

Day 2 Table of Contents

Note to Self-Paced Users of the Day 2 Seminar Handbook	<i>i</i>
Title Page and Notices	1
Author's Note	2
Some Handbook Acronyms and Terminology	3
Day 2 Quick Reference Index	4
Model Day 2 Seminar Class Outline	21
Program and Vector Data Overview	23
A Toolbox for Creating Earthwork Models	23
AGTEK Site Modeling Products Compared	24
Should AGTEK 3D Users Upgrade to AGTEK 4D?	26
Requirements for Importing Vector Data	28
Similarity of CAD, Vector PDF and LandXML Data	29
Raster PDF vs. Vector PDF	30
Tips for Working with Multiple PDF Plan Sheets	31
Revised PDF Plan Sheets	32
Image Selection Utility (Gradework 4D)	32
Alignment Strategies	33
Start-Up Options Menu	34
Shader Support (AGTEK 4D)	34
Plan View Shading Resolution	34
Manage Image Cache (AGTEK 4D)	35
AGTEK Data File Maintenance	36
Requesting and Receiving Vector Data Files	37

Day 2 Table of Contents (Cont.)

Program and Vector Data Overview (Cont.)	
Why Import Vector Data Files?	37
Vector-File-Ready Checklist	38
What to Ask For (CAD/Vector PDF/LandXML)	39
Improving the Odds of Getting CAD Files	40
Sample Pre-Bid CAD File Request Letter	41
Sample Contract-Award CAD File Request Letter	42
File Types and Corresponding Procedures	43
File Viewing, Editing and Conversion Resources	45
Data Entry Guides	46
AGTEK 3D	46
Earthwork 4D	47
Gradework 4D	48
Typical Vector Data File Manipulation Sequence	50
Modeling with Vector Data Step-by-Step	52
Sample Site Grading Plan	52
Street Details, Site Location Map and Plan Abbreviations/Notes	53
New Job File Setup for PDF Data	54
Import First PDF Plan Sheet	55
Multi-Page Preview Dialog	56
Adjust Display and Note PDF Data Type	57
Set Scale for First PDF Plan Sheet	58
Verify and Correct PDF Plan Scale – AGTEK 4D Method	59

Day 2 Table of Contents (Cont.)

Modeling with Vector Data Step-by-Step (Cont.)

Extract and Transfer First PDF Plan Sheet's Vector Data	60
Verify PDF Plan Scale – AGTEK 3D Method	61
Correct PDF Plan Scale – AGTEK 3D Method	62
Translate Job File to Designer's Coordinates	63
Match Point Selection for Aligning Next PDF Plan Sheet	64
Direct Coordinates or Selected (Common) Points?	64
Import and Align Next PDF Plan Sheet (Common Points)	65
Adjust Display, Note PDF Data Type, Set Scale	66
Align Next PDF Plan Sheet (to Previous Sheet)	67
AGTEK 3D (Dialog Method)	68
AGTEK 4D (Shortcut Method)	69
Extract Next PDF Plan Sheet's Vector Data	70
Unrecognized Vector PDF Plan Sheet Problem	71
Transfer Next PDF Plan Sheet's Vector Data	72
Some Points about Vector PDF Plan Data	73
Only 2D Data from Vector PDF Plans	73
Missing or Overlapping Vector PDF Line Work	73
"Horizontal Shift" Error with Next PDF Sheet	73
Correcting Next PDF Sheet's "Horizontal Shift" Error	74
Re-Loading PDF Plan Sheets in AGTEK 3D	75
Re-Loading PDF Plan Sheets in Earthwork 4D	76
Re-Loading PDF Plan Sheets in Gradework 4D	77

Day 2 Table of Contents (Cont.)

Modeling with Vector Data Step-by-Step (Cont.)

Manual PDF Realignment (Align Matching Edges)	78
Starting New Job File with CAD Data	80
Incompatible AutoCAD File Versions	80
External/Block References and Locked/Off/Frozen Layers	81
Widely-Separated Data	82
Arbitrary and State Plane Coordinate Data	82
Crop Rectangle	82
Document SPC Translation Point(s)	83
Zero Internal North/East Offsets (File Information Report)	85
Troubleshoot Missing CAD Data	86
Selection and Transfer of Vector Data	88
Existing and Design Data on Same Layer	88
Pre-Transfer Data Settings and Functions	89
Compression (Point Reduction)	89
Crop Rectangle	89
Imported Elevation Min/Max Filter	89
Transfer Units (Feet, Meters, Architectural)	89
Join Selected Data (AGTEK 4D)	89
Vector Data Display Options	90
Layer Display Control (Alt-B)	90
Hide/Hide All But/Show All/Gray Hidden Lines	90
Label Display Options	90

Day 2 Table of Contents (Cont.)

Modeling with Vector Data Step-by-Step (Cont.)

Selection and Transfer of Vector Data (Cont.)

CAD Text, Elevations, Rotated Text (AGTEK 4D)	90
Vector Data Selection Options	91
Area Select	91
Layer Select/Deselect (Ctrl Key, Left Click)	91
Object Select/Deselect (Shift Key, Left Click)	91
Delete Unwanted Data	91
Vector Data Transfer Options	92
To Existing or Design Surface (Right Click or Menu)	92
To Specified Surface and Layer (Send To Button)	92
Cut/Paste Function (AGTEK 4D)	92
Importing and Transferring CAD TIN Surface	93
Importing and Transferring LandXML Surface Data	94
Selecting and Transferring Step-by-Step Exercise Data	95
CAD Elevation Text Labels	95
Line Work Layers	96
Use PDF Plan Sheet to Verify CAD Data	98
Import and Align PDF Plan Sheet	98
Check CAD Line Work	100
Check CAD Elevation Text Labels	100
Find and Correct Spiked CAD Elevations	101
Select Spiked Elevation Point in Edit Mode or 3D View Mode	101

Day 2 Table of Contents (Cont.)

Modeling with Vector Data Step-by-Step (Cont.)

Find and Correct Spiked CAD Elevations (Cont.)

Job File Min/Max Elevations (File Information Report) 101

Display Interpolated OG Elevation at Pointer in Entry Mode 101

Find Elevation Function 103

2D-to-3D Conversion Techniques 104

Existing Surface Data Lines 104

Assign Elevations to Contours in Edit Mode 104

F9 Elevation Snap 104

Bridge Gap (Join) Utility 105

F8 Auto-Increment Snap 106

Spot Elevations in Edit Mode 107

Point Compress Existing Contours 108

Conform Selected Utility 109

Spot Elevations and Break Lines in Entry Mode 110

Design Surface Data Lines 113

Landscape and Pond Contours 113

Cleanup Pond's CAD Contour 114

Building Lines 115

Bridge Gap (Join) Utility 115

F9 Elevation Snap 115

Auto Pad Utility 116

Trim and Remove Overhanging Contours 119

Day 2 Table of Contents (Cont.)

Modeling with Vector Data Step-by-Step (Cont.)	
2D-to-3D Conversion Techniques (Cont.)	
Design Surface Data Lines (Cont.)	
Top-of-Wall Landscape Grade Lines	121
Snap Circle Setting	122
Varying Landscape Spot Grades at Building	123
Level Landscape Grade Lines at Building (Offset)	124
Street Line Work	125
Assign Elevations in Edit Mode	125
Line Work Cleanup Notes (Fillet/F7 Snap/Join)	127
Assign Elevations in Entry Mode	128
Lot Line Prep with Swap Ends, F7 Extend, F6 Insert	131
Assign Lot Line Elevation by Conform	131
Assign Lot Line Elevation by Slope	132
Assign Lot Line Elevation by Daylight	132
Checklist to Complete the Earthwork Takeoff	133
Translate Job File to State Plane Coordinates	134
Geo-Reference Job File with State Plane Coordinates	136
Identify State Plane Coordinate Zone	139
NGS Coordinate Conversion and Transformation Tool	139
SPCS83 Tool for State Plane Zone Maps in Google Earth	139
State Plane Lookup Utility (Gradework 4D)	140
Reminder of Useful Functions (Edit Mode)	141

Day 2 Table of Contents (Cont.)

Modeling with Vector Data Step-by-Step (Cont.)	
Reminder of Useful Functions (Entry Mode)	142
Additional CAD Data Manipulation Examples	143
Check and Adjust for Architectural Units	143
Adjusting Import Transfer Units (Prevention)	144
Check Job Scale Utility (Scale Repair in AGTEK 4D)	147
Stretch Site Utility (Scale Repair in AGTEK 3D)	148
Data Prep for Auto Pad Utility	149
Import Layer Selection (Alt-B) to Filter Transfer Layers	149
Create Missing CAD Line Work	151
Prep CAD ROW Lines for Pad Setback Offsets	151
Label Select, Hide All But, Join and Compress	151
Swap Ends Utility	153
Offset ROW Pad Setback Lines	153
Prep CAD Rear Lot Lines for Pad Setback Offsets	154
Label Select, Deselect, Join and Compress	154
Change Line Label of Isolated Rear Lot Lines	157
Offset Rear Pad Setback Lines	158
Prep and Offset Partial Rear Pad Setback Line	160
Cleanup Conflicting CAD Line Work	161
Label Select for Hide or Delete	162
Run Auto Pad Utility	164
Label Select Pad Elevation Text Labels	164

Day 2 Table of Contents (Cont.)

Additional CAD Data Manipulation Examples (Cont.)

Data Prep for Auto Pad Utility (Cont.)

Auto Pad Offset Value	164
Auto Pad Data Line Errors	165
Manual Select Pad Elevation Text Labels	167
Fix Non-Responsive Pad Elevation Text Label	168
Create Artificial Pad Elevation Text Label	169
Cleanup for Auto Pad Data Line Errors and Conflicts	171
Horizontal Spikes in Auto Pad Data Lines	171
Gaps in Bounding Annotation Line Work	172
Trim CAD Contours Extending Into Auto Pad Area	173
Street Model from “Conformed” Centerline	175
Join Lines before Conforming Centerline	177
CL High-, Low-, and Match-Point CAD Text Grades	178
Conform Centerline	181
Fixed Horizontal EP Offset Lines	182
Intersection Prep with Ctrl-X, F5, F7	183
Tapered Horizontal EP Offset Line	183
Cleanup EP Offset Lines at Intersection	184
Line Snap Entry of EP Radius Lines	185
Alt-V to Hide Background Layers	185
Interpolating EP End-Point Existing Tie-In Grades	186
Final EP Line Work Cleanup	187

Day 2 Table of Contents (Cont.)

Additional CAD Data Manipulation Examples (Cont.)	
Street Model from “Conformed” Centerline (Cont.)	
TBC Offset Lines	187
Shoulder Offset Lines	188
Conflicting Offset Lines and CAD Street Contours	189
Prep for Removal of CAD Street Contours	190
Trim and Delete CAD Street Contours	191
Conform Other CAD Lines to Final Street Surface	193
Identify and Correct Interpolation Errors	193
Modeling with ASCII Text Survey Data	195
Overview and Compatible Data Formats	195
Borrow Pit Modeling & Volumes I (No Starting Topo)	198
Borrow Pit Modeling & Volumes II (Before and After Topos)	205
Quantify and Document Bid Topo Update	218
Survey Data Layer	220
Apply Survey Utility	221
Compare GPS and Bid Topos with Contours	225
Compare GPS and Bid Topos with Cut/Fill Map	226
Compare GPS and Bid Topos with Profiles	229
Volume Calculations and Evaluation of Results	230
Cross-Section Data Modeling Problem	235
Appendix A – How to Get Help, Training, Program Updates	247
Getting Help	247

Day 2 Table of Contents (Cont.)

Appendix A – How to Get Help, Training, Program Updates (Cont.)	
Getting Trained	249
Getting Program Updates	250
Appendix B – Keyboard Shortcuts	253
Import (CAD Transfer) Mode	253
Edit Mode	255
Entry Mode	260
Profile View Mode	264
Plan View Mode	266
3D View Mode	269
Volume Report Mode	272
Haul Report Mode	273
Print View Mode	274
Appendix C – Download and Use Day 2 Seminar Training Files	275
Appendix D – Exporting AGTEK Data	281
Overview of Exportable File Types	281
File Preparation Tips for Field Data	283
Manage Export Colors before Export (AGTEK 4D)	285
Display Modeling Colors Option (Gradework 4D)	285
Manage Export Colors during Export (AGTEK 4D)	286
Data for CAD Systems	287
3D Surface for Autodesk Revit BIM	288
3D Surface for SketchUp	290

Day 2 Table of Contents (Cont.)

Appendix D – Exporting AGTEK Data (Cont.)	
Data for Google Earth	291
Data for Transfer between AGTEK Job Files	294
Data for Leica Grade Control	297
Data for Topcon Grade Control	298
Data for Trimble Grade Control	301
Data for Stringless Curb Machines	303
Appendix E – Prepping CAD Files for AGTEK	305
Bind External References with DWG TrueView	306
Bind External References with AutoCAD LT	308
Convert DWG/DXF to Layered Vector PDF with DWG TrueView	309
Convert Architectural Units with TurboCAD Deluxe	310
Convert Architectural Units with AutoCAD LT	311
Metric to Imperial (Meters to Feet) Units Conversion Methods	312
CAD Spot Elevation Formats	313
Check for Geolocation Info (SPC Zone) with AutoCAD LT	314
Appendix F – Catalog of Day 2 Handbook Web Resources	315
Appendix G – Horizontal Translations	331
Exercise I - Translate North/East and Align Matching Edges Utilities	332
Exercise II - Data Alignment Tool (Gradework 4D)	337
Appendix H – CAD Spot Elevation Topo Exercise	341
Appendix I – Geo-Reference Job File with Google Earth	349
Appendix J – Conceptual Modeling Exercise	355

Day 2 Table of Contents (Cont.)

Appendix J – Conceptual Modeling Exercise (Cont.)

Boundary Map and Existing Topo	356
Offsets from Property Lines	357
Circle Utility	359
Point Compression Utility	360
Insert/Break Point Function (F5)	360
Trim Lines Utility	361
Join Lines Utility	363
Lot Lines by Snap Entry	365
Lot Lines by Station Generator Utility	366
Lot Lines Clean Up	368
Wildcard Label Selection	368
Elevate Level Lot Areas with Auto Pad Utility	369
Create Lot Grade Labels	369
Run Auto Pad Utility	370
Modify Auto Pad Results with Side-Setback Offsets	371
Assign Tentative Street Centerline Grades by Daylight Function	373
Enter Temporary Design and Existing Perimeters	374
Apply Cut-to-Fill Shrink Factor to Default Job Site Report Region	376
Calculate Volumes to Check Tentative Rough Balance	376
Edit and Finalize Street Centerline Grades	377
Edit Elevations by Point Scroll Range Interpolation	377
Edit Elevations by +/- Function	378

Day 2 Table of Contents (Cont.)

Appendix J – Conceptual Modeling Exercise (Cont.)	
Edit Elevations by Slope Function	378
Prep Street Centerline for Tie-In to Existing	380
Assign Elevations by Conform Selected Utility	380
Create/Prep Street Edge-of-Pavement Line	381
Centerline Offset	381
Insert/Break/Delete/Conform/Trim/Join	382
Fillet Line Utility at Angular Join Points	385
Check and Correct Fillet Elevation Errors	387
Detail Curb & Gutter/Walk with Apply Template Utility (AGTEK 4D)	390
Storm Basin Details	392
Basin Location and Top/Bottom Grades	392
Fillet Line Utility	393
Apply Template Utility (AGTEK 4D)	393
Edit Level Lot Area Footprint Example	395
Offset Move-To Reference	395
F7 Move Point Options	396
Establish Limit of Grading by Slope-Intercept Offset	397
Enter Final Design and Existing Perimeters	399
Enter Final Stripping Area	400
Enter Final Report Regions/Sectional Areas	401
Final Volume Calculations and Site Balancing Grade Adjustments	404
First Calculation and Volume Report Evaluation	404

Day 2 Table of Contents (Cont.)

Appendix J – Conceptual Modeling Exercise (Cont.)	
Use Cut-Fill Colors/Profiles to Choose Grade Raise Areas	405
Partial Grade Raise Based on Volume Report Change Values	407
Second Calculation and Volume Report Evaluation	407
Determine Overshoot Percentage and Modify Change Values	407
Remaining Grade Raise Based on Modified Change Values	408
Third Calculation and Volume Report Evaluation (Balanced)	410
Generate Contours for Conceptual Design Surface	411
Appendix K – Scaling Multiple Paper Sheets with CAD Data – AGTEK 3D	413
Appendix L – Verify CAD Data and Paper Plan Match – AGTEK 3D	415
Appendix M – Volume Calculation Error and Warning Dialogs	417
About the Author and Seminar Instructor	419
Seminar Attendee Survey	421
Tear-Out Plan Sheet for Modeling with Vector Data Exercise	423
Tear-Out Details Sheet for Modeling with Vector Data Exercise	424