HxGN Content Program
Metro HD
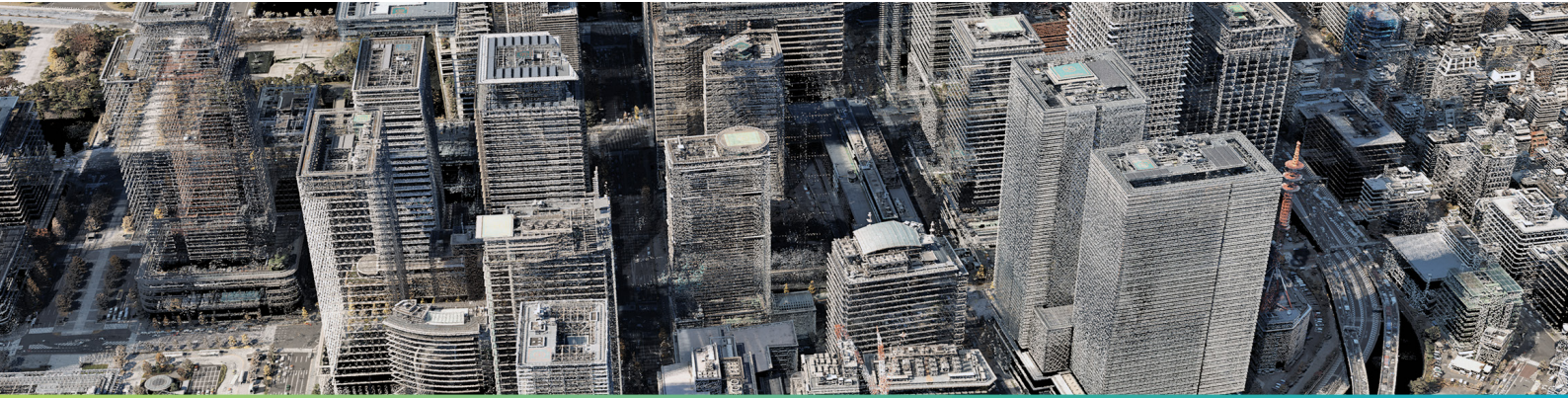
Specification	Acquisition
Nominal Image GSD (Planned)	5.0 centimeter (cm)
LiDAR Density (Planned)	Target: 20 points per m^2 Minimum allowed: 8 points per m^2
Aerial Accuracy	RMSE x/y = 15 cm RMSE z = 25 cm
Ortho Accuracy	RMSE x/y 25 cm RMSEr = 35.4 cm CL95 = 61.2 cm Data sets are produced to meet ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014) for a 25 (cm) RMSEx / RMSEy Horizontal Accuracy Class which equates to Positional Horizontal Accuracy +/- 61.2 cm at a 95% confidence level.
LiDAR Accuracy	RMSEz = 10 cm CL95 = 19.6 cm In open, non-vegetated terrain Data sets are produced to meet ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014) for a 10 (cm) RMSEz Vertical Accuracy Class equating to a NVA = +/- 19.6 cm at 95% confidence level and VVA = +/- 29.4 cm at the 95th percentile.
Minimum Sun Angle	30° minimum, however, every effort should be made to acquire the downtown core as well as any tall building filler lines at the highest solar elevation possible in the day.
Cloud/Cloud Shadow	Must be less than 5%, per 40 square kilometer block. Obscured details must not include urban areas or housing and roads in rural areas. Every effort will be made to remove cloud using adjoining imagery. In these limited circumstances visible seam lines along cloud edges are acceptable.
Smoke/Fire	See cloud cover.
Persistent Smoke (volcano, factory, crop burn, etc)	See cloud cover.

Snow/Ice Cover	Permanent snow/ice is acceptable. Seasonal snow/ice is acceptable if obscured details are not of high significance or represent key man-made, natural, or cultural features on the ground (e.g., paved roads, agricultural field boundaries, housing, communication routes.
Specular Reflection	Must not be detrimental to the image appearance or impede the ability to extract information from the imagery.
Flooding/Standing Water	Acceptable if obscured details are not of high significance or represent key man-made or cultural features on the ground (e.g. paved roads, agricultural field boundaries, housing, communication routes).
Maximum Allowable Orthomosaic Seamline Offset	25 cm (x/y)
Relative Stereo Accuracy	10 cm (x/y), 15 cm (z)
LiDAR Interswath Accuracy	RMSDz: ≤ 6.0 cm
LiDAR Intraswath Accuracy	RMSDz: ≤ 8.0 cm
Side Overlap	Urban areas planned 60% or greater with CityMapper (Nadir Image).
Forward Overlap	Urban areas planned 80% or greater with CityMapper (Nadir Image).
Non-pixel Data	DN value of 0 and 255 reserved for non-data
Sensor and Lens Artifacts	Imagery should be free of artifacts caused by defects in the image sensor or lens pollution.
Band-to-band Pixel Misregistration	≤ 0.5 pixel and no perceivable color fringing
Image Blur Due to Turbulence	Image blur caused by turbulence is not acceptable
Radiometry and Color	Dynamic range adjustment to develop 8-bit imagery from digital camera raw images shall preserve feature detail across the full image histogram: in highlights, mid-tones, and shadows. The appearance of the image must be a realistic representation of the color on the ground. Color and radiometry adjustments shall be made to minimize the impact of atmospheric and solar variance within orthomosaic and aerial images. The color and radiometry of images should be consistent across different flights within a block. Neutral color balance shall be preserved on manmade features (asphalt, concrete, rooftops). Neutral color shift as a result of histogram-based image adjustment methods is not permitted. Neutral objects shall have a DN difference of no more than 5 for any RGB triplet. Sample images may be requested to confirm radiometry and color meet expectation.
Feature Warp/Smear	Bridge/freeway/causeway warp/smear is not acceptable. Where geometric fidelity of a feature is compromised, or pixel stretch occurs, special care will be taken to insure the ortho image is a realistic representation of real-world details and oversimplification or unrealistic fabrication has been minimized.
Building Seamline Sheer	Visible joins between ortho-images and flight lines within each block should be avoided but will be accepted under the following conditions: they do not hide detail or adversely affect the ability to extract information from the image; they do not stretch the entire length of the seamline e.g. clearly outlining entire images; they do not impact geometric fidelity (no change in shape or alignment between images); there is not positional shift between images along visible lines; and the other color difference is slight and/or well graduated and consistent both within the block and with edge matched blocks in the imagery layer they are along cloud edges remaining from the cloud cover conformity.
Building Lean	Supplemental flight lines or increased side lap will be added in dense urban areas as required to minimize building lean. Buildings over 60 ft tall that are not at nadir will be assessed for lean. Seamlines will be moved to use the most nadir data. The objective is to have the center line of roads visible.