

## Day 1 Table of Contents

Note to Self-Paced Users of the Day 1 Seminar Handbook	i
Notices	1
Quick Reference	2
Seminar Outline	16
Program Overview	19
Note to Earthwork Beginners	19
Software Installation and Setup Notes	20
A Toolbox for Creating Earthwork Models	23
AGTEK Site Modeling Products Compared	24
Should AGTEK 3D Users Upgrade to AGTEK 4D?	26
Data-Entry Options for Site Modeling and Takeoff	28
Requirements for Paper Plan Digitizing	30
Requirements for Working with PDF Plan Sheets	31
Raster PDF vs. Vector PDF	32
Tips for Working with Multiple PDF Plan Sheets	33
Revised PDF Plan Sheets	34
Image Selection Utility (Gradework 4D)	34
Alignment Strategies	35
Start-Up Options Menu	36
AGTEK Data File Maintenance	39
Screen Layout in AGTEK 3D and AGTEK 4D	40
Modes, Surfaces and Layers Overview	41

## Day 1 Table of Contents (Cont.)

Program Overview (Cont.)	
Entry Mode Screen Reference	44
Edit Mode Screen Reference	45
Utility Toolbar Reference	46
Data Entry Guides	47
Typical Data Entry Sequence	49
Earthwork Modeling Step-by-Step	50
Sample Site Grading Plan	50
Street Details, Site Location Map and Plan Abbreviations/Notes	51
New Job File Setup	52
Import First PDF Plan Sheet	53
Multi-Page Preview Dialog	54
Adjust Display and Note PDF Data Type	55
Set Scale for First PDF Plan Sheet	56
Verify and Correct PDF Plan Scale - AGTEK 4D	57
Verify PDF Plan Scale - AGTEK 3D	58
Correct PDF Plan Scale - AGTEK 3D	59
Translate Job File to Designer's Coordinates	60
Determine Best Use of Raster PDF Plan Sheet	61
Raster-to-Vector Conversion Option	62
Unrecognized Vector PDF Plan Sheet Problem	63-A
Geo-Reference Job File with Google Earth	64

## Day 1 Table of Contents (Cont.)

### Earthwork Modeling Step-by-Step (Cont.)

Enter Notes on Documentation Layer	72
Enter Existing Perimeter	73
Two Problems with Existing Perimeter Inside Grading Limits	74
Multiple Existing Perimeters and Perimeter Holes	74
Enter Existing Data Lines	75
Existing Data Lines Overview	75
Existing Contours	75
Streaming Entry Option	76
Existing Spot Elevations	78
Critical Spot Elevations	78
Entry Options	78
Spot Elevation Topo (No Contours)	80
Open Job File (with Data Line Errors), Re-Load PDF Plan Sheet	81
Error-Check and Correct Existing Data Lines	82
Error Check with Plan View	83
Crossing Data Lines	83
Display Elevation Labels	84
Horizontal Spike	85
Point Reduction of Streamed Contours	86
Error Check with 3D View	87
Obvious Vertical Errors	87

## Day 1 Table of Contents (Cont.)

### Earthwork Modeling Step-by-Step (Cont.)

Non-Graphical Elevation Error Detection Tools	88
Site Min/Max Elevations	88
Find Elevation Function	88
Line Editor vs. Point Editor	90
Error Check with Trimesh Utility	91
The TIN Surface	91
Disable Shader Support for Trimesh Evaluation (AGTEK 4D)	92
Effect of Break Line on TIN	92
Error Check with Water Flow Utility	93
Error Check with Contour Surface Utility	94
Trimesh, Water Flow, and Contour Methods Compared	95
Enter Corrective Existing Break Lines	96
Ridge and Saddle	97
Swale Flow Line	99
Connecting Widely-Separated Contours at Site Perimeter	101
Spread Debris Pile	102
Existing Street	106
Views of Completed Existing Surface	108
Match Point Selection for Aligning Next PDF Plan Sheet	110
Direct Coordinates or Selected (Common) Points?	110
Import and Align Next PDF Plan Sheet (Direct Coordinates)	111

## Day 1 Table of Contents (Cont.)

### Earthwork Modeling Step-by-Step (Cont.)

Selected (Common) Points Alignment Outtake	114
Re-Loading PDF Plan Sheets (AGTEK 3D)	115
Re-Loading PDF Plan Sheets (Earthwork 4D)	116
Re-Loading PDF Plan Sheets (Gradework 4D)	117
Manual PDF Realignment (Align Matching Edges)	118
Enter Design Data Lines	119
Design Data Lines Overview	119
Building Data Lines (and Adjacent Landscape Grades)	120
Fixed Elevation Building (Fixed Landscape)	120
Stepped Elevation Building (Sloped Landscape)	121
Building with Retaining Wall (Fixed and Sloped Landscape)	123
Pond Data Lines	125
Street Data Lines	126
Line Labels on Data Lines	127
Offset Design Data Lines	129
Pre-Offset Error Checking	129
Horizontal Error	129
“Guesstimate” Correction to Bad Plan Street Grade	130
Note Bad Plan Grade on Documentation Layer	131
Offset Line Utility Options and Settings	132
Fixed Landscape Grade at Building	134

## Day 1 Table of Contents (Cont.)

### Earthwork Modeling Step-by-Step (Cont.)

Offset Specified Range of Points	136
Pond Data Lines	138
Street Data Lines	140
Four Approaches to Offsetting Street Data Lines	141
Swap Ends Utility	142
Offset Lines for Walks, C & G, Crown	143
Apply Template Option for Street Data Lines (AGTEK 4D)	146
Enter Supplemental Design Data Lines	151
Enter Elevations by Slope and Daylight	151
Design Landscape Contours	152
Design and Drafting Entry Options	153
Plan-Profile Entry Options	153
Contours or Break Lines to Model Fixed-Slope Areas	154
Views of Design Surface (without Design Perimeter)	155
Enter Design Perimeter	156
Hole in Design Perimeter at Undisturbed Area	157
Editing Design Perimeter Alignment	157
Design Perimeter Alignment by Slope Intercept	157
Error-Check and Correct Design Data Lines	158
Check with Plan and 3D Views (Edit Mode)	159
Check with Trimesh Utility	160

## Day 1 Table of Contents (Cont.)

Earthwork Modeling Step-by-Step (Cont.)	
Check with Water Flow Utility	160
Check with Contour Surface Utility	160
Check with Plan and 3D Views (3D View Mode)	161
Enter Corrective Design Break Lines	162
Bad Street Surface Example	162
Flat TIN Triangles at Site Perimeter Corners	163
Views of Completed Design Surface	164
Existing and Design Surface Adjustments	165
Enter Stripping Areas	166
Topsoil Stripping	166
Holes in Stripping Areas	167
Debris Removal (Over Topsoil)	167
Existing Sidewalk Removal	168
Stripping Beyond Design Perimeter	169
Stripping Fill or Cut Areas Only	169
Stripping Variable Depth Topsoil	169
Verify and Edit Stripping Areas	170
Report Regions and Sectional Areas Defined	172
Enter Report Regions and Sectional Areas	173
Building Areas	174
Pond Top, Slope and Bottom Areas	176

## Day 1 Table of Contents (Cont.)

Earthwork Modeling Step-by-Step (Cont.)	
Street Blacktop, C & G and Walk Areas	180
Landscape Areas	187
Verify and Edit Report Regions/Sectional Areas	188
Holes in Report Regions and Sectional Areas	188
Selection Methods and Cross-Hatching	189
Individual Region/Area Edits	190
Multiple Region/Area Edits	191
Editing Region/Area Boundary	191
Subgrade Modeling Notes	193
Entering, Viewing and Interpreting Profiles	196
Surface Selection and Layers Display	196
Two-Point (Straight-Line) Profile Example	196
Multi-Point (Curving) Profile Example	197
Evaluating Profiles	198
Profile Interpretation	198
Profile Point Scroll	199
Set Profile Station Start Value (Edit Station Offsets Utility)	200
Cross Sections on Profile (Station Generator Utility)	201
Viewing and Interpreting Plan View Maps	202
Cut-Fill Maps, Display Options, and Settings	202
Stripping Area and Sectional Area Depth Maps	206



## Day 1 Table of Contents (Cont.)

### Earthwork Modeling Step-by-Step (Cont.)

3D Drive-Through Simulation	207
Calculating, Reporting and Interpreting Cut/Fill Volumes	208
Setting Up the Calculations	208
Ref and Diff Surface Considerations (AGTEK 4D vs. AGTEK 3D)	209
Volume Calculation Error and Warning Messages	210
Calculation Screen, Control Keys and Results Dialog	211
Overview of the Three-Part Volume Report	212
Cut/Fill Quantities (Part 1)	212
Stripping Quantities (Part 2)	212
Sectional Quantities (Part 3)	212
Detailed Breakdown of Cut/Fill Quantities (Part 1)	213
Answering Questions with the Volume Report	214
Shrink/Swell Adjustments	215
Three Volume/Density States of Soil	215
Estimated Shrink/Swell	215
Soils Report Densities	215
Densities Not Provided	216
Mixed Onsite Fill Materials	218
Measured (Actual) Shrink/Swell	219
Shrinkage on Remove/Scarify/Re-Compact Volumes	219
Subsidence Loss Adjustment	219

## Day 1 Table of Contents (Cont.)

Earthwork Modeling Step-by-Step (Cont.)	
Bump the Fill Factor	220
Rule of Thumb Adjustments	220
Compaction Depth Formula	221
Topo Method	221
Haul Swell Adjustment	222
References and Comments	223
Export Volume Report to Text File for Excel	225
Export Volume Report to XLSX File for Excel (AGTEK 4D)	228
Other Applications	229
Length/Area Utility	229
Appendix A - How to Get Help, Training, Program Updates	231
Getting Help	231
Getting Trained	233
Getting Program Updates	234
Appendix B - Keyboard Shortcuts	237
Import (CAD Transfer) Mode	237
Edit Mode	239
Entry Mode	244
Profile View Mode	248
Plan View (Cut-Fill Map) Mode	250
3D View Mode	253

## Day 1 Table of Contents (Cont.)

Appendix B - Keyboard Shortcuts (Cont.)	
Volume Report Mode	256
Haul Report Mode	257
Print Preview Mode	258
Appendix C - Download and Use Day 1 Seminar Data Files	259
Appendix D - Catalog of Day 1 Handbook Web Resources	263
Appendix E - Format and Print Documentation	273
Print Device Setup	273
Volume Report	274
3D Views	276
Cut-Fill Map	277
Cut-Fill Map (Over Plan Sheet Image)	278
Profile Views	279
Spanning Multiple Printed Pages	280
Combine Images from Different Job Files on Same Print Page	281
Export Image Object from Print Page to EMF File	281
Save Print Page Layout to AIP File	281
Recover Print Page Layout from AIP File	282
Save Print Page Layout to PDF File	283
Save 3D Surface to VRML (WRL) File	283
Legacy Image Presenter Compatibility	283
Publish to Google Earth (AGTEK 3D Options)	283

## Day 1 Table of Contents (Cont.)

Appendix E - Format and Print Documentation (Cont.)	
Publish to Google Earth (AGTEK 4D)	284
Appendix F - Digitizing from Paper Site Grading Plans - AGTEK 3D	287
New Job Setup for Paper Plan Digitizing	287
Paper Plan Scaling Method 1 (Arbitrary Coordinates)	288
Paper Plan Scaling Method 2 (Designer's Coordinates)	290
Rescaling Paper Plan Sheet	292
Adjusting Data Digitized at Wrong Paper Plan Scale (Stretch)	293
Calculating an Unknown Paper Plan Scale	294
Appendix G - Digitizing from Multiple Paper Plan Sheets - AGTEK 3D	295
Appendix H - Digitizing from Paper Profile Sheets - AGTEK 3D	301
Appendix I - Merging AGTEK ESW Job Files	321
Appendix J - Design and Drafting Tools	323
Example Base Map and Existing Topo Contours	324
Circle Utility	327
Point Compression Utility	328
Trim Lines Utility	329
Station Generator Utility	333
Copy vs. Cut for Pasting Surface Layer Data (AGTEK 4D)	334
Auto Pad Utility	337
Wildcard Label Selection	338
Assign Elevations by Daylight Function	340

## Day 1 Table of Contents (Cont.)

### Appendix J - Design and Drafting Tools (Cont.)

Assign Elevations by +/- Edit Function	342
Assign Elevations by Slope Edit Function	343
Assign Elevations by Conform Utility	344
Fillet Line Utility	346
Establish Limit of Grading by Slope Intercept	349
Contour Surface Utility	351
About the Author and Seminar Instructor	353
Seminar Attendee Survey	355
Tear-Out Grading Plan Sheet for Earthwork Modeling Exercise	357