Essential Geospatial Data Inputs for Designing Roads and Highways

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Road Design Parameters

Roads and highways are designed based on

- Road function
- Type
- Volume of expected traffic
- Potential traffic hazards and safety standards
- Capital cost
- Maintenance costs
- Vehicle operating costs
- Environment impacts
- Aesthetics
- Convenience of the road users

- Designs are based on Standards of IRC, BIS and ISO
- Geometric features are accurately measured and mapped.
- Conventionally ETS and GPS are used for survey
LiDAR

Accurate data capture in less time
Road Asset Management

• Capture all road assets through state-of-the-Art LiDAR technology

• GIS Platform that enables retrieve information that will aid in governance and rendering citizen centric services.

• An application that has a unique feature - 360 degree panoramic imagery of the road for any section integrated with LiDAR data for sub meter accuracy and measurements.
Area of Study || Uttrakhand State || India

- Dehradun to Mussoorie road of about 34 Km length.

  - Start Chainage CH :00 +000 with elevation value 576.09 mtr
  - Ending Chainage CH :34 +190 with elevation value 1782 mtr
  - Elevation difference from start to end point is 1,206 M
Panoramic Imagery near Sabji Mandi Chowk
Identification of features in Panoramic Imagery
Measurement of features in LiDAR Data
Topographic Map – Feature List

- Building
- Slum
- Drainage
- Flyovers
- Gas lines
- Divider Islands
- Footpath
- Parcel Boundary
- Row of Trees
- Railway Tracks
- Road Width
- CenterLine
- Water Pipe Lines
- Water Tank
- Bridge
- Culvert
- Canal
- Creek
- Divider
- Driveway
- Under Construction Building
- Under Construction ROW
- Tramways Line
- KIT Guard
- Bt Road (asphalt)
- Tiles Path
- Cc Road
- Footpath Tile
- Footpath Grass
- Gravel Road
- Road Divider
- Culvert
- Bridge
- Manhole (others)
- Handhole (others)
- Transformer
- Electrical Pole
- Telephone Pole
- Traffic Signal Pole
- HT Tower
- Telecom Tower (others)
- Industry
- Temple
- Church
- Mosque
- Theatre
- Railway Crossing
- Railway Station
- Fire Station
- Police Station
- Airport
- Hospital
- College/university
- School
- Hotel
- Petrol Bunk
- Water Bodies
- Bus Stand
- Trees
- Milestones
- Well \ Bore
- Hand Pump
- Water Valve
- Grave Yard
- Street Light
- Signal Sign Board
- Fire Hydrent
- Electric Cabinet
- Gate
- Gas line marker
- Telephone Cabinet
- Bank

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Road Map with Chainages Marked
Road Map with Chainages Marked - Enlarged View
Longitudinal Section – Along Road Centerline
Cross Section at 10 M Interval
Road Condition Mapping

Potholes identified using panoramic image
Road Condition Mapping

Raveling identified using panoramic image
Road Condition Mapping

Crocodile Cracks identified using panoramic image
Road Condition Mapping

Delamination identified using panoramic image
Road Condition Mapping

Edge Break identified using panoramic image
ROW - Encroachment
Bridge Condition in Panoramic Imagery
Topographic Map Creation using LiDAR data
Topographic Map Creation using LiDAR data
Web Application
Web Application
Summary

- Road DPR consultants conventionally use ETS and GPS for topographic surveys.
- LiDAR scanners integrated with 360 degree panoramic data provides accurate geospatial data for survey.
- Beneficial for carrying out Safety audits.
- Datasets are used for future reference and revisits to the fields are avoided.
- Periodic updates are essential.