Drones in work Zones
Beaver Excavating – Ohio Based contractor with Offices in Ohio and West Virginia

- Founded in 1953

Background of UAS use

- Received our part 333 exemption in 2015 and our
- Part 107 license in 2016
- Our UAS’s for in house use only, not a “drone for hire business”

Current UAS fleet consists of

- Three fixed wing drone’s, an Ebee RTK and 2 Ebee Plus
- Two quad-copter drones, SenseFly Albris and a DGI Phantom
- A Seafloor systems autonomous boat for bathometric surveys
- Evaluating a heavy lift VTOL UAV for LIDAR and large area missions
Core Services

- Mass excavating and grading
- Underground Utility Installation
- Cast-in-place concrete

**Heavy Highway Group**
- Highway and roadway new construction and reconstruction
- Bridge construction
- Retaining wall structures
- Box culverts, drainage structures
- Sound walls
- Airport, railway, intermodal, and dam infrastructure
- Waterway improvements
- Site reclamation
- Wetland mitigation
- Structure demolition

**Industrial Group**
- Industrial site development and infrastructure
- Steel, refining, manufacturing, processing facilities
- Building and equipment foundations, anchor bolt installation
- Ironwork
- Concrete structures, walls, floors, pits
- Tank and silo foundations
- Sheeting, shoring, and piling
- Demolition
- Laydown yards, equipment and material storage areas
- Equipment and processing line installation, material handling
- Rail sidings, loading and unloading facilities

**Commercial Group**
- Landfill construction
- Reservoir and impoundment construction
- Retail/Commercial site development infrastructure
- Power generation infrastructure
- Distribution centers, mixed-use developments, recreational facilities
- School and municipal complexes
- Soil and synthetic liners
- Detention structures and ponds
- Haul roads, retaining walls

**Specialty Services**
- Dynamic compaction
- Roller compacted concrete
- Driven piling and sheeting, drilled caissons, tie-back walls
- Mine grouting
- Soil stabilization and reinforcement

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**Beaver Constructors** (Projects and services for the food processing, manufacturing and distribution industry along with general building, commercial and industrial services.)
- Food processing and distribution infrastructure
- Specialty flooring
- Concrete, foundations and structures
- Carpentry
- Pre-engineered metal buildings
- Masonry
- Food processing specialties
- Loading docks

**Shale Energy** (Projects and services for the Marcellus and Utica Shale gas and oil industry)
- Site development infrastructure
- Well pad sites, process plants and facilities, compressor stations
- Access roadway and infrastructure
- Municipal roadway improvements and maintenance
- Aggregate surfacing
- Impoundment construction

**Core Services**
- Underground Utility Installation
- Cast-in-place concrete
Uses of UAS’s at Beaver Excavating

• Mapping original ground
• 3D mapping the exterior of structures
• Job progress checks such as quantities of earth moved
• Aerial photographs for documentation
• Final job as-buils
• Load quantity analysis
• Map or inspect unsafe areas such as landslides or near highwalls

Benefits of using UAS’s

• Keeps job personnel out of harms way
• Map hundreds of acres of complex terrain in a matter of hours
• Document large structures in a matter of minutes
• Gives us an instant snap shot of the project
• Old way took days or weeks
• Photogrammetry from UAV’s very accurate, 3D point clouds have very high level of detail. Less than 1% difference in volume compared to mapping with GPS or total station
Flying under the small UAS rule

• Get a remote pilot certificate from the FAA

• Register your UAS as a “non modeler”

• Follow all part 107 rules
FAA Part 107 Safety Rules

• Unmanned aircraft must weigh less than 55 pounds, including payload, at takeoff
• Fly in Class G airspace
• Keep the unmanned aircraft within visual line-of-sight
• Fly at or below 400 feet
• Fly during daylight or civil twilight
• Fly at or under 100 mph
• Yield right of way to manned aircraft
• Do not fly directly over people not involved in UAS operations
• Do not fly from a moving vehicle, unless in a sparsely populated area

https://www.faa.gov/uas/getting_started/part_107/#or
Beaver Excavating added safety measures

- PIC (Pilot in command) has ADS-B in only transceiver – to monitor air traffic during flight
  - All maned aircraft are required to have ADS-B Out avionics by January 1st 2020
- PIC has hand held aircraft radio tuned to local Unicom for emergency communication
- VO (Visual Observer) for every flight
- Hands free radios for PIC and VO
- Track in service data for all batteries
  - Replace after 1 year in service, at loss of battery life or any visual signs of damage or swelling
- 20 / 20 Rule – DO not fly in winds gusting over 20 mph or temperatures less than 20 F
ADS-B Transponder with tablet
Where UAV’s can be used in work zones

• Can not fly over people or moving vehicles

• Can only fly in class G airspace – be aware that there is a lot of places that are not class G airspace
  • Use an airspace map or the B4UFly app to check if it is ok before you fly

• Mission planning should consider glide path or emergency landing area of drone
Part 107 and airspace waivers

- You can apply for a part 107 or airspace waiver through the FAA’s Drone Zone Portal https://faadronezone.faa.gov/#/
- Instant approval of airspace waivers through Skyward or Airmap service through L.A.A.N.C. (Low Altitude Authorization and Notification Capability system)
- Not all airports are participating in LAANC
- Phase 6 of LAANC starts tomorrow. Phase 6 is the final roll out phase and adds service to the central north region
Respecting and complying with the wishes of your customers

- Submittal of drone pilot license and part 107 compliance prior to UAS operations

- Notice and approval of flight plan before every flight

- Some customers have their own private flight control center requiring flight deconfliction notice and approval before USA operations

- Varying insurance requirements (some companies require 1 million in coverage for each UAS)

- Specific approval for every computer, camera and transmitter, with make model and serial number of each device before their use was allowed on site