PLANE TABLE MAPPING PROJECTS IN FIELD GEOLOGY COURSES: INTEGRATING NEW AND OLD TECHNOLOGY

DATA COLLECTION FLOWCHART

Alidade and Plane Table Group

Step 1: setup instrument on established station with known coordinates and elevation. Plot position of 2nd and 3rd established instrument stations, and then draft 100 foot grid lines .

Step 2: collect and plot data as points on the plane table map from the established station. If required the instrument may be moved to another established station with known coordinates and elevation.

Step 3: Sketch geological contacts and topographic contours by the end of day.

Step 4: If the Total Station is to be used the plane table data point positions and elevations must be recorded into a spreadsheet and uploaded to the Total Station so that previously recorded alidade data will appear on the TDS computer. Contact lines can be reproduced by instructing the Survey Pro software to connect lines and curves through data points.

On following work days steps 2 through 4 are repeated as necessary once the Alidade and Plane table instrument is set up on a known station position

Total Station Group

Step 1: Use the Total Station to measure the relative positions of the 3 instrument station positions in the project area. The GPS can measure the absolute coordinates of the 1st station at at later time. A stationary backsight prism target is positioned to provide a north reference so that all data is collected with true azimuths.

Step 2: The team working with the Total Station collects position and geological data that is automatically plotted with the Survey Pro application. Contacts can be traced by connecting lines or curves through data points. An 8 hour session may collect up to 150 stations as compared to 30 to 35 points with the alidade and plane table.

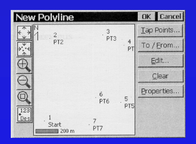
Step 3: At the end of the work day the position and contact data is downloaded and plotted with AutoCAD ™ software. Since each team uses the Total Station for only one day, the downloaded position data must be manually plotted onto the plane table map so that it is accessible the next work day. The grid lines previously plotted on the plane table aid this process.

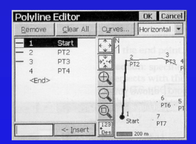
Steps 2 and 3 are repeated by the next team to use the Total Station once the instrument is set up and calibrated at one of the established 3 instrument stations defined in Step 1 above.

Point data downloaded from SET500 Total Station:

X (feet)	Y (feet)	Z (feet)	Point
4806.54	5073.36	908.35	R172
4852.78	5066.21	907.85	R171
4867.68	5053.20	908.36	R169
4929.40	5068.07	910.22	R164
4892.30	4960.43	909.15	R152
4811.80	4950.37	910.14	R146
4821.57	4954.28	907.57	R145
4768.08	5066.50	907.56	C22
4866.05	5047.73	907.89	C14
4876.44	5052.97	909.04	C10
4795.38	5031.22	902.30	R176
4885.21	5045.34	904.42	R167
4952.50	5054.60	903.31	R161
.	.	.	.
.	.	.	.

Data collected on the TDS Ranger while collecting data with the Total Station is easily downloaded to a spreadsheet format (i.e. Excel) via an RS232 serial port. The user may customize the Survey Pro software to store any number of attributes that are attached to each point, and which would appear in the spreadsheet as additional columns.

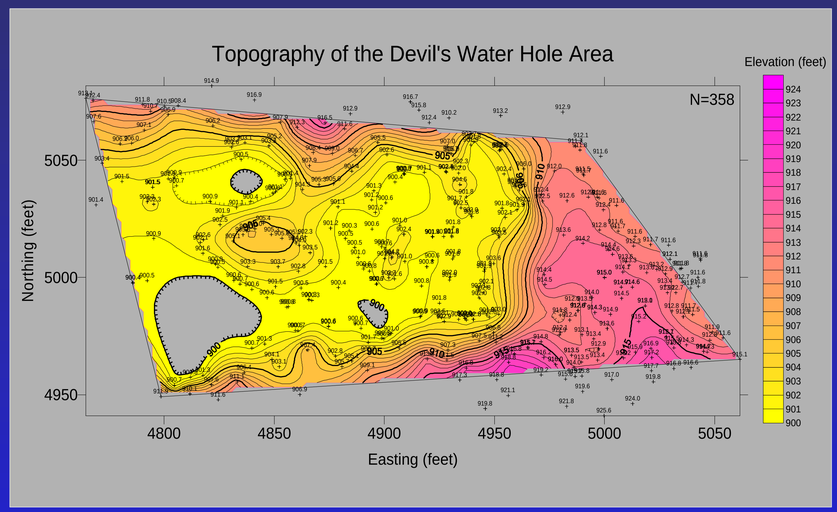




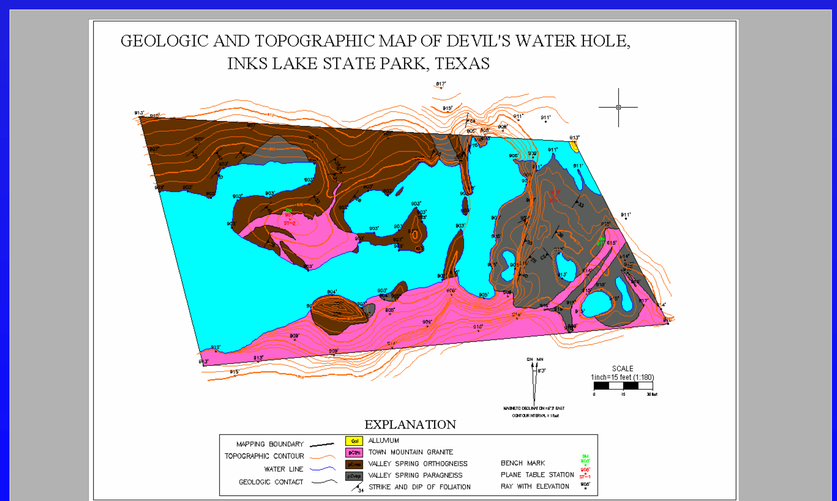
The SurveyPro ™ application software makes data collection with the Total Station extremely user-friendly. The above left screen capture is a typical map view within SurveyPro displaying several data points surveyed by the instrument. Note that the user can "zoom" in and out to any required scale with the tools on the left side of the window. The polyline editor (right screen) can fit lines through data points, therefore, a finished geologic map can be constructed entirely within the TDS data collector computer.

SUMMARY

We believe that Field Geology students should be exposed to the latest technology such as the Total Station, however, older traditional instruments such as the Alidade and Plane table also serve a useful purpose. The Alidade forces students to deal directly with the geometry and trigonometry of field surveys, and that develops within each of them a sense of what is a reasonable result, and what is not. A mixture of both types of technology shows the student what is possible with the latest instrumentation, but the older technology instills in them the fundamentals of a large-scale (1:120) topographic and geologic survey. This fact, and the cost of the Total Station/GPS system (approximately $12,000) has convinced us that a mix of the old and new technology is the best course for the future.



The above topographic map was generated by combining the data collected by each of the three student teams with the Total Station during the 2002 summer field course. This number of data points total 358 for approximately 24 hours of work (3 work days) , including the time needed to train the students to use the Total Station. Training time averaged 45 minutes to an hour, including leveling the instrument on the tripod. Initially the Total station is assigned an arbitrary location and elevation- later the GPS is used to fix the absolute position of each point through a transformation option in the Survey Pro software.



The above geologic map was constructed in 1998 using only alidade and plane table technology during the 3-day mapping project. A comparison can be made against the 3-day combination of Total Station data (see top map). In essence, each student team collected approximately the same number of points in one day with the Total Station as they would in three days with the alidade and plane table. This 3-fold increase in productivity allows for a much more detailed topographic and geologic map product. The students universally prefer the Total Station not only for its increased productivity but also for its ease-of-use.