ASBA 2024

ASBA TECHNICAL MEETING & TRADE SHOW

DECEMBER 3-6, 2024 | ORLANDO, FLORIDA

JOBSITE GRADE CONTROL: UNDERSTANDING VERTICAL AND HORIZONTAL CONTROL IN SPORTS FACILITY CONSTRUCTION

This course will provide attendees with an opportunity to learn more about managing vertical and horizontal control on jobsites, survey terminology, and a review of the methods and equipment used to establish benchmarks, survey/layout, and perform grading activities.

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THE DIFFERENCE IN VERTICAL AND HORIZONTAL CONTROL AND WHY IT IS IMPORTANT.

- If you’re new to this material, then you're probably wondering what each of these items are and what they mean to you.
- The simplest way to put it is that horizontal control refers to where you are on a map. In most cases for construction, where you are on a map is relative to where you are from your control points.
- Vertical control refers to elevation control. In most cases, relation to sea level on a particular datum. You find this location by working on of your known benchmark elevation.

SPEAKING THE LANGUAGE/TERMINOLOGY

- Grade Laser
- Tripod
- Stick & Beacon
- Robotics
- Benchmark
- Control Point
- CAD file
- Northing & Easting Coordinates

CONTROL POINTS/TRAVERSE POINTS

- Control points are specific relative points with known coordinates on a site that a surveyor uses to locate other locations. They are typically labeled on a set of plans with northing and easting coordinates.
- Within a CAD file, these can be used to locate other site characteristics in relation to them.

BENCHMARK

- A benchmark is a location on a site with a known elevation.
- A control point is usually also a benchmark with a known elevation.
- Some benchmarks could be storm structure lids, landmarks, buildings pads, or just a stake in the ground.
- Benchmark definition: A standard against which something is compared.

GRADE LASER (LASER LEVEL) TOOL FOR VERTICAL CONTROL

GOOD PRACTICE IN THE FIELD

Always use the same benchmark each day. In other words, don’t work off of benchmark A on Monday and then work off of benchmark B on Tuesday. This helps keep a better control of elevation and less variance.

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TECHNOLOGY

UTS Grading

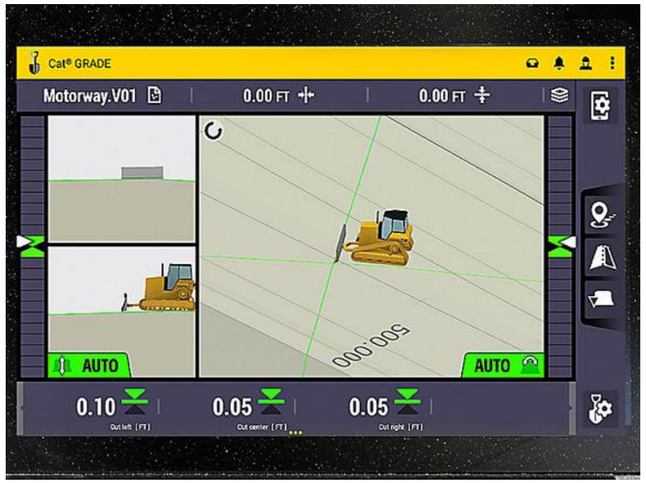
2D LASER GRADING

GPS GRADING

2D GRADING

- 2D grading is the most simple method of grading with technology.
- Operates exactly like the grade laser
- Beacons on each side of the blade
- Accuracy based on benchmark/setup

UTS GRADING



- Operates off of a 3D model
- Can build model off of CAD file with elevations
- High accuracy
- Use of survey equipment tied in with machine
- Automatic grading
- Can model for multiple types of equipment
- Can model for trenches with slope
- Requires less thinking in the field on complicated grades

UTS IN ACTION

UTS is great for projects with complicated grading plans. You can place the specified elevations in the UTS model and will be able to hit those elevations and locations with precision.

This method also grants the opportunity to use existing shots in the field if you are matching to existing grade somewhere on the project grading.

GPS GRADING

- GPS grading uses satellite signals to control systems for grading activities.
- GPS antennae
- Machine sensors
- Control box- Display mounted in machine
- Still works off of model which can be based from AutoCAD

TRACK CONSTRUCTION GRADING

- Class 4 certified tracks should be sloped outside to inside
- Percentage of slope varies based on competition level
- High School
- College
- Other (Usually less particular) Ex. Elementary, Middle, ect.
- Could use UTS, GPS, or 2D
- Typical process in our world: GPS site contractor, 2D or UTS for fine grade on the sports contractor.

TRACK 2D GRADING

- Set up laser flat
- Pull string line across intended grade perpendicular to running direction
- Set laser receivers to the string line grade on each side of the blade
- Must reset the receivers on each pass and change of direction

TRACK UTS GRADING

- Build model off of a topographic survey or CAD file
- Tie into jobsite
- Auto grade using singular setup
- Elevation offset inside machine

HARD COURT CONSTRUCTION GRADING

- Usually best to grade using 2D laser guided equipment
- .83% to 1% for outdoor hard courts is recommended for proper sheet flow of water and playability
- Tennis and PB: Best practice to slope not in playing direction
- BB/VB/ Multi-purpose: Slope direction less important

FIELD CONSTRUCTION GRADING

- Field grading plans can be very simple or complex
- Choice of type of grading would be based on what the grading plan looks like
- Single slope usually 2D laser grading would be sufficient
- Projects with multiple grade breaks could be better GPS/UTS candidates
- Turf fields: typically .5% to .75% in order to prevent infill migration

THANK YOU

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