FUGRO PANORAMIX OBLIQUE IMAGERY

Fugro’s oblique PanoramiX mapping solution is much more than a pretty picture, revolutionising the way imagery is used. PanoramiX is imagery and information rolled into one comprehensive package. Manage assets, monitor change, verify compliance, assess risk – and all from the comfort of your desk.

PanoramiX combines an unprecedented level of detail with powerful 3D mapping and visualisation software. Designed to increase your productivity, PanoramiX answers the needs of multiple users, including property assessors and first responders, as well as facilities and construction managers.

THE PANORAMIX ADVANTAGE

From a single airborne mission, the system collects imagery of the ground at nadir and oblique angles, providing high-resolution, photogrammetrically accurate orthoimagery, obliques, terrain data and 3D models. High-resolution, high-accuracy products have a pixel resolution up to 1-inch ground sample distance (GSD).

PanoramiX products are delivered with PX Mapper, a fast and easy-to-use mapping software that is compatible with Esri’s ArcGIS. Users can navigate imagery and land features along with synchronised oblique views. They can also now map ground features in three dimensions.

The PanoramiX system incorporates its own ground processing tools. These can be used to develop digital elevation models as well as 3D topographic and planimetric geographical information system (GIS) data layers, such as contours and transportation networks.

With full ownership of project deliverables, clients benefit from unlimited use of their data across an entire organisation. PanoramiX allows customers and their counterparts to share and communicate information using only one detailed and accurate dataset.

To continue supporting our customers’ goals, we now offer oblique imagery with a new dimension – a high-resolution 3D modelling environment that merges powerful GIS layers to produce a map that is more intelligent and seamless than ever before. With a suite of spatial software that supports advanced analysis, our federal, state and local customers across all divisions, can experience a GIS that efficiently resolves everyday management and planning challenges. From E911 to transportation property assessment, asset management and civil engineering, our 3D oblique models allow users to extract and apply the most practical information from geospatial data.
GEOSPATIAL KNOWLEDGE GENERATION WITH PX MAPPER

Fugro’s PX Mapper software is delivered as an integral part of the PanoramiX solution, providing robust capabilities for image viewing and exploitation. It is available locally or remotely, providing GIS users and non-specialists alike with 360-degree views of ground features.

PX Mapper allows users to overlay corresponding vector data (like parcels and streets); quickly reference the pertinent metadata for the imagery; and use the interactive tool bar to calculate horizontal, vertical, and area measurements.

Equipped with powerful tools for analysis and visualisation, PX Mapper enables users to query and extract 3D geospatial information, annotate building and ground features and integrate existing ArcGIS databases and web mapping services (WMS).

SOFTWARE INTEGRATION

The PX Mapper application programming interface (API) and plug-ins enable users to exploit oblique imagery within multiple platforms like ArcGIS and TerraExplorer. We recognise that most GIS users invest in software platforms to perform their tasks. PX Mapper easily shares geolocation information with other software systems to link positions and views for enhanced analysis.

3D OBLIQUE MODELS

Fugro transforms oblique imagery into a 3D-model environment by creating the pixel-based point cloud from the high-resolution imagery, generating a photo-mesh from the point cloud and fully texturing the photo-mesh from the imagery. The 3D environment, combined with PX Mapper for detailed visual guidance, expands the functionality of GIS to perform topographic contouring, flood volume calculations, viewshed analysis and shadow predictions, among other capabilities.
PANORAMIX APPLICATIONS
With the ability to map and analyse structures accurately from multiple view points, PanoramiX supports a number of land management and infrastructure-related applications.

Facilities management
PanoramiX data and derived 3D building models provide detailed information about critical infrastructure. Through the multiple oblique views, users can identify and assess structures quickly and efficiently, to support maintenance operations. With imagery captured at a 45-degree angle, the sides of buildings can be mapped in complete and accurate detail. The elevation of first floors, critical in the calculation of insurance-related flood damages and risk, can be derived. Three-dimensional diagrams of walls, including the exact location of doors and windows on all sides of a structure, enable accurate calculation of square footage and costs associated with maintenance efforts. Facility managers use PanoramiX to measure the slope, length, area and condition of specific roof features from the safety of a computer, reducing a once dangerous task to a simple click of a mouse.

Change detection
How do you find, manage and stay on top of all this change in an efficient and cost-effective manner? Fugro’s change detection service discovers and reports on changes that affect land and property management. Fugro determines the best and most accurate change detection method, based on pre-existing and newly collected datasets such as imagery, vector-based polygons (building footprints) and surface models.

Emergency management
After a natural disaster, rapid PanoramiX imagery acquisition and delivery enable damaged buildings, bridges and other infrastructure to be assessed accurately. Through the multiple oblique views, infrastructure managers can identify high water marks from flooding and assess other damages quickly and efficiently, to reduce response times and increase situational awareness during recovery operations.

Public works
The pressure to reduce costs and eliminate budget over-runs has never been greater. Fugro saves customers time and money with detailed base maps, planimetrics, orthomosaics, contours, and hydrologic datasets. PanoramiX also enables users to visualise existing right-of-way (ROW), parcel and plat data in a 3D-like environment, as these vectors can be projected on the oblique and viewed at a 45-degree angle. Planimetrically derived building footprints, roads, edge of pavement, and parking lots are among the many man-made objects that can be obtained from PanoramiX. Digital terrain models, contours, and hydrologic features such as streams, ponds and lakes can also be captured, displayed, and measured against the PanoramiX oblique imagery.

Land-use management
Planning departments must be able to balance a wide array of needs and interests while addressing the dynamics of growth and change in a rapidly evolving world. PanoramiX helps city planners, architects and engineers perform comprehensive site assessments with high-resolution, easy-to-interpret, oblique aerial views. Three-dimensional models of trees, buildings and structures used in line-of-site and shadow analysis can be generated as an additional PanoramiX service.
## Oblique and nadir imagery product accuracy

|                     | GSD at 45° oblique |                     | GSD at nadir |                     |                     | Flying height (AMT*) |                     |                     | Ortho pixel resolution (GSD*) |                     |                     |                     |                     |                     |                     | Ortho RMSE | Ortho accuracy | Surface model vertical RMSE | Ortho scale | Ortho accuracy |
|---------------------|--------------------|---------------------|--------------|---------------------|---------------------|---------------------|---------------------|---------------------|-------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                     | Oblique GSD        | Nadir GSD           | Altitude     |                     |                     |                     |                     |                     | Ortho GSD                    |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     | 2                   | 2.5                 | 3            | 4                   | 6                   | 8                   | 12                  |                     | 2.4                          | 3.0                 | 3.6                 | 4.8                 | 7.2                 | 9.6                 | 14.4                |                     |                     | 2.050                         | 2.550                         | 3.075                         | 4.100                         | 6.150                         | 8.200                         | 12.300                         |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     |                     |                     |              |                     |                     |                     |                     |                     | 6                            | 8                   | 9                   | 12                  | 18                  | 24                  | 37                  |                     |                     | 625                            | 777                            | 937                            | 1,250                          | 1,875                          | 2,499                          | 3,749                          |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     |                     |                     |              |                     |                     |                     |                     |                     | Ortho GSD                    |                     |                     |                     |                     |                     |                     |                     |                     | Ortho GSD                    |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     |                     |                     |              |                     |                     |                     |                     |                     | 2.4                          | 3.0                 | 3.6                 | 4.8                 | 7.2                 | 9.6                 | 14.4                |                     |                     | 6                              | 8                  | 9                   | 12                  | 18                  | 24                  | 37                  |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     |                     |                     |              |                     |                     |                     |                     |                     | 0.40                         | 0.50                 | 0.60                 | 0.80                 | 1.20                | 1.60                | 2.40                |                     |                     | 0.12                           | 0.15                 | 0.18                 | 0.24                 | 0.37                | 0.49                | 0.73                |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     |                     |                     |              |                     |                     |                     |                     |                     | 0.98                         | 1.22                 | 1.47                 | 1.96                 | 2.94                | 3.92                | 5.87                |                     |                     | 0.30                           | 0.37                 | 0.45                 | 0.60                 | 0.90                | 1.19                | 1.79                |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     |                     |                     |              |                     |                     |                     |                     |                     | Horizontal accuracy RMSE* in E or N** |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     |                     |                     |              |                     |                     |                     |                     |                     | 1.20                         | 1.50                 | 1.80                 | 2.40                 | 3.60                | 4.80                | 7.20                |                     |                     | 0.37                           | 0.46                 | 0.55                 | 0.73                 | 1.10                | 1.46                | 2.19                |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     |                     |                     |              |                     |                     |                     |                     |                     | 2.4                          | 2.9                  | 3.5                  | 4.7                  | 7.1                 | 9.4                 | 14.1                |                     |                     | 0.7                            | 0.9                  | 1.1                  | 1.4                  | 2.2                 | 2.9                 | 4.3                 |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     |                     |                     |              |                     |                     |                     |                     |                     | Common mapping scales |                     |                     |                     |                     |                     |                     |                     |                     |                     |                          |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     | 1" = 40'           |                     |              |                     |                     |                     |                     |                     | (1:500)                      |                     |                     |                     |                     |                     |                     |                     |                     |                          |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     | 1" = 50'           |                     |              |                     |                     |                     |                     |                     | (1:600)                      |                     |                     |                     |                     |                     |                     |                     |                     |                          |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     | 1" = 60'           |                     |              |                     |                     |                     |                     |                     | (1:720)                      |                     |                     |                     |                     |                     |                     |                     |                     |                          |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     | 1" = 80'           |                     |              |                     |                     |                     |                     |                     | (1:960)                      |                     |                     |                     |                     |                     |                     |                     |                     |                          |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     | 1" = 125'          |                     |              |                     |                     |                     |                     |                     | (1:1,500)                    |                     |                     |                     |                     |                     |                     |                     |                     |                          |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     | 1" = 166'          |                     |              |                     |                     |                     |                     |                     | (1:2,000)                    |                     |                     |                     |                     |                     |                     |                     |                     |                          |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|                     | 1" = 250'          |                     |              |                     |                     |                     |                     |                     | (1:3,000)                    |                     |                     |                     |                     |                     |                     |                     |                     |                          |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |

**Conversion formulas**

1 metre = 3.2808333'  

NSSDA = 2.447 × RMSE  

NSSDA* = 1.96 × RMSE  

NSSDA** = 1.73 × RMSE  

Where RMSE = \(\sqrt{\text{RMSE}^x + \text{RMSE}^y}\)  

**Acronyms**

ASPRS = American Society of Photogrammetry and Remote Sensing  

NMAS = National Map Accuracy Standard  

NSSDA = National Standard for Spatial Data Accuracy  

AMT = Above Mean Terrain  

RMSE = Root Mean Square Error

**Unit abbreviations**

* = inch  

' = foot  

cm = centimetre  

m = metre