3D Modeling for Contractors
The Constructible Model
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SITECH Ohio – a construction technology partner for the 21st Century

- Established in 2012 in Columbus Ohio
- Specializing in:
  - Automated Machine Guidance
  - Site Positioning & Control Systems
  - Constructible Modeling Software

- Major brand vendor
- Work with hundreds of Civil Contractors
- Sales
- Support
- Training
1990’s Construction Technologies…
30 years later... it's here... all of it.
The Construction Continuum

1. Feasibility Planning
2. Detailed Planning
3. Detailed Design
4. Estimating & Bidding
5. Planning & Scheduling
6. Execute Construction
7. As-Built Sign Off
8. Maintenance
The Constructible Model
What is a “Constructible Model”? 
The Constructible Model – Why?

- Using Outdated Methods in Specs.
- 2D paper plans do not show 3D construction reality
- Errors in CAD Data or Paper (PDF) Plans (BAD CAD)
- Inaccurate Level of Detail in Plans (Missing Critical Information)
- Design issues discovered after excavation has started. (Conflicts)
- Existing ground quantities issues discovered after excavation has started.
- Construction site progress not linked to plans (Scheduling/Workrates)

How much would be saved if these issues can be eliminated on future projects?
The Constructible Model – Why?

- Constructible modeling for the Contractor is the secret to HOW ATC’s can harness construction Contractor expertise
- With Constructible modeling software a Contractor has foresight into
- Shortening construction time
- Reducing Project Costs
- Advancing new and more effective designs, technology, materials and construction methods
The Constructible Model - Data

Ohio Department of Transportation Files
The Constructible Model - DATA
The Constructible Model - Benefits

Data Prep & 3D Model Conversion

- Automated File Clean Ups
- Elimination of Duplicate Lines
- Elimination of Empty Layers
- Mass Joining of Entities
- Mass Elevation of Entities
- Layer Standardization & Org.
- Field to Finish Mapping
- More…
The Constructible Model - Software
Built in “Holistic Civil Super Systems” for Contractors

- Survey Data Reduction
- Civil Design & Drafting
- Construction Takeoff/Estimating
- Construction Data Prep
- Construction Planning
- Project As-builts/GIS
- More...
The Constructible Model - Benefits

Survey Data Reduction

- Total Station Data Reduction
- RTK Data Reduction
- GNSS Post Processing
- Level Data Reduction
- UAS Data Processing
- Photogrammetry/Scanning
- Field to Finish Mapping
- More…
The Constructible Model - Benefits

CAD Functionality

• Create/Edit Objects:
  • 2D/3D Linestrings
  • Arcs/Circles
  • Text
  • Layers
  • More…
The Constructible Model - Benefits

Surface Tools

• Create DTM/TIN/TTM:

• Using any 3D Data:
  • Points
  • Linestrings
  • Contours
  • Point Clouds (LIDAR)
  • More…
The Constructible Model - Benefits

Site Design

- 3D Linestring
- VPI Commands
- Vertical Curves
- Elevate Objects
- Lines
- Pads
- Contours
- Variable Offset
- Surface Tie
- Surface Slicer
The Constructible Model - Benefits

Corridor Design

• Runways, Roads, Rails, Paths, Ditches/Trench

• Horizontal/Vertical Alignments

• Typical Sections Built from instructions

• Including Layers of Materials

• Automatically creates Finished Surface

• Dynamic
The Constructible Model - Benefits
Intersections, Roundabouts, Cul-de-Sacs

- Dynamic
- Parametric
- Turn Lanes
- Islands
- Surface Models
The Constructible Model - Benefits

Image Management

- Dynamic
- Import Images
- JPG, TIFF, PDF, More…
- Georeference Images to site location
- Import Vector PDF
- Drape over Surface Model
The Constructible Model - Benefits

Site Quantity Takeoff Tools

• Apply Materials/Site Improvements Areas
• Strata/Boring Data
• Subsurfaces
• Digitize
• Area /Length Count Reports
• Takeoff Reports
• Mass Earthwork
• Material Quantities
The Constructible Model - Benefits
Road Quantity Takeoff Tools

- Create Stored Sections
- Digitize PDF Cross Sections
- Create From CAD Cross Sections
- Generates a Corridor from the Cross Sections
The Constructible Model - Benefits
Plan Production & Drafting Capabilities

- Publish Plan Sets
- Plan Sheets
- Grid Sheets
- Profile Sheets
- Cross Sections
The Constructible Model - DATA

MACHINES – capture Topo/Performance/Productivity

• Passive Survey
• Machine Mapping Enabled
• Import Data from the Machine
• Productivity Monitoring
• Cut/Fill
• Coverage
• Elevations
The Constructible Model - DATA

DRONES/SCANNERS LiDAR – Photogrammetry & Point Clouds

- Import Point Cloud Files
- Create Regions
- Classify/Clean Data
- Build Surfaces
The Constructible Model - DATA

SURVEY INSTRUMENTS – Base Stations / Rovers / Total Stations

- Rover & TS Topography
- Mapping
- As Built / Feature Coded
- Select Quantities
The Constructible Model - Evolution

**CURRENT**

- **2D Drawings**
  - Single discipline
  - Manual and CAD Discipline approach

- **3D Models**
  - Single discipline
  - Limited intelligence Discipline approach

- **3D Collaboration Models**
  - Multi-discipline
  - VR visualization
  - Project collaboration

**FUTURE**

- **BIM for Infrastructure**
  - Multi-discipline and workflow support
  - Intelligent object model
  - Lifecycle value

**ISOLATED**

**COLLABORATIVE**

**INTEGRATED**
The Constructible Model - FUTURE

- More than surfaces, points and lines
  - Infrastructure management
  - Design, construct, as-built
  - Field collected / office generated
  - Sub models
    - Geology, imagery, GIS, structures, tunnels, rail, road, point clouds, utilities
    - Features and processes
  - Centrally managed
  - Mixed Reality Visualizations
The Constructible Model - FUTURE
The Constructible Model - FUTURE