DRONE SERVICES

WHAT CAN A DRONE DO FOR YOU?

2020 MONROE AVE NW • GRAND RAPIDS, MI 49505 MBCE.COM 616.363.9801

Moore+Bruggink
Consulting Engineers

THE BENEFITS OF A DRONE

Drones have become a valuable tool for a wide variety of industries, commercial enterprises, and municipalities. Drones can be safely and efficiently deployed to capture stunning imagery or video of any subject matter from perspectives that were previously only possible from planes. Innovations in drone and photogrammetry software have expanded the capabilities of drones far past simply capturing images for marketing.

Drone imagery can be collected and processed to create accurate models of the earth's surface, including natural features and manufactured structures. These include high-resolution georeferenced maps, digital elevation models, point clouds, and 3D models.

Using drone imagery and photogrammetry software, Moore+Bruggink can deliver these products efficiently with a verifiable level of accuracy.

We are also FAA Part 107 licensed operators for commercial drone use, with experience flying and capturing data for a wide array of projects.

Moore+Bruggink can deliver a full spectrum of time and cost saving deliverables for your next project.

DELIVERABLES

HIGH-RES ORTHOMOSAIC

(GEOTIFF, KML, GOOGLE MAPS TILES)

High-Resolution Orthomosaics are a valuable resource for any project. Georeferenced and formatted to be used in almost any software, this imagery can be used for:

- Measuring Distances
- Recording Land Use
- Digitizing Features
- Monitoring Construction Progress
- Base Maps for Creating a Site Plan

Need imagery to reflect recent changes that are not currently available through other sources? **Moore+Bruggink** can capture and process imagery to deliver the product you need within a day. Using cloud technology, we can also provide you the ability to share this information in an easy to access web format as well.

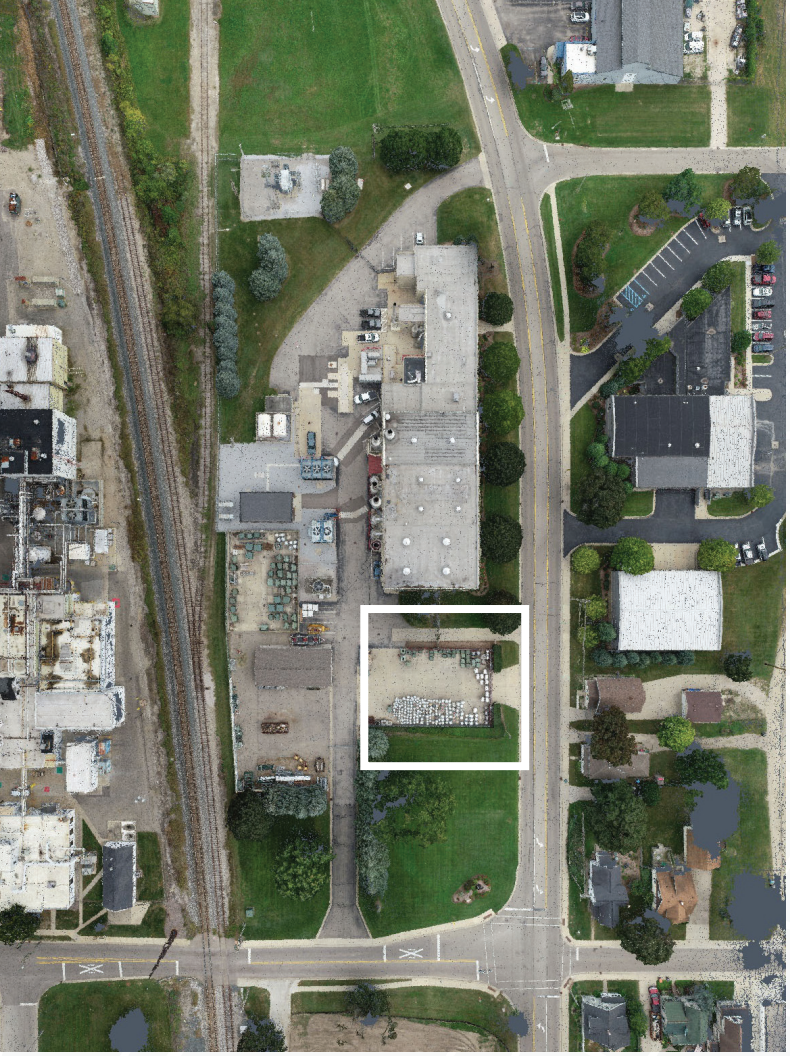
DIGITAL ELEVATION MODELS

DIGITAL SURFACE MODEL / DIGITAL TERRAIN MODEL (.TIFF)

A Digital Surface Model (DSM) represents the earth's surface and includes all natural and manufactured structures. A Digital Terrain Model (DTM) represents the earth's surface and excludes all natural and manufactured objects, leaving only the bare earth.

These models can be used for:

- Creating Relief Maps
- Modeling Hydrology
- 3D Rendering of Buildings and Sites
- Elevation Layers
- GIS Analysis
- Engineering and Infrastructure Design



CLASSIFIED POINT CLOUD

(.LAS, .LAZ, .PLY, .XYZ)

A Classified Point Cloud is the most valuable deliverable and can add tremendous value to a project.

Use a Point Cloud to:

- Provide a highly accurate visual reference of the existing condition of a building or site
- Calculate Volumetric Data
- Create Surfaces in CAD
- Model 3D Infrastructure
- Produce As-Built Drawings

3D TEXTURED MESH/MODEL

(.PLY, .FBX, .DXF, .OBJ)

A powerful visualization tool, a 3D mesh or model can be incorporated with architectural renderings to give clients a “real world” feel for what a site or development will look like once completed.

Moore+Bruggink can capture and process imagery to deliver the product you need within days.

PROJECT SUMMARY

THE SAND PIT

Moore+Bruggink recently completed a drone survey for an active sand pit to create a Conceptual Site Plan for a client. This project presented us with several intriguing obstacles as a result of daily changes to the site. Today's sources for aerial imagery and elevation data were unable to reflect the current state of the site and were not usable for the design process.

The engineer required more detailed data to complete the site design. We were able to deliver that data using the drone. The drone survey was finished in less than half the time of what traditional survey methods would have taken, saving not only time, but money.

TRADITIONAL SURVEY

Field Time (one man crew) = 16 hours
CAD / Processing = 2 hours

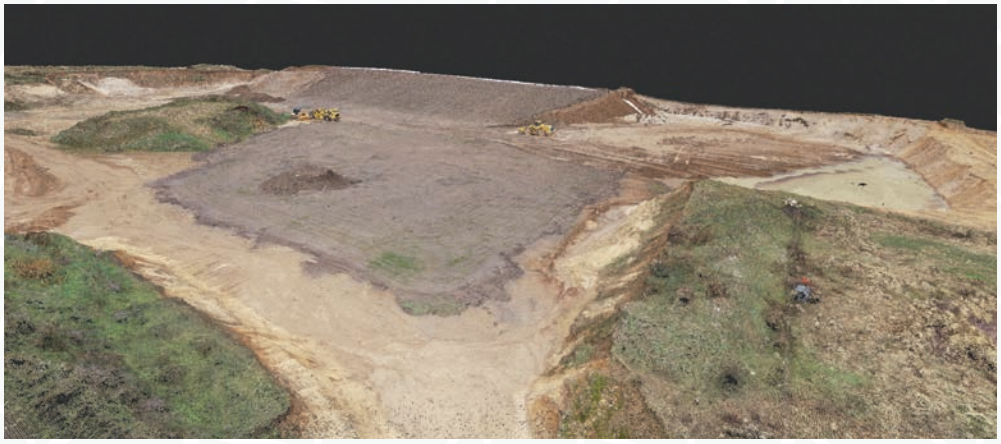
Total Time = 18 hours

DRONE SURVEY

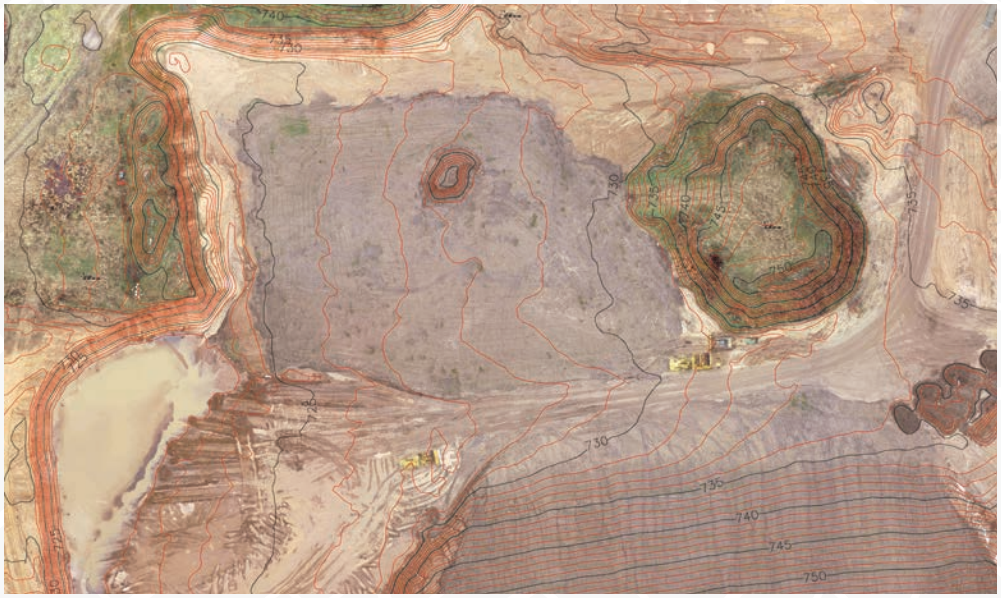
Field Time (one man crew) = 3 hours
CAD / Processing = 3 hours

Total Time = 6 hours

Point Cloud created from Drone Survey



CAD surface created from Point Cloud overlaid on High-Res Imagery



ACCURACY

Verifiable Accuracy of Deliverables

GROUND SAMPLING DISTANCE (GSD)

Ground Sampling Distance is a way to measure or quantify the resolution of the orthomosaic. It is measured by taking the distance between two consecutive pixel centers measured on the ground. In simpler terms, it is a measure of how much ground each pixel represents in the image. The larger the value of the image GSD, the lower the spatial resolution of the image and the less visible the details are. We are currently able, on average, to capture a GSD between 1-2 cm. This means that one pixel in the image represents 1-2 cm on the ground, giving you the ability to see the ultra-fine details of your image as you zoom in.

GROUND CONTROL POINTS

A Ground Control Point (GCP) is a point whose coordinates are known. Their coordinates have been measured with traditional surveying methods using RTK GPS. GCPs are used to geo-reference a project; this ensures that all deliverables are accurate in both XY (horizontal) planes as well as Z (vertical). Using ground control allows us to produce verified accuracies within a .10 (on hard surfaces) of what traditional survey methods can capture.

RMS ERROR

A root-mean-square error is the industry standard for quantifying the accuracy of the Ground Control Points. It is a way to measure the “fit,” or how closely the ground control point was matched to the imagery. This provides us a quality check when outputting the point cloud and other deliverables to ensure that any measurement taken in those deliverables is extremely accurate. It is also a way for us to show you, the client, that your product is verified to be accurate.

CONTACT

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PORTFOLIO

Relevant Michigan Projects

CITY OF ZEELAND, MI

Washington Avenue Reconstruction

The drone was used to complete a survey of the stretch of road to be reconstructed. Using this method was not only more efficient, but greatly improved safety by eliminating the need for any traffic control. Ground Control was set along the length of the road and did not require anyone to go beyond the curb line of the road.

CEDAR SPRINGS, MI

St. John Paul II Church Expansion

Moore+Bruggink was tasked with creating a 3D model of the current site. This model was then integrated with the architect’s rendering of the proposed expansion in order to visualize what the new site would look like.

HOMER, MI

Waste Water Sludge Lagoon Improvements

Facing a short project timeline, **Moore+Bruggink** used a drone to complete a survey of the sludge lagoons at Homer’s Waste Water Treatment Plant. What would have taken a week to complete using traditional survey methods was done in one day using a drone. The point cloud was used to create a surface in CAD for the engineer to complete the design.

GRAND RAPIDS TOWNSHIP

Twin Lakes Nursery Special Land Use Permit

Grand Rapids Township approached **Moore+Bruggink** to create a High-Resolution Orthomosaic of the current property at Twin Lakes Nursery. This imagery was used as a record for the current state of the property in reference to the Special Land Use Permit filed by the nursery with the Township. This gives the nursery and the Township a record of the property that can be easily referenced in the future. Instead of using outdated imagery from another source, **Moore+Bruggink** was able to create a current, high-resolution orthomosaic of the property in under a day’s time.

CREATING COMMUNITY SINCE 1956

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