace University, Kothrud, Pune.	“Innovation & Entrepreneurship”.	Speaker
18.	INTERGEO 2022, Essen, Germany.	18 th to 20 th Oct 2022, Essen, Germany.	“Geo data acquisition for Infrastructure and Smart City projects using LiDAR Technology”.	Speaker





2. About Mobile LiDAR Technology :

- Mobile LiDAR is an advanced mapping solution used to collect survey grade 3D point cloud data along the motor able roads / highways quickly & accurately.
- Incorporates the most advanced LiDAR sensors, Cameras (including all cameras for 360 degrees view), position / GNSS / GPS receivers & IMU (Inertial Measurement Unit).
- Mobile mapping : is the process of collecting & mapping geospatial data from a mobile vehicle, typically fitted with a Mobile LiDAR system.
- Output after processing include; Geo-referenced 3D point cloud data, digital 3D maps in Autocad *.dwg or Arc GIS *.shp files, pavement distress, images / Panaromic views & Videos.



‘Leica Pegasus Two’ Mobile LiDAR mounted on a SUV vehicle.





2. About Terrestrial LiDAR Technology (Contd...):



- Terrestrial LiDAR can be mounted on a Tripod, and used for static scans of heritage buildings, plants & small sites.



- Backpack LiDAR can be carried on the shoulders, and used for kinematic scans by walking, usually where the mobile LiDAR cannot capture the data.



- Handheld LiDAR can be carried in the hand, and used for kinematic scans by walking, mainly for creating the BIM models & interior measurements.





2. About Aerial LiDAR Technology (Contd...) :



- Aerial LiDAR can be mounted on a UAV / Drone, for low altitude flying and used for smaller or medium size of the projects.



- Aerial LiDAR can also be mounted on a chopper or fixed wing airplanes, for high altitude flying and used for mapping larger alignments & metro cities.



3) Data Captured by Leica 'Pegasus Two' Mobile LiDAR (Laser Scanning) system:

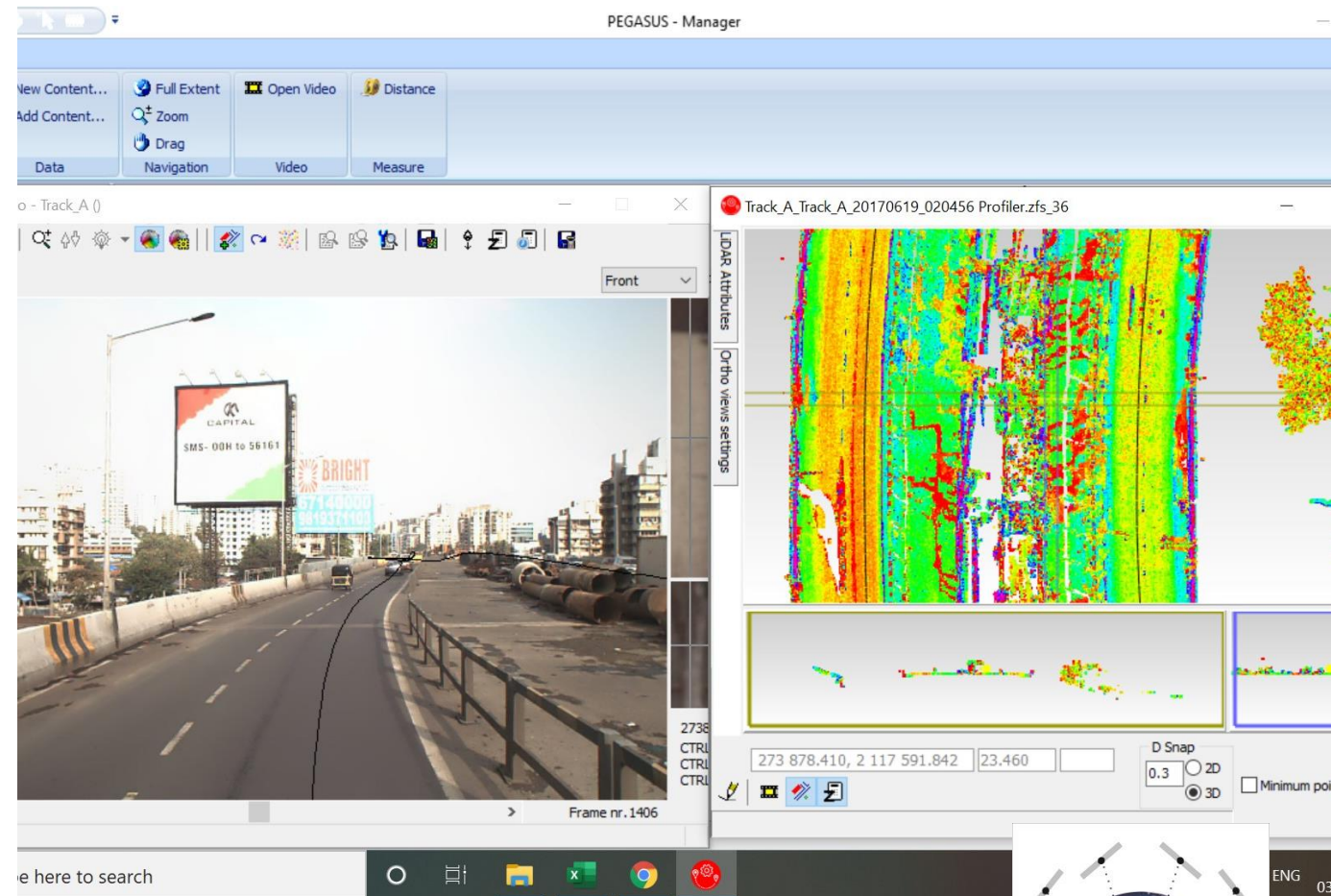
- The Leica 'Pegasus Two' mobile LiDAR / NSV can capture:
 - (i) '3D Scan point cloud data' in 360 degrees (Z+F 9012).
 - (ii) 'High Resolution photographs' in all directions & pavement.
 - (iii) 'Trajectory file' / position information, (GNSS Receivers).
- Above data can be captured for about 80 to 100 Km per day, depending upon the road & site conditions.
- DGPS base station observations ensure accuracy of the data.
- Requires proper logistics planning for DGPS & LiDAR teams.
- **Absolute accuracy of the LiDAR data is + / - 5 cm.**
- **The precision of Z+F 9012 laser profiler is < = 1 mm.**





4) Mobile LiDAR Data Processing Methodology & software's used for generating outputs :

- The data captured by Mobile LiDAR is processed in the following Software's :
- 'Waypoint Inertial Explorer', for trajectory.
- 'Leica Auto P', for point cloud registration.
- 'Leica Map factory- Arc GIS' for feature extraction / vectorization (point, line, polygon) for all the road side features & amenities.
- '3D Reshaper' for DEM & Contours.
- Arc GIS / Autocad, MS Excel for drawings & data display.



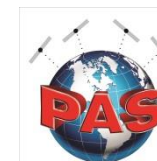
New Feature Target:

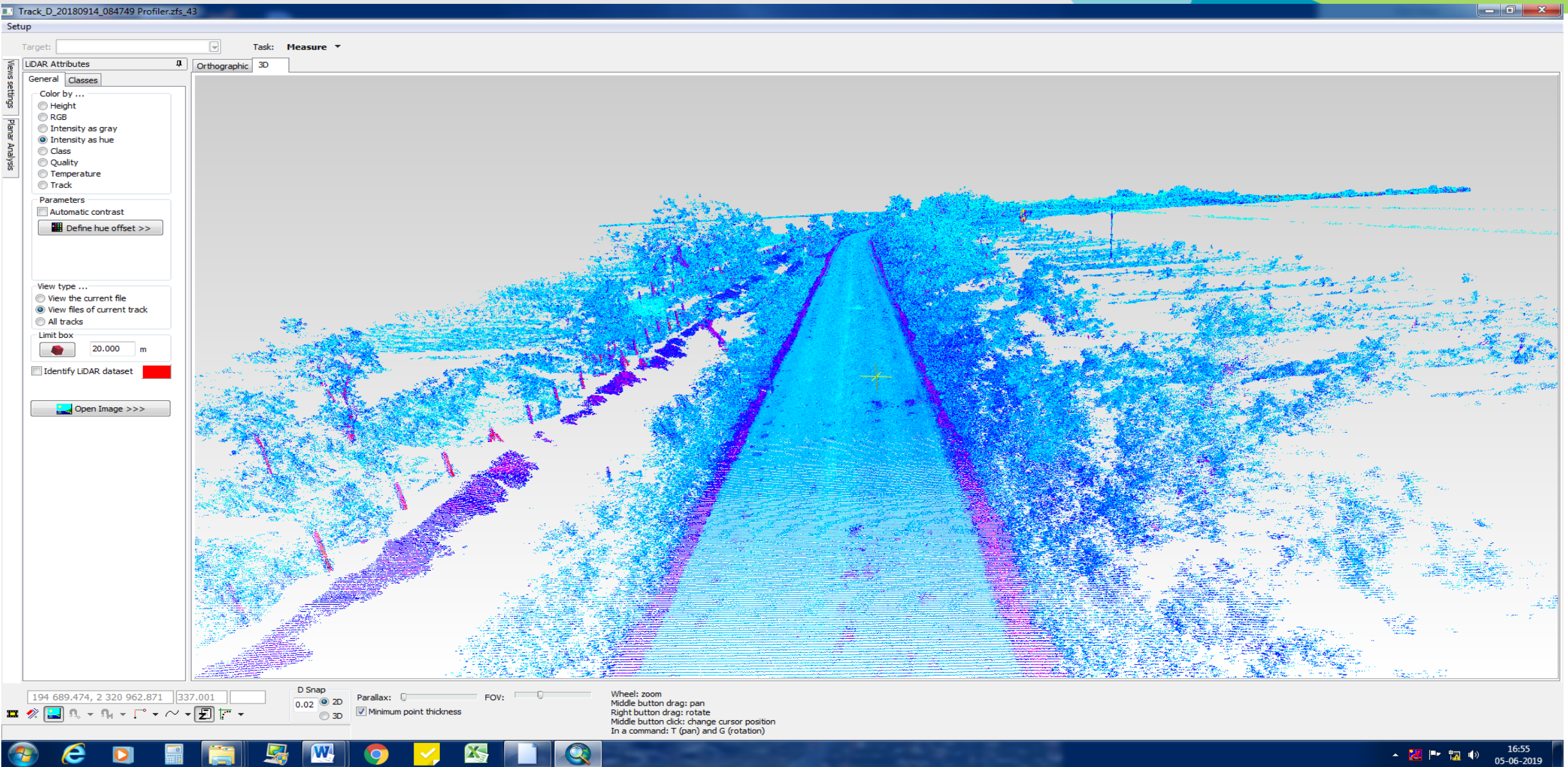


928, 1 816 271.182 | 560.785 | 0.053
D Snap
0.2 2D
3D
Parallax: FOV:
 Minimum point thickness

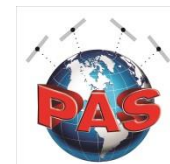


'3D Scan point cloud data' captured by using NSV / Mobile LiDAR 'Leica Pegasus Two':





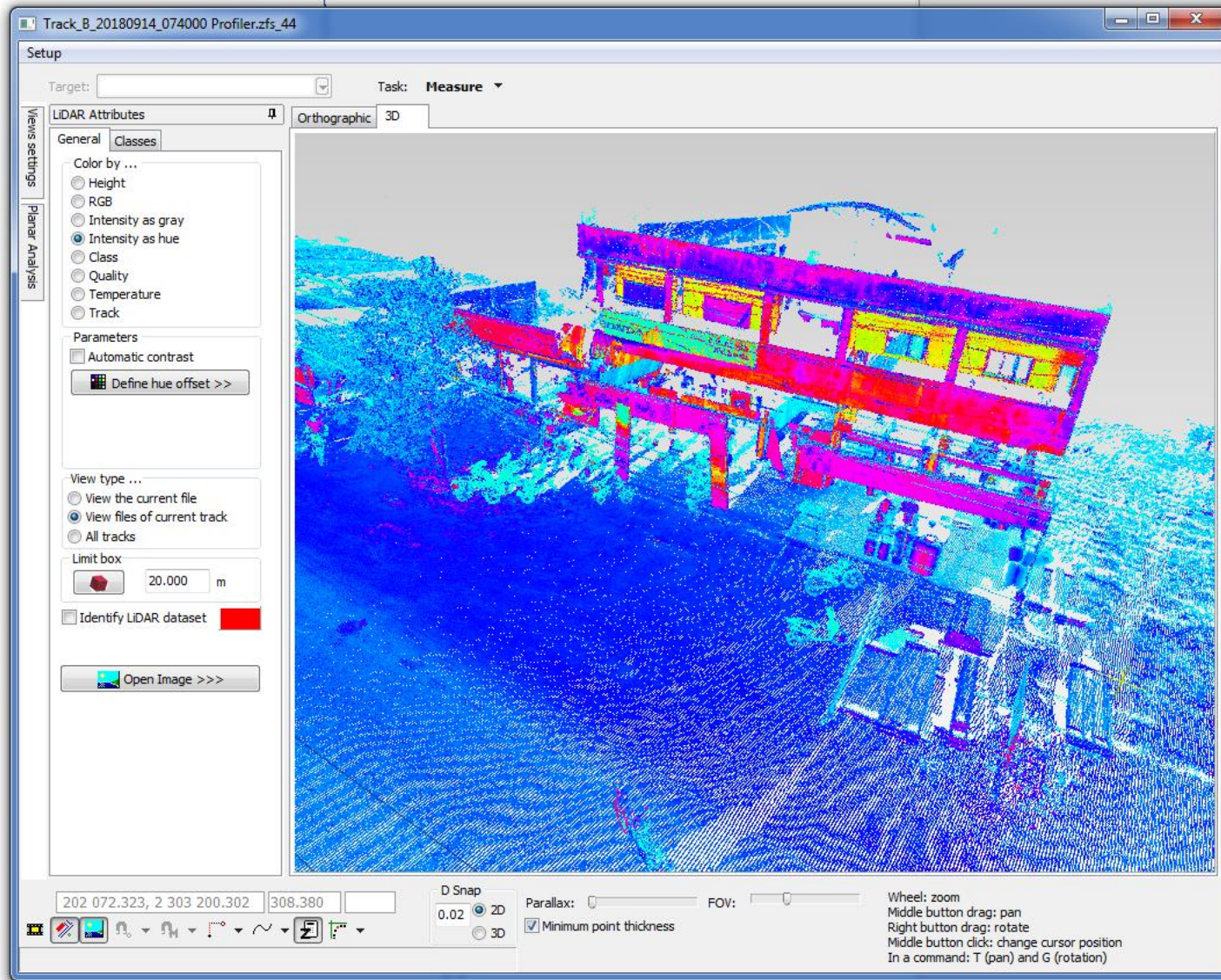
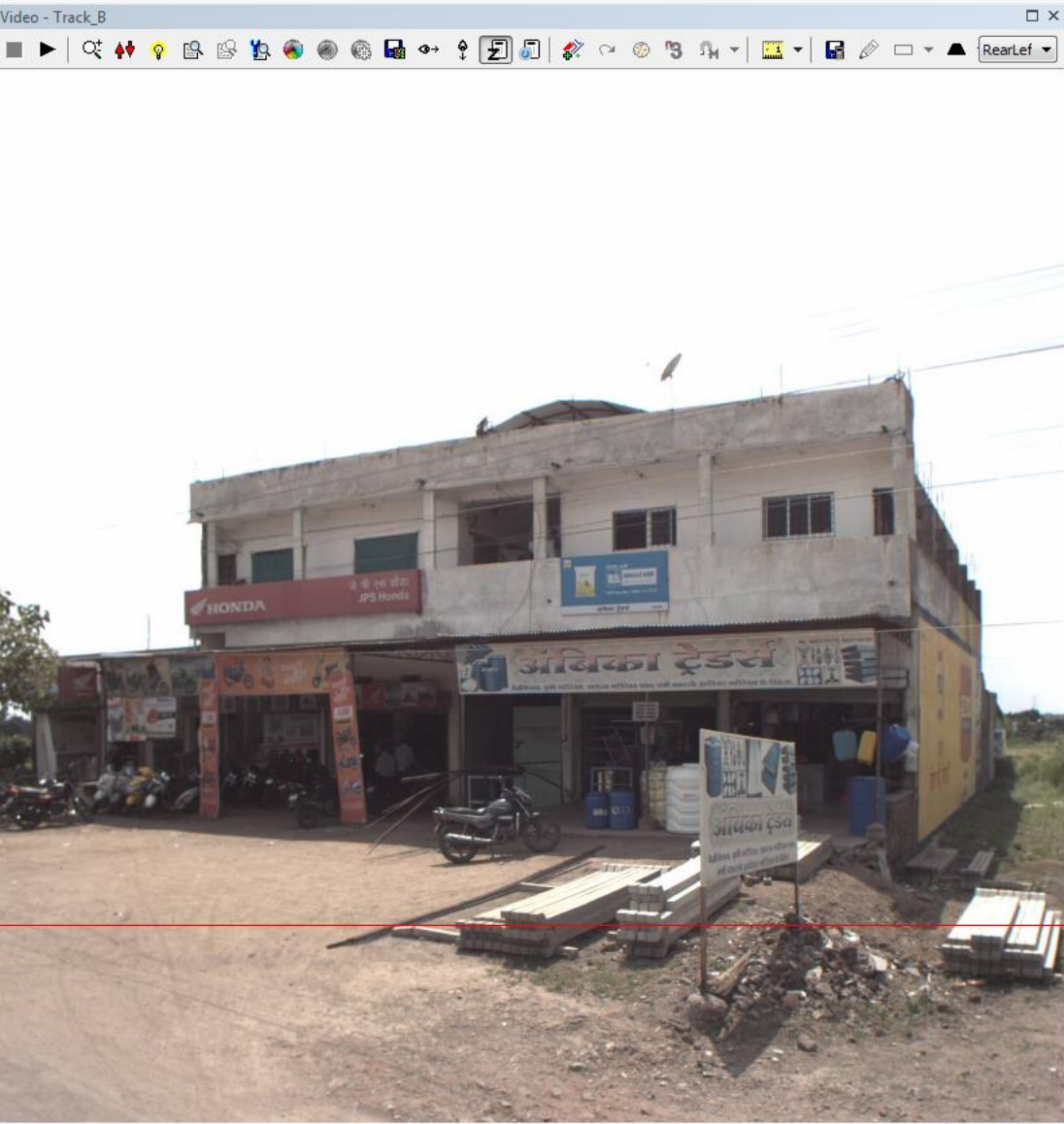
'3D Scan point cloud data' captured by using NSV / Mobile LiDAR 'Leica Pegasus Two':





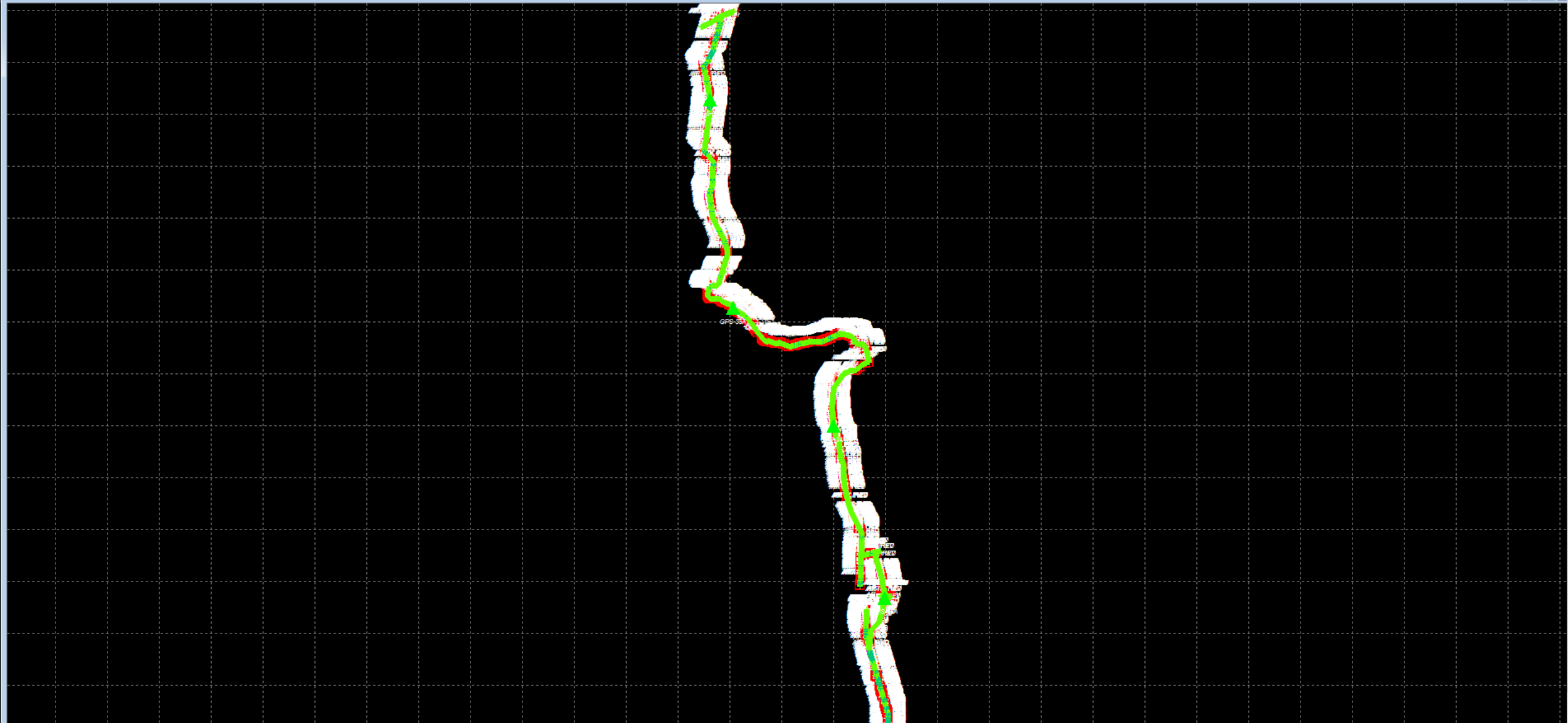
‘High Resolution Photographs’ captured using NSV / Mobile LiDAR ‘Leica Pegasus Two’:





Screen Shot of 'Photographs' & '3D Scan point cloud data' in 'Leica Map Factory' :





'Trajectory file' generated using NSV / Mobile LiDAR 'Leica Pegasus Two':

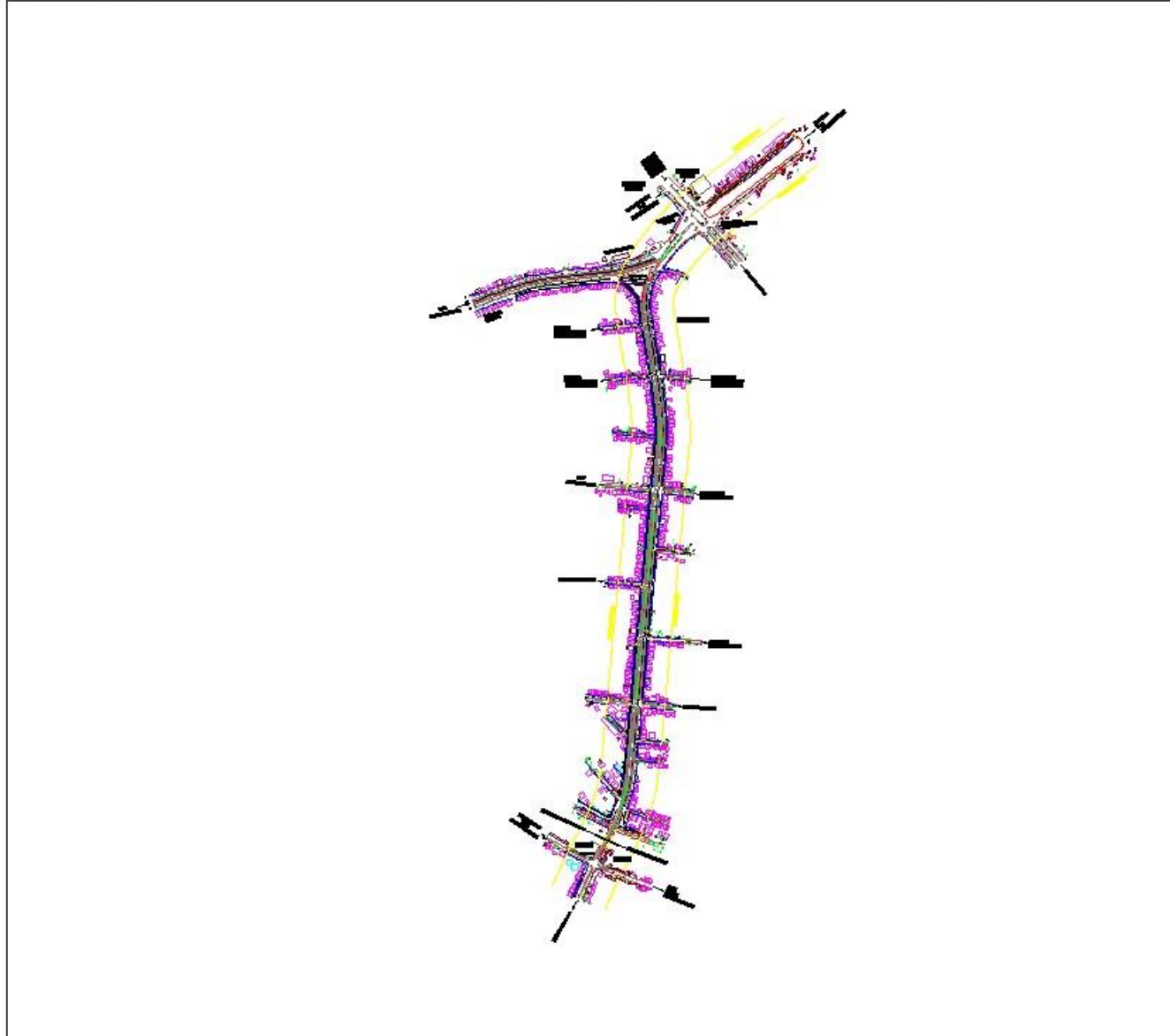




PROJECT : 399_PCMC

PACKAGE : Akurdi Road

Length : 2.5 Km



PLAN OF :
MOBILE LIDAR SURVEY



For 2.5 K.M. length
Chainage from K.M. 00/000 TO K.M. 02/500

LEGEND :

POINT FEATURES

[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]

LINE FEATURES

[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]

POLYGON FEATURES

[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]
[Symbol]	[Symbol]	[Symbol]

SCALE = 1 : 2000



PRASHANT SURVEYS

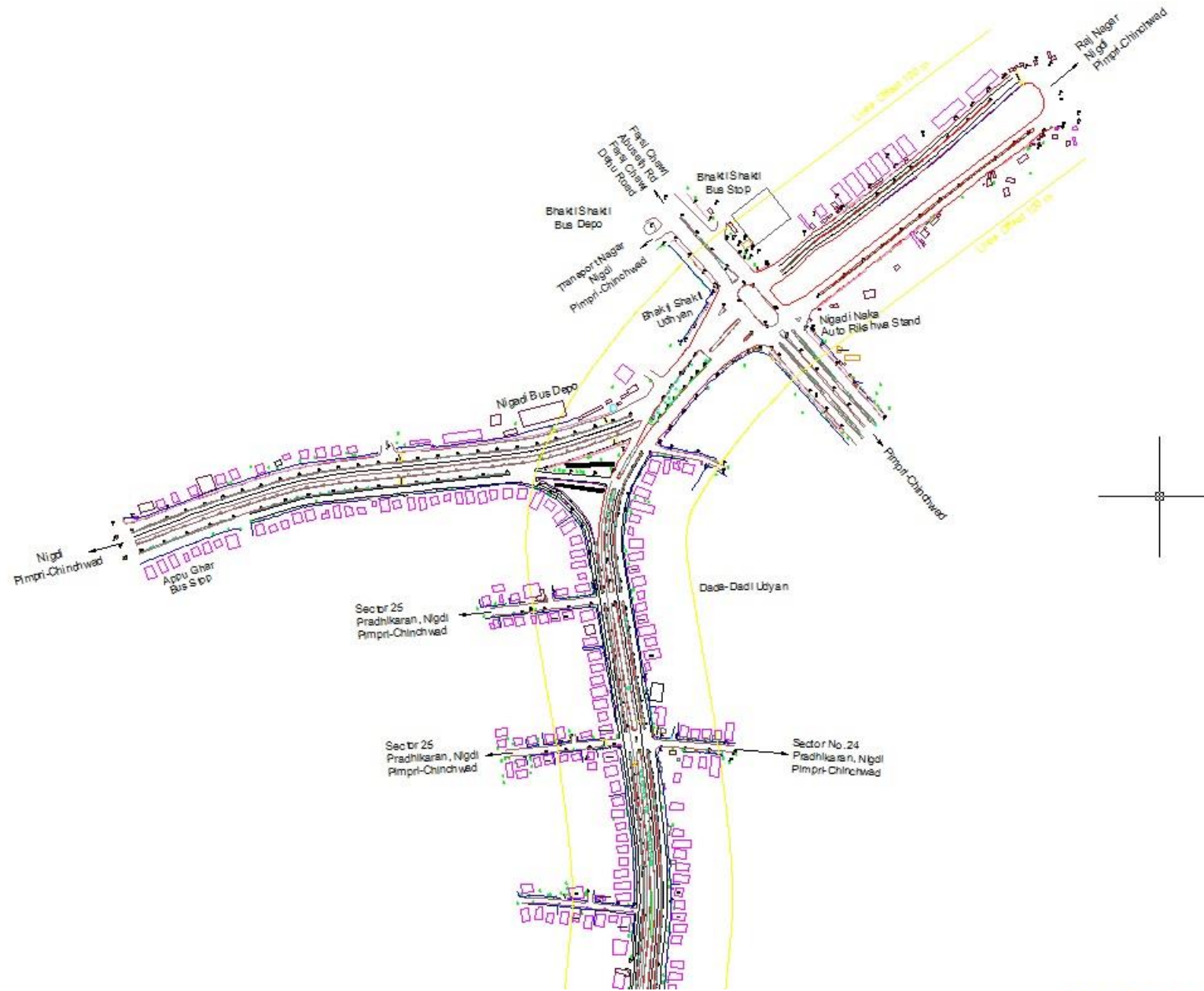
20/4, Mayfair Arcade, 883 Nande Path,
Besides Chakravarti Lal (M/Ro), Pune-411002.
E-Mail : prashantsurveys@gmail.com
Website : www.prashantsurveys.com

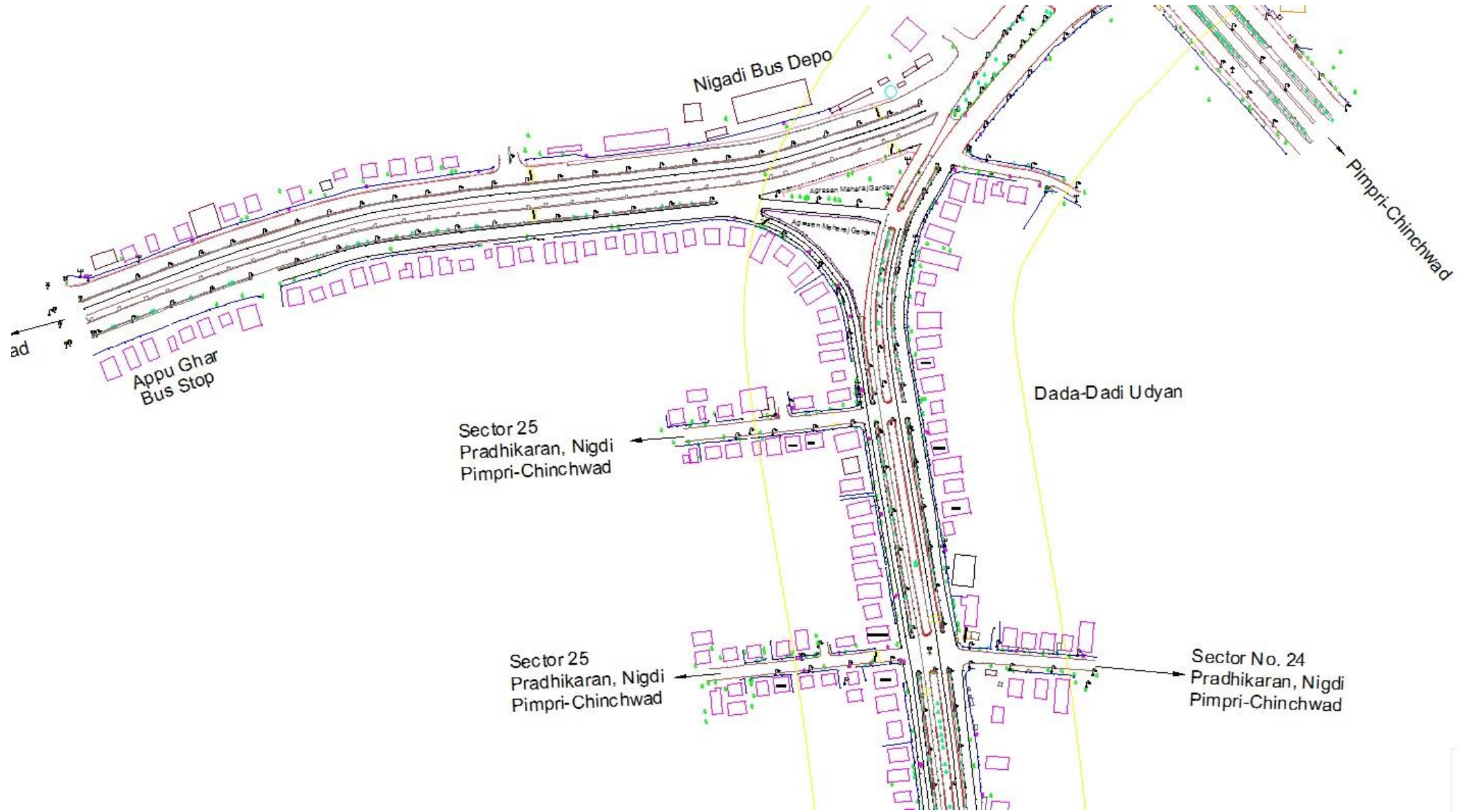
Date of Drawing : 16-10-2017.

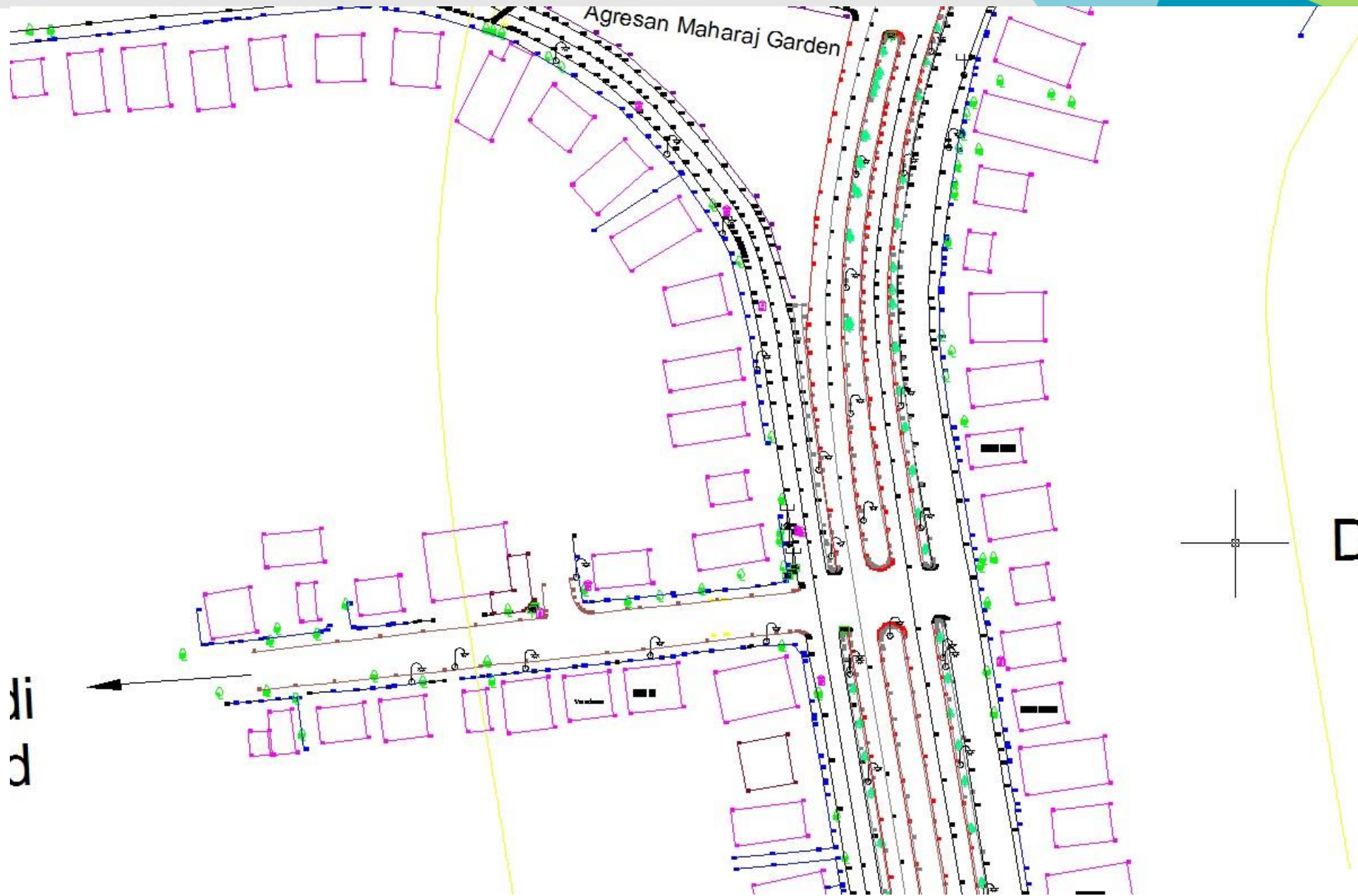
Drawing Revision No. : 00.

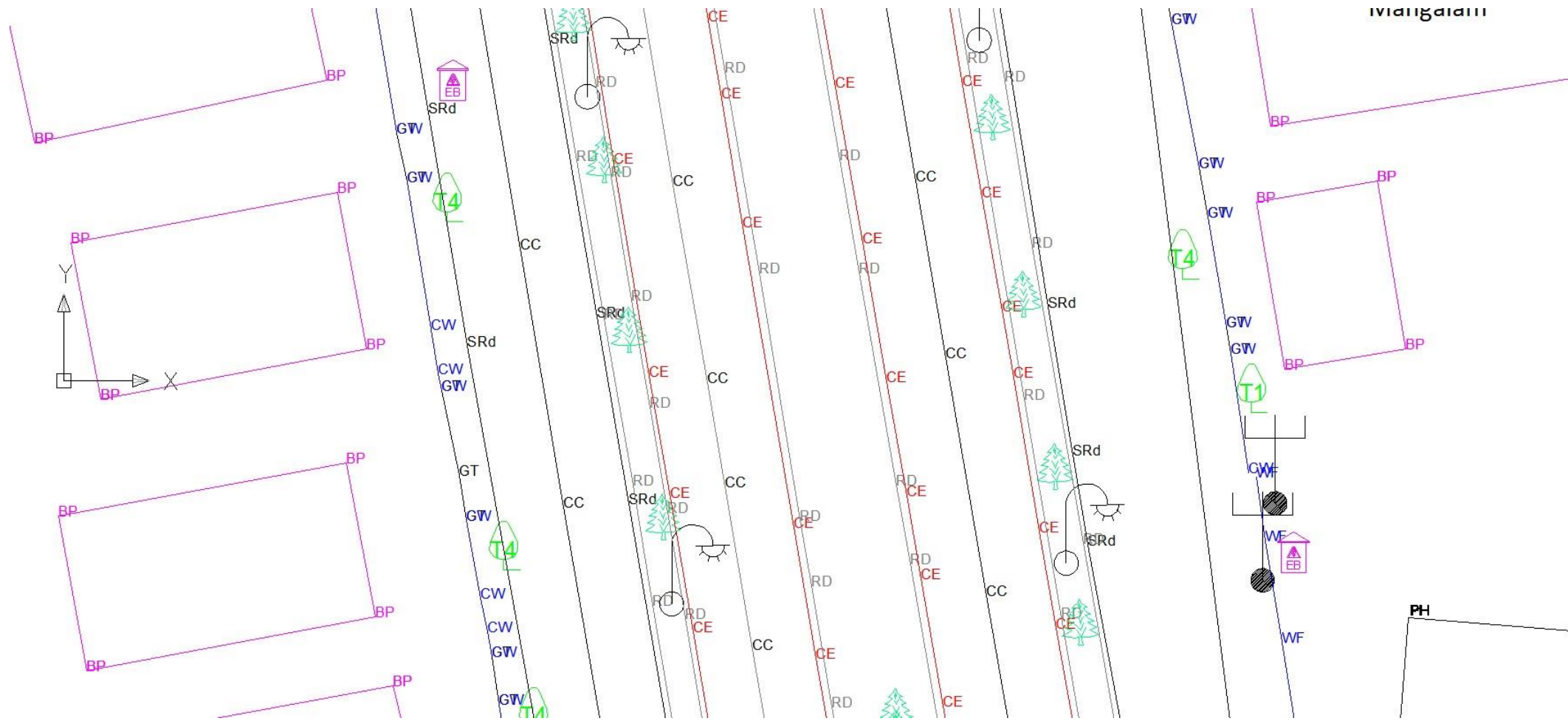
File No.: 399_PCMC_KM_2.5_PLAN.dwg











'3D Plan of Mobile LiDAR data, captured by 'Leica Pegasus Two':





5) Use of LiDAR technology for Road & Railway infrastructure projects :

- Mobile LiDAR Survey is very fast, since about 50 to 100 Km highway / railway alignment can be captured per day based on the traffic and site conditions.
- We can capture dense data typically about 1 million points / second using the Mobile LiDAR scanners.
- The data captured by mobile LiDAR also gives us 360 degrees panoramic / street view images.
- The terrestrial LiDAR (tripod mounted / Backpack / hand held) can be used for mapping the shadow areas where the mobile LiDAR cannot capture the data.
- The advanced backpack system also uses the SLAM (Simultaneous Localization And Mapping) technique which is useful in GPS denied areas especially under the bridges and culverts.
- The handheld Laser scanner is very handy for capturing the BIM of the interiors of any building / railway station for generating the LOD (Level Of Detail) 3 details.
- With the combination of the above LiDAR techniques, projects of even large size can be mapped easily.

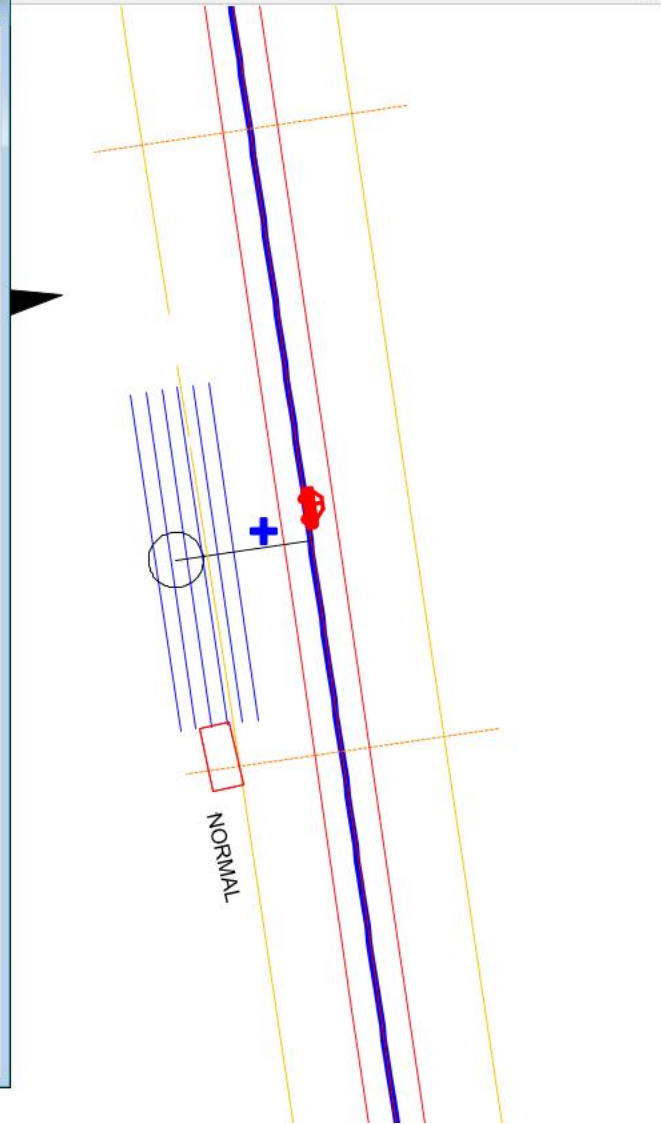
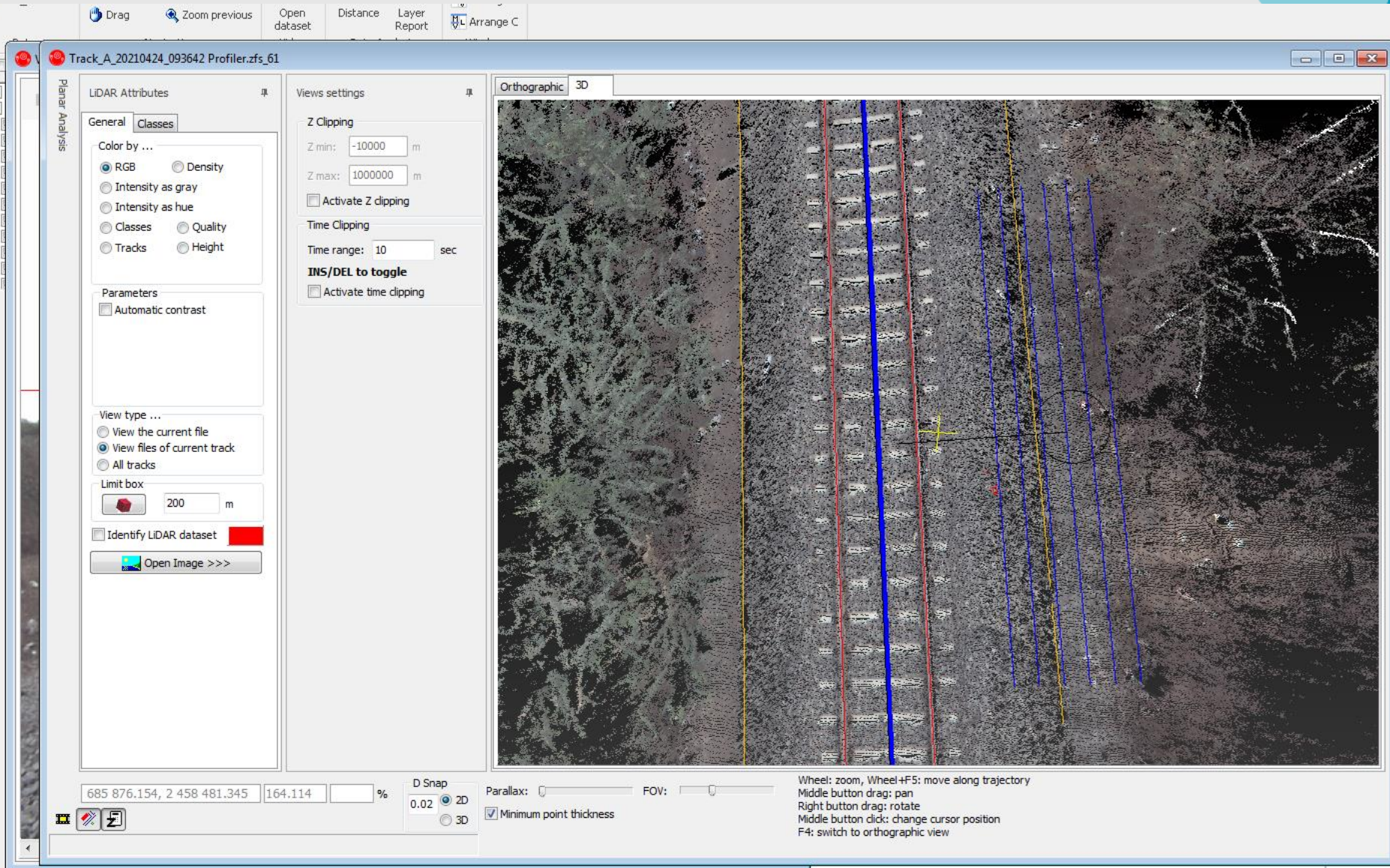




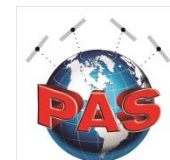
'Leica Pegasus Two' mounted on 'Tower Wagon' for Railway project :

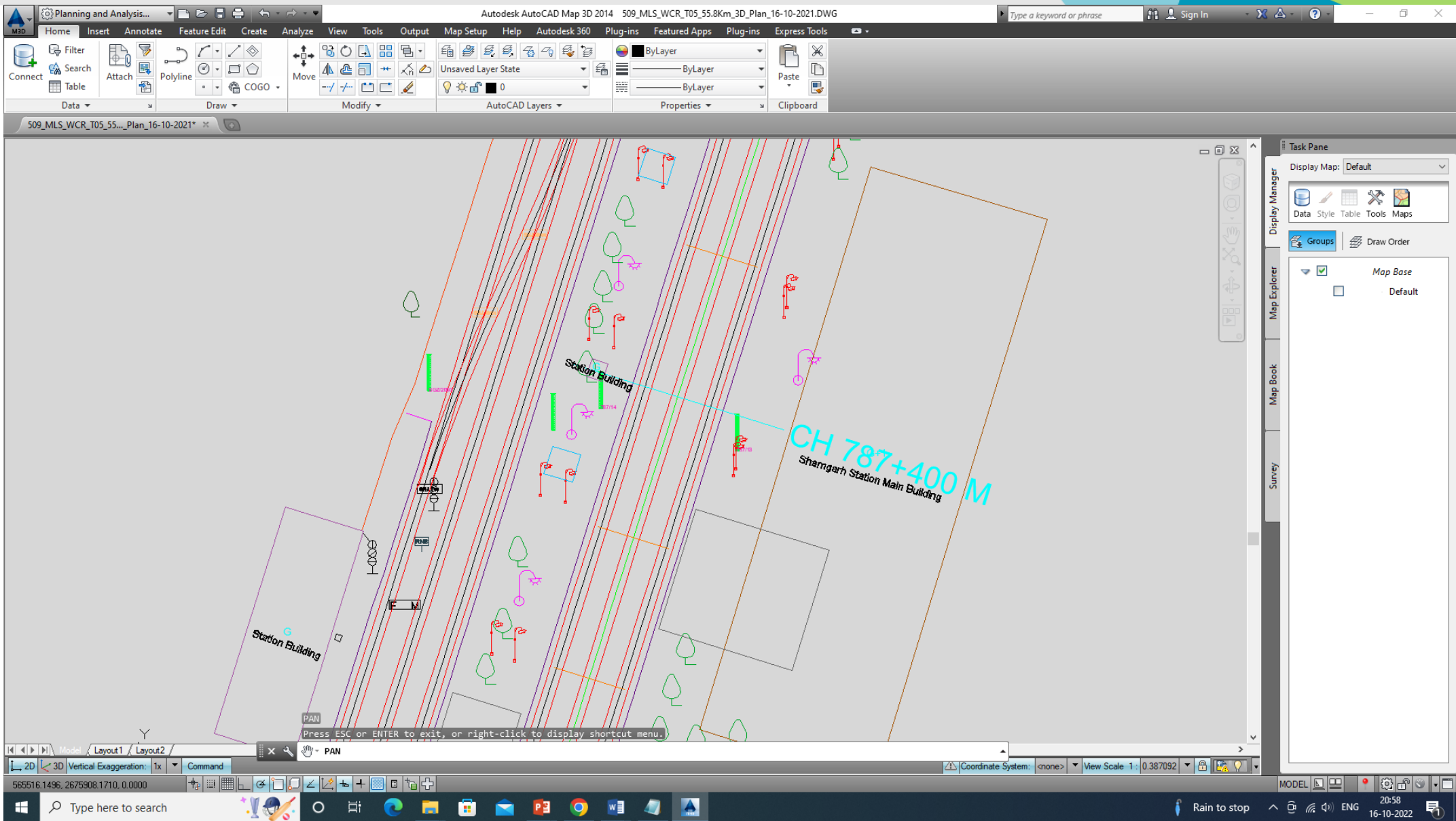


'Leica Pegasus Two' mounted on 'Motorized Trolley' for Railway project :



Screen Shot of 'Leica Pegasus Viewer' with 3D point cloud data for Railway project :





Screen Shot of 'Vectorized' 3D Plan in Autocad *.Dwg format for Railway project :





6) Use of Aerial / airborne LiDAR technology for greenfield alignments :

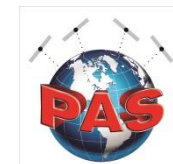
- The airborne Laser scanning is done typically with the Laser sensors fitted on the helicopter or manned airplanes. This technology is suitable for greenfield alignments.
- These Laser scanners provide digital elevation models (DEM) and digital surface models (DSM) upto 10 cm to 15 cm accuracy, which is sufficient for preliminary design of the highway or railway greenfield alignments.
- A major advantage of airborne laser scanning is the ability to provide data from any type of terrain and features under a forest canopy.
- This is currently the most detailed and accurate method of creating digital elevation models, replacing photogrammetry.
- The airborne Laser scanning is useful for mapping large alignments, usually above say 500 Km length with high speed and great density of point cloud under a single platform.





7. GNSS / DGPS Base Stations / Ground Control Points (GCP's) :

- The precise GNSS / DGPS Base Station network sometimes called Ground Control Points (GCP's) is the backbone of all the data capture methods (Mobile LiDAR, UAV / Drone or airborne).
- These have to be established by Dual Frequency Survey Grade GNSS receivers with triangulation method and proper adjustments.
- GPS data is observed in static mode for at least two hours per base station with more than 4 satellites.
- These base station points are established on existing permanent structures / Km stones or monumental pillars and database maintained for future references and adjustments.







8. Creating digital 3D As built Topographic Survey Maps & City Models :

- A 3D city model is digital model of urban areas that represent terrain surfaces, sites, buildings, vegetation, infrastructure and landscape elements in three-dimensional scale belonging to urban areas.
- 3D city models support presentation, exploration, analysis, and management tasks in a large number of different application domains within a single framework and therefore, create and manage complex urban information spaces.
- The Open Geospatial Consortium (OGC) defines an explicit XML-based exchange format for 3D city models, CityGML, which supports geometric & topology information of 3D city model components.
- Many software providers like Bentley, ESRI, Terrasolid, Sketchup have developed their platforms for creating the digital 3D city maps & models.



Model taken from 'Here Technologies':



Thank You !!



9. Contact us :

Prashant Advanced Survey LLP,
O-207, 2nd Floor, Bramha Boulevard
Phase 1, Connaught Road, Near
Sadhu Vaswani Chowk, Pune-
411001, Maharashtra, India.

PRASHANT ADVANCED SURVEY LLP

(Advanced Land Survey & Geospatial Solutions)

Mr. Prashant S. Alatgi +91 98900 55670

Designated Partner

(Ph.D. Research Scholar, M.E. Civil; 24+ years experience)

Mr. Shivanand A. Alatgi

Chief Technical Officer

(Retired from 'Survey of India'; 49+ years experience)

Website : www.prashantsurveys.com

Email : prashant@prashantsurveys.com,
prashantadvsurvey@gmail.com

GWF 2023,
Rotterdam, The Netherlands,
02nd May to 05th May, 2023.

ISO 9001 : 2015

