Getting Started

In

By

MicroSurvey Software Inc.

MICROSURVEY END-USER LICENSE AGREEMENT

This MicroSurvey End-User License Agreement ("Agreement") is a legal and binding agreement between you ("Licensee") and MicroSurvey Software Inc., a BC corporation ("MICROSURVEY") concerning the use of the MicroSurvey products (the "Product"), the software provided in connection with the use and operation of the Product, including firmware and stored measurement data (collectively the "Software") and all related documentation provided in connection with the acquisition of the Product ("Documentation"). The Software includes software owned by, and licensed from, third party licensors.

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1. **Title to Product and Rights to Use Software and Documentation.** Title to the Product and the rights to use the Software and Documentation are conditioned upon the payment of the required purchase price and any applicable license and maintenance fees and Licensee's acceptance of the terms and conditions of this Agreement.

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vi. This Agreement will terminate automatically if (x) Licensee violate any of the terms or conditions of this Agreement, (y) MICROSURVEY publicly posts a written notice of termination on its website www.microsurvey.com (that, or any successor site, the "Site"); or (z) MICROSURVEY revokes this Agreement or issues a new agreement in writing or electronic form and conditions Licensee continued use of the Software upon acceptance of the new agreement.

3. **Ownership.** All rights, title and interest in and to the Software and Documentation including, without limitation, all copyright, patent, trade secret and other intellectual property rights shall at all times remain the property of MICROSURVEY, it licensors, or its suppliers, as applicable. The Software and Documentation are licensed, not sold, and are protected by copyright and other intellectual property laws and treaties. Licensee shall take appropriate steps reasonably calculated to notify others of MICROSURVEY and its licensor's/suppliers' ownership of the Software and Documentation.

4. **Warranty.** MICROSURVEY warrants that the Product will, for 90 days after the Effective Date (the "Warranty Period"), substantially conform to the Documentation; provided, that Licensee must notify MICROSURVEY in writing of any breach of the foregoing warranty within the Warranty Period. For any breach of the foregoing warranty reported during the Warranty Period, MICROSURVEY will use reasonable efforts to promptly correct such defect without further charge. If MICROSURVEY is unable to correct such defect, then MICROSURVEY will refund the license fees paid for the Product. This represents MICROSURVEY'S exclusive liability and Licensee's sole and exclusive remedy in the event of a breach of the foregoing warranty.

5. **Warranty Disclaimer.** EXCEPT AS DESCRIBED IN SECTION 4 (WARRANTY), MICROSURVEY HEREBY DISCLAIMS ALL WARRANTIES RELATING TO THE PRODUCT, SOFTWARE, AND DOCUMENTATION, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT AND FITNESS FOR A PARTICULAR PURPOSE. MICROSURVEY DOES NOT REPRESENT THAT THE OPERATION OF THE PRODUCT AND/OR SOFTWARE WILL BE UNINTERRUPTED OR ERROR-FREE. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, MICROSURVEY MAKES NO WARRANTY THAT: (A) OPERATION OF THE PRODUCT AND/OR SOFTWARE WILL BE UNINTERRUPTED OR ERROR-FREE, (B) THE PRODUCT AND/OR SOFTWARE WILL MEET LICENSEE SPECIFIC NEEDS, (C) SPECIFIC RESULTS WILL BE ACHIEVED WITH THE PRODUCT AND/OR SOFTWARE, OR (D) ALL ERRORS OR FAILURES WILL BE CORRECTED. IN NO EVENT SHALL MICROSURVEY'S, ITS LICENSORS', OR ITS SUPPLIERS' LIABILITY TO LICENSEE FOR THE PRODUCT AND/OR SOFTWARE, WHETHER BASED ON CONTRACT, TORT, WARRANTY, OR ANY OTHER LEGAL THEORY, EXCEED THE AMOUNT OF PURCHASE PRICE PAID FOR THE PRODUCT AND ANY RELATED LICENSE OR MAINTENANCE FEES PAID BY LICENSEE.

6. **Exclusion of Damages.** TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL MICROSURVEY, ITS LICENSORS, OR ITS SUPPLIERS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, PUNITIVE, INDIRECT, OR CONSEQUENTIAL DAMAGES WHATSOEVER (INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFITS OR OTHER DATA OR INFORMATION, OR FOR BUSINESS INTERRUPTION) ARISING OUT OF OR IN ANY WAY RELATED TO THE

USE OF OR INABILITY TO USE THE PRODUCT AND/OR SOFTWARE, EVEN IN THE EVENT OF THE FAULT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, BREACH OF CONTRACT OR BREACH OF WARRANTY OF MICROSURVEY, ITS LICENSORS OR ANY SUPPLIERS, AND EVEN IF MICROSURVEY OR ANY of ITS LICENSORS OR SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. BECAUSE SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, THE ABOVE LIMITATION MAY NOT APPLY TO LICENSEE.

7. **Limitation of Liability.** NOTWITHSTANDING ANY DAMAGES THAT LICENSEE MIGHT INCUR FOR ANY REASON WHATSOEVER (INCLUDING, WITHOUT LIMITATION, ALL DAMAGES REFERENCED ABOVE AND ALL DIRECT OR GENERAL DAMAGES), THE ENTIRE LIABILITY OF MICROSURVEY AND ANY OF ITS LICENSORS OR SUPPLIERS UNDER ANY PROVISION OF THIS AGREEMENT AND LICENSEE EXCLUSIVE REMEDY FOR ALL OF THE FOREGOING SHALL BE LIMITED TO THE AMOUNT ACTUALLY PAID BY LICENSEE FOR THE PRODUCT AND ANY RELATED LICENSE OR MAINTENANCE FEES PAID BY LICENSEE. THE FOREGOING LIMITATIONS, EXCLUSIONS AND DISCLAIMERS (INCLUDING SECTIONS 5 AND 6 ABOVE) SHALL APPLY TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, EVEN IF ANY REMEDY FAILS ITS ESSENTIAL PURPOSE. LICENSEE ACKNOWLEDGES THAT (A) THE PROVISION OF THE PRODUCT AND SOFTWARE IS CONDITIONAL UPON MICROSURVEY EXCLUDING AND/OR LIMITING ITS AND ITS LICENSORS' AND SUPPLIERS' LIABILITY TO LICENSEE IN ACCORDANCE WITH THIS AGREEMENT, AND (B) THE EXCLUSIONS AND LIMITATION CONTAINED IN THIS AGREEMENT ARE FAIR AND REASONABLE IN ALL THE CIRCUMSTANCES KNOWN AT THE DATE OF THIS AGREEMENT.

8. **Indemnification.** Licensee agrees to defend, indemnify and hold MICROSURVEY, its affiliates, distributors, licensors, and suppliers harmless from and against any and all losses, damages, costs or expenses (including reasonable attorney's fees) (a) suffered by Licensee related in any way to the Product, Software, or this Agreement and/or (b) related to any claim or demand made by any third party in connection with or arising out of (i) any breach by Licensee of any of the terms and conditions of this Agreement, (ii) Licensee use or misuse of the Product or Software, (iii) Licensee violation of applicable laws, and/or (iv) Licensee violation of the rights of any other person or entity. MICROSURVEY reserves the right, at its own expense, to assume the exclusive defense and control of (but not liability for) any matter otherwise subject to indemnification by Licensee. Licensee will be liable to MICROSURVEY for reasonable attorney's fees in any such case.

9. **Support.**
   a) General. Except as set forth in Section 9(b) (Website Support) and 9(c) (Contract Support), MICROSURVEY shall have no obligation under this Agreement to maintain or support the Software. Licensee may contact MICROSURVEY to inquire about MICROSURVEY'S commercially available support and maintenance services provided pursuant to separate agreements. This Agreement shall not obligate either party to enter into any such separate agreement. Any updates or error corrections to the Software that may be provided to Licensee from time-to-time, if any, shall be deemed Software hereunder and shall be licensed to Licensee under the terms and conditions of this Agreement. If any such updates or error corrections are made available to Licensee, then Licensee shall promptly (a) implement such updates or error corrections, (b) cease using the earlier versions without such updates or error corrections, and (c) make such updates or error corrections available to the users of the earlier versions. Licensee shall be solely responsible for procuring all hardware and third-party software necessary to operate the Software, including without limitation the items described on Appendix 1 attached hereto.

b) Website Support. MICROSURVEY will use reasonable commercial efforts to host and maintain a web site (the "Support Site") for the Software during its commercial life (as reasonably determined by MICROSURVEY) that will include some or all of the following features:

- A "Frequently Asked Questions" section with answers to common questions about the Software.
- A searchable "Helpdesk" section with general user instructions and information about the Software.
- A link to allow end users of the Software to download any bug fixes, error corrections or other updates to the Software that MICROSURVEY may make available through the Site.
- "Contact MICROSURVEY" electronic response capability. MICROSURVEY will use reasonable commercial efforts to respond within two (2) business days to a customer inquiry received via this system. Answers to such inquires will be added to the FAQ's, as appropriate.

c) Contract Support. Upon mutual agreement in writing between Licensee and MICROSURVEY, or between Licensee and one of MICROSURVEY'S authorized reseller's, MICROSURVEY will provide contracted support services to Licensee as may be agreed upon and related to the Software.

10. **Term and Termination.**

a) This Agreement is effective until terminated. Licensee may terminate this Agreement at any time, with or without cause, upon notice to MICROSURVEY. MICROSURVEY may terminate this Agreement for Licensee's breach of this Agreement.

b) Upon termination of this Agreement, Licensee shall immediately cease all use of the Software and Documentation and return to MICROSURVEY all copies of thereof within five (5) days after such termination. Upon MICROSURVEY'S request, Licensee will certify in writing to MICROSURVEY that all such copies have been returned to MICROSURVEY. The following provisions of this Agreement shall survive termination or expiration of this Agreement: Sections 1(b) (Restrictions), 2 (Ownership), 4 (Warranty Disclaimer), 5 (Exclusion of Damages), 6 (Limitation of Liability), 8 (Term and Termination), and 9 (General).

11. **General.**

a) Assignment. MICROSURVEY may assign this Agreement without notice to Licensee. Licensee shall not assign this Agreement or transfer any of the rights, duties, or obligations arising under this Agreement without the prior written consent of MICROSURVEY. This Agreement shall be binding upon, and inure to the benefit of, the permitted successors and assigns of the parties thereto.

b) Amendments; Modifications. Notices of changes to this Agreement or other matters may be made to Licensee by displaying notices or links to notices to Licensee generally on the Site.

c) Governing Law; Forum; Attorney's Fees, Injunctive Relief. The terms of this Agreement shall be construed and governed exclusively by the laws of the province of British Columbia, excluding the application of its conflict of law provisions and rules. Any dispute, controversy or claim between the parties arising out of or relating to this Agreement or a breach of this Agreement shall be settled pursuant to the terms of this Section __(c) by arbitration before three neutral arbitrators (selected from a panel of persons having experience with and knowledge of the computer

business), provided at least one of which arbitrators shall be an attorney, and administered by the Arbitrators Association of British Columbia in accordance with its Commercial Arbitration Rules in Kelowna, British Columbia. Any provisional or equitable remedy which would be available from a court of law shall be available from the arbitrators to the parties. Judgment upon the award of the arbitrators may be enforced in any court having jurisdiction thereof. The parties hereby consent to the non-exclusive jurisdiction of the courts of the Province of British Columbia for any action (i) to compel arbitration, (ii) to enforce the award of the arbitrators or (iii) prior to the appointment and confirmation of the arbitrators, for temporary, interim or provisional equitable remedies, and to service of process in any such action by registered mail, return receipt requested, or by any other means provided by law. The application of the United Nations Convention of Contracts for the International Sale of Goods is expressly excluded.

d) Severability. The illegality, invalidity or unenforceability of one or more provisions of this Agreement shall not affect the legality, validity or enforceability of any other provision, and this Agreement shall be construed in all respects as if such illegal, invalid or unenforceable provision were deemed amended to achieve as near as possible the same economic effect as the original in a legal, valid and enforceable manner if possible.

e) Further Relationships. Neither party is obligated by this Agreement to enter into any further business relationship after the termination or expiration of this Agreement.

f) Notices. All notices under this Agreement shall be in writing, and shall be deemed given when personally delivered, when received if by nationally recognized courier, or three days after being sent by postage prepaid, certified or registered Canadian Mail, as applicable, to MICROSURVEY at MICROSURVEY's address as set forth herein or to Licensee at the address that Licensee provided upon entering into this Agreement, or such other address as a party last provided to the other by written notice.

g) Independent Contractor. MICROSURVEY and Licensee are independent contractors. No partnership, joint venture, or other joint relationship is created by this Agreement.

h) Entire Agreement. This Agreement represents the entire agreement between the parties relating to its subject matter and supersedes all prior representations, discussions, negotiations and agreements. All changes, modifications, additions or deletions shall be effective immediately upon notice thereof, which may be given by means including, but not limited to, posting on the Site, or by electronic or conventional mail, or by any other means by which Licensee may obtain notice thereof. Use of the Product and/or Software after such notice constitutes acceptance of such changes, modifications or additions. This Agreement may be amended at any time by mutual agreement of the parties.

Table of Contents

Welcome

MicroSurvey Software Inc. is pleased to present our flagship product - MicroSurvey CAD 2010.

This version contains over 1,000 bug fixes and general improvements. Rather than attempt to add a list of new features, this time we have tried to make all of the routines work better, smoother, and more reliably. This is part of the advantages of a maintenance system. We can focus on how to improve the products so they work better for you, rather than trying to add features that might make an attractive upgrade purchase. The two are not completely different, but the maintenance route is more focused on your needs.

Included with this program are over 170 training movies and extremely comprehensive on-line help. Movies help make the printed documentation obsolete. That is why we reduced our manuals to a "Getting Started" document that contains the tutorials only. Since the help system is electronic, we can treat it as a living document that can be updated with each service pack or new CD.

We plan on introducing more exciting products for you in the next year. Watch our web site for news and updates on this and other MicroSurvey products.

Yours truly,

Darcy Detlor,
President,
MicroSurvey Software Inc.

Copyright Notices

MicroSurvey CAD 2010

Contact Addresses and Phone Numbers

Corporate Head Office

MicroSurvey Software Inc.
#205 – 3500 Carrington Road,
Westbank, BC, V4T 3C1
Canada

Office Hours: *8am to 5pm Pacific Time*.
(Monday to Friday, except holidays)

Sales & Technical Support **1-800-668-3312**
International Voice: **+1-250-707-0000**
Fax: **+1-250-707-0150**

Eastern Technical Support Office

MicroSurvey Software Inc.
3427 Hwy. #17 East
Corbeil, Ontario, P0H 1K0
Canada

Office Hours: 8:30*am to 5:00pm Eastern Time*.
(Monday to Friday, except holidays)
Technical Support Number: 1-800-668-3312
International Voice: +1-250-707-0000

Electronic Contacts

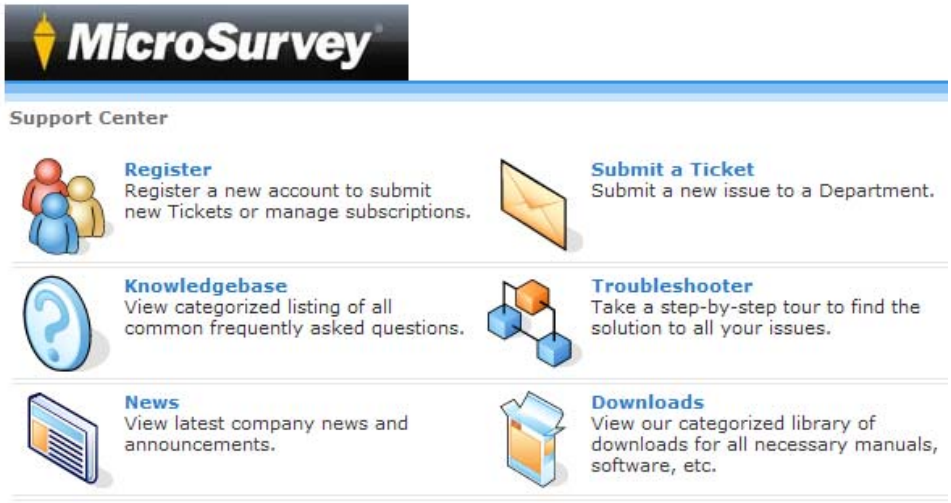
Internet web-site - **http://www.microsurvey.com**

Helpdesk - **http://www.microsurvey.com/helpdesk/**

General Information - **info@microsurvey.com**

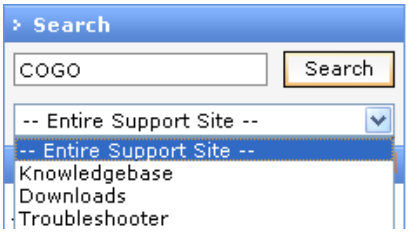
Contacting MicroSurvey for Technical Support

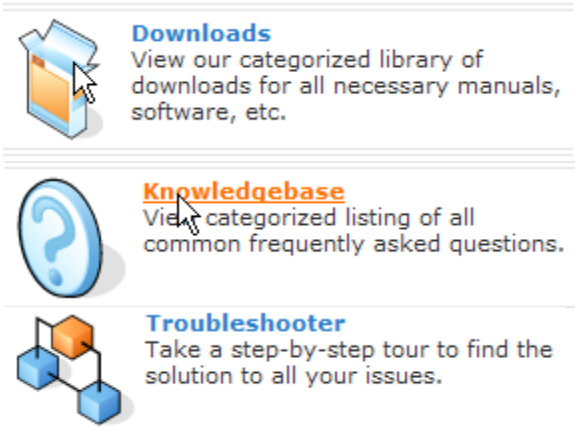
Fast, up to date Technical Support is available at any time to customers in the MicroSurvey Helpdesk at http://www.microsurvey.com/support/



There you have the option of using the Search Window, browsing Troubleshooter, Downloads and Knowledgebase articles or Submitting a Ticket to request help:

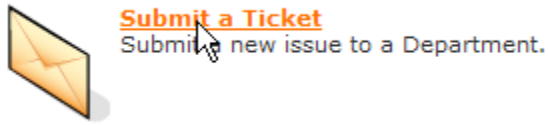
Self Support (via the Internet):



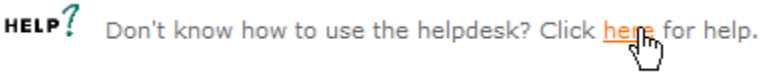


Paid Tech Support:

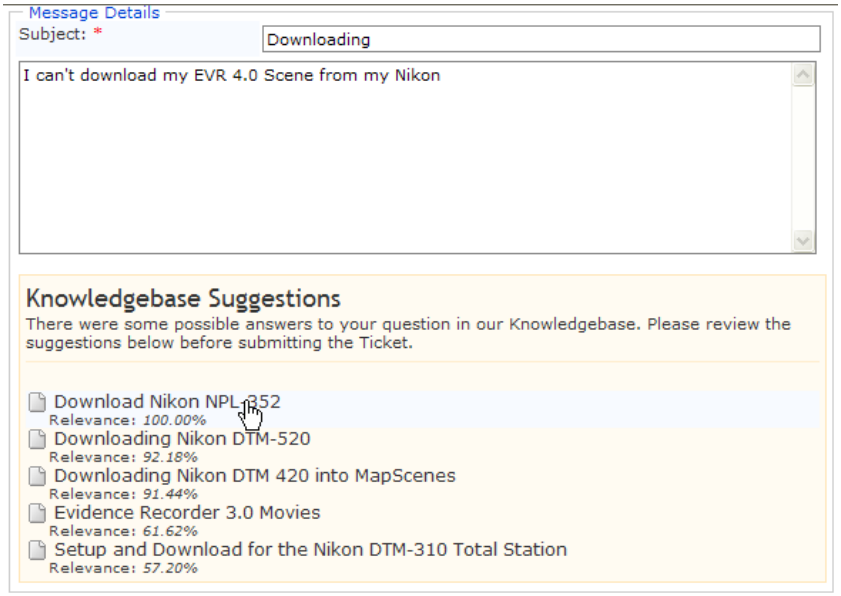
If your department has a current tech support maintenance contract you can contact MicroSurvey Tech Support by submitting a ticket:



-if it is your first time submitting a ticket, view these movies for a quick guide:



As you are entering your question Helpdesk will suggest articles which may answer your question immediately:



If you are unable to access the internet please phone for tech support.

Before calling for Tech Support, please review the information below:

The following information explains how to prepare for your call so that your inquiry can be answered promptly and accurately. Take a few minutes before you place your call to check the printed documentation and the on-line help files to see if the answer is already at your disposal. Remember that there are several tutorials and movie files that can also help explain some topics.. If they do not help you then when you call please have the following information available if requested. Computer brand and model, CPU type and clock speed, amount of RAM and hard drive space free, other hardware attached to the computer such as plotters and digitizers, version of the program, operating system and version, whether or not you have a support contract.

Please make sure that you have all the steps you completed prior to your problem and can explain them to the technical support representative. We may ask that you forward a copy of your data to us if we can not identify the problem immediately.

Available Support Products:

Introductory Support

As is the MicroSurvey standard, MicroSurvey CAD 2010 includes a 90 day free support period. Support is available Monday to Friday except holidays in two times zones noted above: To reach a technical support specialist, use the phone number listed under “Contact Addresses and Phone Numbers”.

A support manager or designated alternate will have access to expedited telephone support.

** This support is not intended to be a substitute for qualified training, which is also available though our office.*

Free Web Based Support

Web access to our support section which includes over 100 on-line training movies, technical tips, notes, and files is free with MicroSurvey products. Our web site is continually enhanced to provide new answers to commonly asked questions. We post free incremental updates, letting you stay up to date with the software version you are running.

Maintenance Subscription Support Program

- 1 year term includes Version Upgrades with significant enhancements plus critical service packs.
- Electronic Help Desk Support (Available 24x7)
- Telephone Support (available from 8:30 AM Eastern time until 8:00PM Eastern (through our Western office))
- Free email updates to advise of any updates and improvements.
- Call MicroSurvey's toll free number if you wish to purchase maintenance 800-668-3312 or purchase on line at: http://store.microsurveysales.com/surveysupport.html.

Why did MicroSurvey Switch to Annual Maintenance Plans?

Like many software companies, whether they produce CAD programs like AutoCAD or accounting programs like Quickbooks, MicroSurvey has abolished standard upgrades for an annual maintenace plan. Here at MicroSurvey we pay for maintenance on a number of software programs like IBM Purify, Quotewerks, Quickbooks, Codebase, Stingray, Visual Studio, ACT, and many more.

Why MicroSurvey CAD?

Switching to the IntelliCAD platform for our software line has changed many of the opportunities for both MicroSurvey as a company and you, our customer. The IntelliCAD Technology Consortium (ITC) is a non-profit organization that is dedicated to one task - the creation of a Powerful, flexible CAD engine for its members. As a member, MicroSurvey receives many more updates on a more regular basis than in previous years. This gives us an ability to release updates more frequently.

In the past (before we went to maintenance) MicroSurvey had to accumulate both internal and external improvements, and bug fixes, and assemble them into an 'upgrade'. These upgrades appeared between 18 months and 30 months after the last release. Intermediate Service Packs had some critical bug fixes, but we could not add new features. These had to be saved for the upgrades. **This means that we put significant improvements on our shelf for months.** In addition, since bug fixes are often in the middle of code that we have updated, we have to shelve the bug fixes until the next upgrade. This was bad for you, and bad for us. We do not like our customers using code that has bugs, but as a software company it was impossible for us to release everything as it was done - for free. That would be unsustainable for us as a company.

Here is a less abstract example:

The ITC released 6.6 while we were building MicroSurvey CAD 2010. This release contain well over 1,000 bug fixes. The ITC's ability to find bugs has grown almost exponentially as they have added an incredibly sophisticated, automated testing system. The ITC is performing almost 1 million test runs *per day* on the code. *They have over 50,000 drawings they open and save daily.* They do graphic file comparisons using automated bitmap file comparisons. MicroSurvey had to sit on these updates and accumulate them into our upgrade. In addition to this, MicroSurvey built its own updates including an entirely new surveying database system, and a completely new rendering and viewing engine. These updates required surgery deep inside of IntelliCAD, so they held up releasing bug fixes.

In the next year, the ITC has scheduled new updates

That will add more to the user interface. More importantly, a few years ago the ITC started on a complete, from the ground up, rewrite of IntelliCAD. This new CAD engine, which will arrive late in 2009 or early 2010, should show significant performance improvements over the current version. With the maintenance system MicroSurvey has no need to sit on updates. We will still have new versions, but they will be available to maintenance plan customers immediately. *Customers not on maintenance who decide to wait will be required to purchase all the years of missing maintence to get the new version.* So, it makes no sense to wait. Take full advantage of the maintenance now rather than get billed for missing years. As a company, MicroSurvey has had to do that with some of the software products that we use internally, and it is much less enjoyable. I sign the checks, so I have felt the pain.

Once you are on maintenance, your annual cost for MicroSurvey software is known.

There are no surprises, no extra budget amounts that are unexpected. The maintenance fee will be *lower than the cost of a normal upgrade*, because it helps both you and us to maintain our business in an orderly manner. We are passing on the savings and stability to you, our customer.

Training

MicroSurvey Software Inc. can provide training to you, in your office or in a classroom situation (where facilities and numbers allow). MicroSurvey also has its own 16 seat classroom in our head office location and runs courses periodically at this beautiful location.

MicroSurvey has training staff that will travel to almost anywhere and provide you with the professional skills you require to operate your MicroSurvey CAD 2010 program. Please feel free to call and ask for a quotation or inquire about potential classroom situations.

Your local dealer may also be able to setup or arrange a training session for you. Contact our head office for more information about training.

Getting Started

Hardware Requirements

MicroSurvey CAD 2010 operates entirely within Windows, and has no hardware requirements over and above those of Windows itself except as noted below. We suggest the following basic system as a minimum for *efficient* operation:

- Modern processor – the faster the better!
- 512megabytes RAM (1GB or more if you are working in large drawings most of the time)
- 1 Gigabyte of free hard disk space (1.5 GB if you wish to install all of the movies)
- Video resolution set to 1024X768 or better (lower resolutions may result in part of the pull down menus running off the bottom of the screen)
- Mouse, digitizing tablet or other pointing device

In order to use the data collector communication features, your system will also need an external RS-232 serial port or a USB connection for best performance with MicroSurvey FieldGenius™.

In order to get printed output, you will require a printer or plotter configured to work in your Windows environment. We recommend obtaining the most up-to-date printer/plotter drivers off of the manufacturers Internet web site.

Just like your system RAM, the more RAM your graphics card has, the faster it can render which results in faster, smoother playback. Video cards that are optimized for video or games work best with our Render command.

An important thing to note is that not all graphics cards have been tested with our rendering engine. For a list of graphics cards that have been tested please visit the following website: http://developer.hoops3d.com/hoops/graphicscards.html

Software Requirements

MicroSurvey CAD 2010 is compatible with 32-bit editions of Microsoft Windows 2000, Microsoft Windows XP (SP2 or SP3), Microsoft Windows Vista (Release or SP1). 64-bit editions of Windows XP and Windows Vista have not been tested by MicroSurvey Software Inc.

Note: Users must have Administrator's rights to authorize MicroSurvey CAD 2010.

When using a digitizing tablet you will require the current WINTAB driver for your tablet, and it must be installed and configured in Windows.

Installation instructions

As with most software packages today, installing MicroSurvey CAD 2010 is a snap!

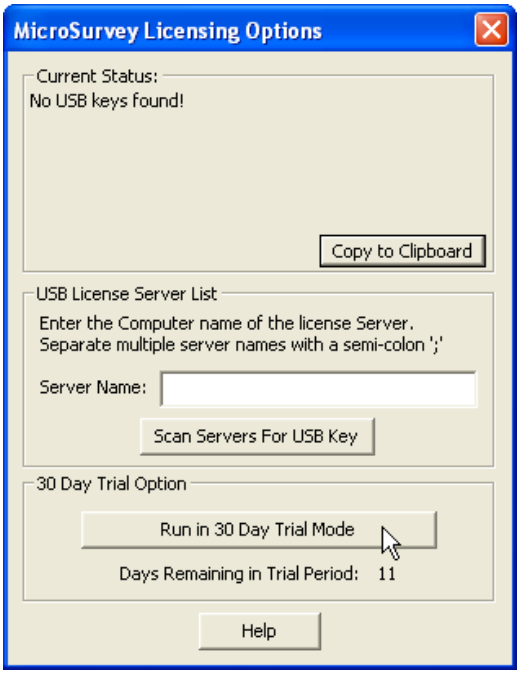
After confirming that your system meets the hardware and software requirements above, insert the CD in your drive to begin the installation. Your CD may Auto Start as soon as the CD is placed in the drive and the drawer is closed but if not, go to your Windows Start button, select Run and type d:\setup at the command prompt (assuming your CD-ROM drive is D). Choose the button of the action you want to take. Follow the prompts, clicking Next to continue from step to step.

MicroSurvey CAD 2010 Initial Startup

MicroSurvey CAD 2010, like other MicroSurvey Software Inc. products, is marketed in the form of a "Convertible Demo", which lets you try out all its functions without buying a copy. You can obtain a copy of the entire package by mail for a nominal shipping and handling fee; we also encourage you to redistribute copies to anyone in complete and unaltered form. This copy will be fully functional in every way but will shut down after 30 days.

If you decide to purchase the system, you can convert it to full operation by contacting MicroSurvey Software or an authorized dealer and arranging to purchase a USB Key license.

When you initially start up the program, you will see the following dialogue box:



The program will be fully functional for 30 days during the trial period. You have the option of running the program in 30 Day Trial mode to see how the program works.

If you have already received your USB key you will want to follow the steps in "Registering MicroSurvey CAD 2010" to run your program in fully registered mode.

License Options

MicroSurvey Software is registered by activating a USB License key. USB License Keys allow us to provide you with more license flexibility compared to password based activation.

Whenever you start your software and no USB License Key or Network License Server is found, you will see the MicroSurvey Licensing Options dialog.

Evaluation:

Demo Mode

If you haven't purchased anything and want to evaluate our software, you can do so without a USB License Key. Our software will run in a 30 day demo mode which begins the moment you run the software for the first time.

To activate Demo Mode, press the Run in 30 Day Trial Mode button on the Licensing Options dialog. This dialog will appear when you run the software.

When in demo mode the program will function like a fully registered version, everything is 100% functional, including saving and printing.

Expired Mode

Your demo time period is 30 days, and begins the first time the software is run. After 30 days the program will automatically switch to an Expired state. Once the program is expired, you can still open existing projects but Saving and Printing is disabled. Once expired, the only way to continue using your software is to purchase it.

Purchased Licenses:

When you purchase our software, you can purchase it as;

a) Standalone

One license per key.

The USB key must be inserted into a USB port on this specific computer during the entire time the program is in use. Removal of the USB key will cause the program to warn you and then if the key is not replaced, exit abruptly (saving your drawing as it exits).

b) Network Version

Multiple licenses per key.

The Network version will require the installation of a Network License program on the server. Then the USB key needs to be on a computer on the network that everyone has rights to. The license is then released to the appropriate machine and the counter is decremented by one. When the user exits the program the counter is incremented by one again. Only the number of licenses activated on the USB key can be used at any one time, but as a user exits the program, freeing up a license, another user can then use that license.

Registering MicroSurvey CAD 2010

Activating Your USB Key

Critical Note: The USB license is small, sturdy and convenient. BUT it contains the only version of your MicroSurvey CAD 2010 License. If the key is somehow damaged it can be exchanged without the purchase of a new license but if the key is lost or stolen it ***CANNOT BE REPLACED*** *and must be repurchased at full current retail pricing!*

If possible, insure this key against loss or theft.

Each License Key has a unique serial number that we store on our MicroSurvey License Server. Our license database contains the following information about your key:

- *Which company the license key* belongs to.
- Which products the key is allowed to run.
- How many copies of each product is allowed to run.
- What version of a product you are allowed to upgrade to.
- The expiration date of your support and software subscription plan.

Activating Your Key (Method 1)

Using the Internet on the PC with MicroSurvey CAD installed on it:

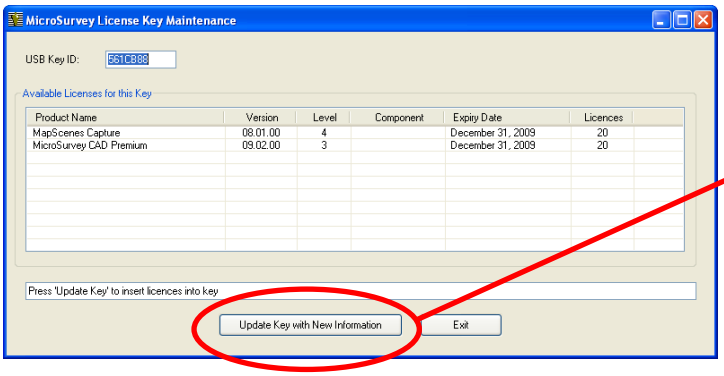
There are two ways you can activate your key with the following method being the easiest. Method 1 will most likely be the method you use because most of our customers have internet access directly on the computer that the software will be run on.
Before you can activate your key you will need to ensure you have:

- **Internet Access** - To activate your key, you will need internet access on the computer you will be activating the key from. Once activated, you do not need internet access.
- **Microsurvey CAD 2010 Installed** - When you install MicroSurvey CAD 2010, a special program called the License Manager is also automatically installed. You need the License Manager to activate your key.
- **USB License Key** - You will need to have the USB License Key that was shipped with your purchase.
- **USB Port** - You will need a free USB port either on the computer or via a USB Hub.

1. Insert your USB License Key in any available USB port on your computer.
2. Go to windows Start | Programs | MicroSurvey CAD 2010 and run the License Manager program:

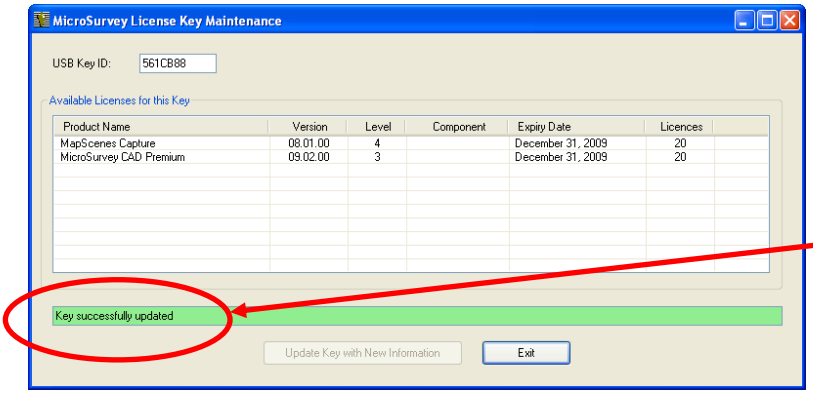
3. The Key Maintenance program will display the information about what products are licensed for the key, how many licenses you are allowed to run, and the expire date of your support and software subscription plan.

4. On the MicroSurvey License Key Maintenance program, select the “Update Key with New Information” button.



On the MicroSurvey License Key Maintenance program, select the “Update Key with New Information” button.

5. If successful, you will see a message “Key successfully updated”.



If successful, you will see a message indicating that the key was updated.

6. Pick the Exit button and now you can run the MicroSurvey CAD program directly.

Activating Your Key (Method 2)

Using the Internet on a different PC:

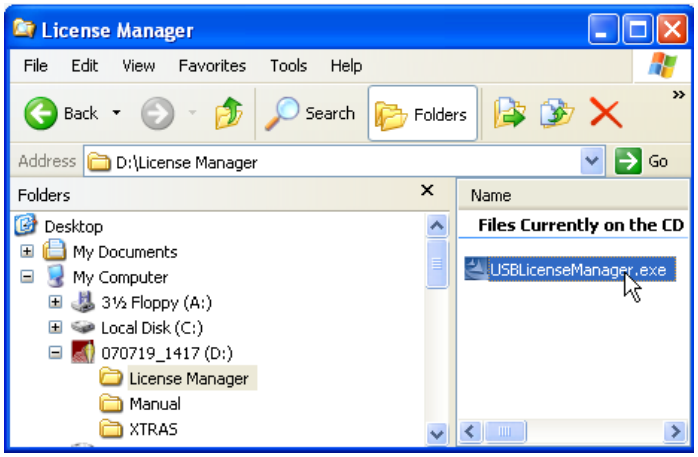
Method 2 should only be used if you don't have internet access on the computer you will be running your software on. *Use this method if you need to activate your key without installing MicroSurvey software.*

Before you can activate your key you will need to ensure you have:

- Another computer that has Internet access. You will need to be logged in as an administrator. *Once the USB key has been activated on this computer, it can be moved back to the computer running MicroSurvey CAD 2010 and you will not need internet access again.*
- Product CD - You will need the original product CD that was shipped to you with the purchase of your software.
- USB License Key - You will need to have the USB License Key that was shipped with your purchase.
- USB Port - You will need a free USB.

1. Insert your Product CD in your CDROM drive.
2. On the startup install screen, press Exit:

3. Use Windows Explorer to manually browse to the following directory on the CD: USB Activation | License Manager Install



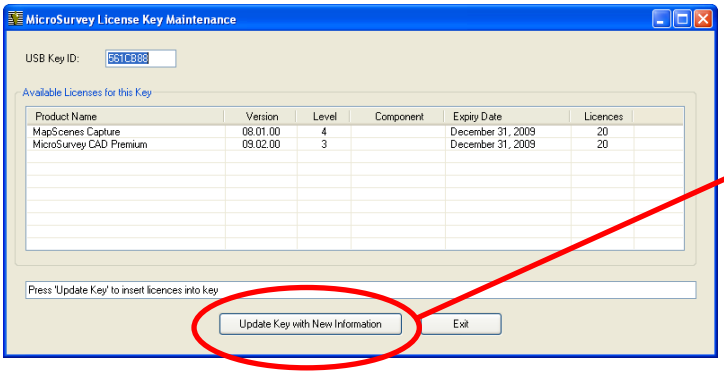
4. In the License Manager Install directory, run the USBLicenseManager.exe program. *(You must be logged in as an Administrator to complete this task)*

5. After the installation completes, you can insert the USB License Key in any available USB port on your computer.

6. Go to Start | Programs | MicroSurvey | USB License Manager and start the License Manager program.

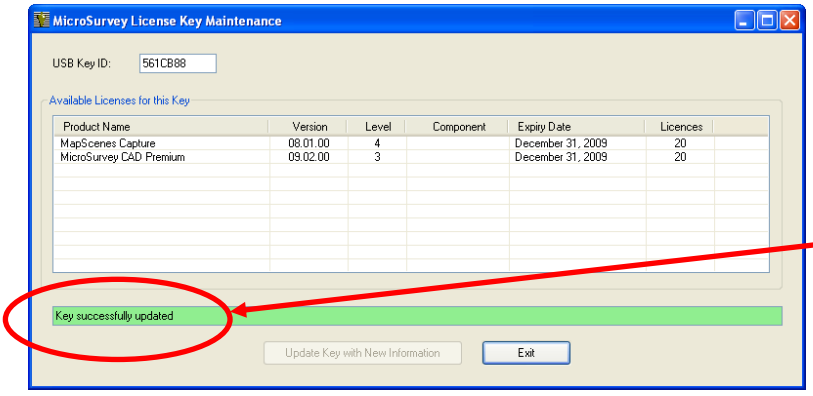
7. The Key Maintenance program will display the information about what products are licensed for the key, how many licenses you are allowed to run, and the expire date of your support and software subscription plan.

8. On the MicroSurvey License Key Maintenance program, select the “Update Key with New Information” button.



On the MicroSurvey License Key Maintenance program, select the “Update Key with New Information” button.

9. If successful, you will see a message “Key successfully updated”.

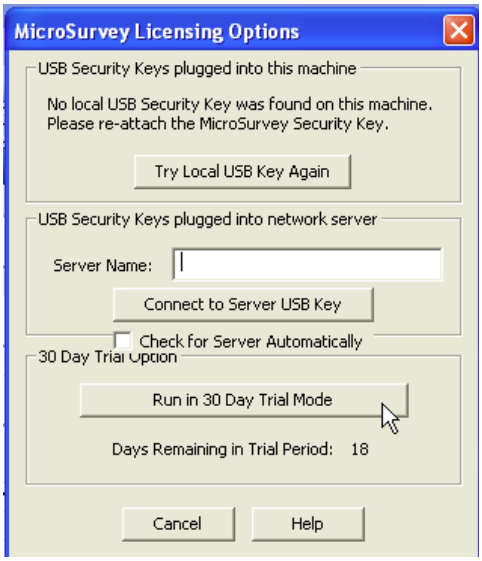


If successful, you will see a message indicating that the key was updated.

10. Pick the Exit button.

11. After the activation is complete, you can insert the USB License Key in any available USB port on the computer with MicroSurvey CAD installed on it and start the program.

Running MicroSurvey CAD 2010 with the USB Key:

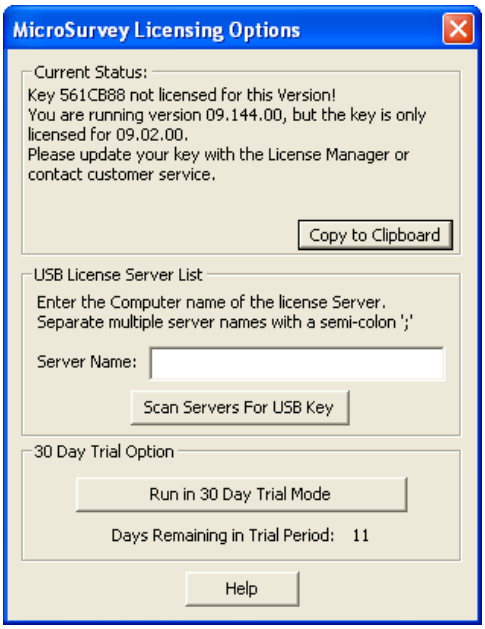


The Licensing routine will check for a USB key as soon as it is run:

If you have a Standalone License ensure that the USB key has been inserted. If you see the message at the top of the dialog on the left, insert the key and pick "Try Local USB Key Again", if available.

If you have a Network License ensure that the USB key has been inserted in the Server and that the correct Server name is listed. Pick on "Scan Servers For USB Key", if necessary.

Running MicroSurvey CAD 2010 with a USB Key that was not updated:



If you are upgrading from a previous version of MicroSurvey CAD that used a USB key, you may see a message like what is shown in the top portion of the dialog to the left.

If this is the case, then you will need to first run the License Manager and update your USB key to allow it to run this new version.

See how to use the License Manager in the pages above.

General License Notes

With MicroSurvey CAD 2010 you can easily transfer the license to another PC. Install MicroSurvey CAD 2010 as a convertible demo on the new computer and insert your USB License Key.

You can also install as many copies of MicroSurvey CAD 2010 as you like. Install it at home, at the office, on your laptop or where ever you need to use it. All that matters is that if you want to use the program, you must have your USB Key License with you.

About the Program

How MicroSurvey CAD 2010 Works

MicroSurvey CAD 2010 creates a database that contains connectivity information, coordinate locations, descriptions, traverses, bearings, and distances. The program tracks the entities stored in the CAD drawing by their handle numbers. Many files are created to store this information.

In order to limit the number of files you need to work with, we combine the data files into one file when you close the MicroSurvey CAD 2010 job. The database is stored in a file with the extension .MSZ. This file is stored wherever your CAD drawing is stored.

The MSZ file is expanded into a directory that has the same name as your job with the extension .MSJ. If you are running MicroSurvey CAD 2010 and you look in the directory where your job is located, using My Computer, you will see this .MSJ subdirectory. When you close the MicroSurvey CAD 2010 job, by exiting or closing the drawing, then the files will be automatically compressed into one file, and the directory will be removed. While you have the job open, the original .MSZ file is rename to .MBZ and it serves as an emergency backup file.

MicroSurvey CAD 2010 has an Automatic backup timer that will save the drawing (but not the database) regularly, to a temporary folder.

In the event that the .MSZ file cannot be opened, the system will automatically attempt to open the .MBZ file. If neither file can be opened (very unlikely), then the system can still reconstruct the coordinate database and the connectivity database directly from information we store in the drawing.

If you have only the drawing created in MicroSurvey CAD 2010 and no database for whatever reason, we can still recover coordinates from the drawing automatically upon opening the DWG file. This can be accomplished by running the Audit database command. See the on-line help for more information.

Workflow

This summary is intended to provide an introduction to users who are not familiar with MicroSurvey CAD 2010 and outlines the steps necessary to prepare a survey drawing.

Generally you will be starting with data from a data collector, from field notes, or from direct COGO data entry. You may also extract data from existing CAD drawings.

When you first start MicroSurvey CAD 2010 you must either open an existing drawing (DWG, or DXF file) or start a new one. Opening an existing drawing will automatically open and link to the associated MicroSurvey CAD 2010 coordinate database (.MSZ file). If you start a new drawing, a new MicroSurvey CAD 2010 database file will be automatically created.

On new projects or when you open existing projects, you will be shown the Main Job Defaults. You should fill out the dialog box and set up the basic job information and scale factors. Next you will need to set the System Toggles to choices appropriate to the job. Where you start next depends on the data source. Most options can now be found on the Assistant or in the MicroSurvey pull down menus.

For data collectors you will either download directly from the data collector using the choices on the Data Collector Communication menu or reading a file from the data collector using the

choices on the MsTraverse | Download Data Collector menu. For field note entry you will use the Enter Traverse command on the MsTraverse | Traverse Entry / Editing menu. For manually entered COGO data, you will use the COGO command from the MsCOGO menu. (you can simply type COGO if you wish as a short cut) For point, line and curve data in a pre-existing CAD drawing, you will use the Auto Add Points to Objects command in the MsPoints menu.

When you enter a traverse in MicroSurvey CAD 2010, either by downloading a data collector or by manually typing in the data, the program creates a traverse database. Each traverse is contained in a separate database. The databases are stored in the project directory when MicroSurvey CAD 2010 is loaded and running, and they are automatically compressed into the .MSZ file when MicroSurvey CAD 2010 is unloaded.

There is a set order that you should use when working with raw data information in MicroSurvey CAD 2010 (once a job is open):

1) Manually enter, load from a file or download the data into the traverse file.

2) If you are entering the data manually, and the Auto Coordinate toggle is ON, then points will be coordinated and drawn onto the MicroSurvey screen as you enter the data. If you download the data from a data collector, any coordinates in the ASCII file will be entered immediately in the coordinate database. The raw data shots read in from the data collector ASCII file are NOT processed into coordinates until you select Re-coordinate Traverse.

3) Edit the raw data to correct any known errors by selecting MsTraverse | Active Traverse Editor.

4) Enter any starting setup and backsight coordinates into the coordinate database before you attempt to coordinate the traverse. Use Store and Edit Coordinates on the MsPoints menu.

5) Select MsTraverse | Traverse Calculations | Re-coordinate Traverse. This is the program that analyzes the raw data and computes the coordinates for all the raw data shots taken in the field.

6) Use the MsPoints | Active Coordinate Editor to view the points. Examine the MicroSurvey drawing for errors.

7) Correct errors using MsTraverse | Active Traverse Editor and Re-coordinate the traverse. When you run Re-coordinate traverse on a traverse that has already been coordinated, you will trigger a point protection alert for each point processed. To avoid this, turn off Point Protection in System Toggles, then the entire traverse will then be process without interruption.

8) To see the line work for the traverse go to the MsTraverse | Traverse Entry / Editing | Show Traverse Graphically command.

9) Use the MsTraverse | Traverse Calculations | Compute Closure option to analyze the closure of the traverse.

10) You may balance the traverse using one of several options, Angle Balance, Transit Balance, Crandall's, Least Squares, or Compass Balance. See Traverse Balancing in the on-line help for details.

11) If you detect an error after balancing, you can revert back to the original or edited traverse and re-coordinate it again starting at step

For more examples of MicroSurvey workflow, please see the Tutorials

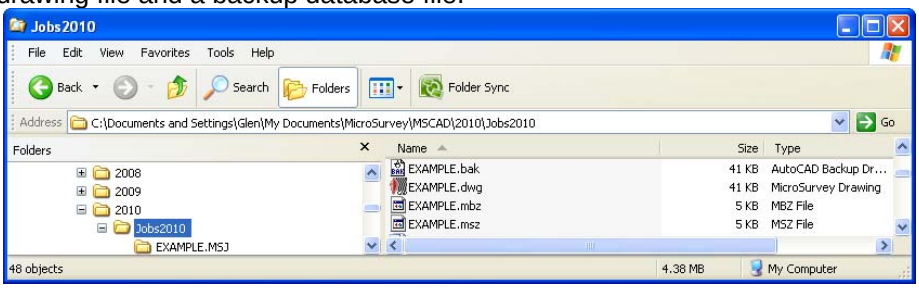
Files types used by MicroSurvey CAD 2010

An outline for how MicroSurvey CAD 2010 saves your drawings.

The default folder name to save your jobs in C:\Documents and Settings\USER\My Documents\MicroSurvey\MSCAD\2010\Jobs2010. (Where \USER\ is your user login name) Then create a new one for 2011, etc. as desired. We do NOT recommend that you place your jobs directly in our MSCAD 2010 program folder or in a sub folder under MSCAD 2010. Also - try and keep your folder names simple and not too many levels deep (Microsoft forces us to make them deep enough already). The job name should also be kept simple. Under this folder you can have many jobs, each with its own name. When you start a new job or open an existing job, there are several files created automatically on the hard drive in the folder you selected.

Below is an example of what files are created by MicroSurvey - using the job "EXAMPLE".

Every MSCAD project contains four important files, a drawing file, a database file, a backup drawing file and a backup database file.



Main files saved by MSCAD

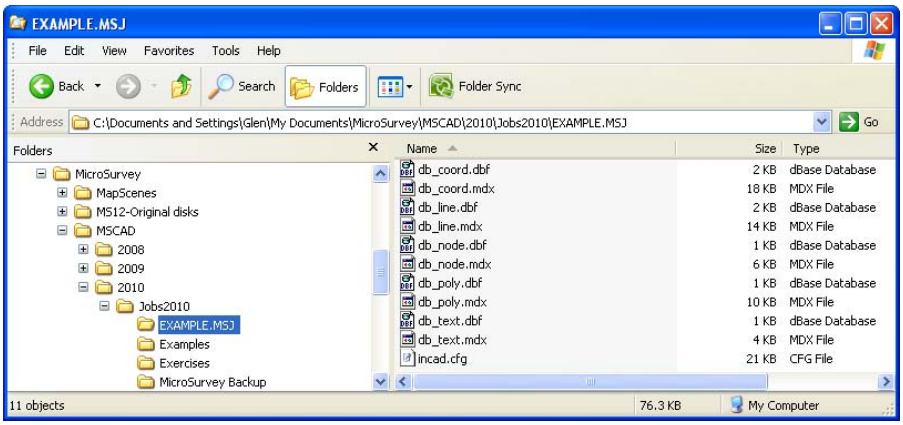
Drawing File	→	EXAMPLE.DWG
Database File	→	EXAMPLE.MSZ
Backup of Drawing file	→	EXAMPLE.BAK
Backup of Database file	→	EXAMPLE.MBZ
Temporary Folder	→	<dir> EXAMPLE.MSJ

If sending files to another computer or MicroSurvey user, make sure to send **both** the Drawing and Database files.

When you create a new project, MicroSurvey creates a database that contains all survey related data which can include connectivity information, coordinate locations, traverses, bearings and distances.

In order to limit the number of files you need to work with, we combine the data files into one file when you close MSCAD. The database has an extension of .MSZ and is stored wherever your CAD drawing is located. When you're working on your project, the MSZ file is expanded into a directory that has the same name as your job with the extension .MSJ. Note that when you save or close your project, the MSJ folder will be compressed back into the MSZ file.

Do not store or edit files found in the temporary ***.msj*** folder!



Some of the sample files contained in the temporary .MSJ folder

When the Job is opened, the Drawing file goes into your computer memory, and the Database file is opened into a temporary folder. The temporary folder has the same name as the JOB but has an extension of MSJ attached to it.

You should not touch this folder and nothing should be placed in here except via the automated routines in our program. We place this temporary MSJ folder in the same location on the hard drive as the job. **This is why you cannot open a job from your floppy drive, CD drive, Thumb Drive (etc.) as it is too slow and does not have enough space, or ability to work live!**

When you save the job, the contents of this folder are compressed and saved into the MSZ file. If you exit the program the MSJ folder is erased, along with everything in the folder, so you no longer have direct access to anything in there. This is why you should not place anything in this folder yourself.

Each time you save the job you are taking the current information in memory and saving it to the DWG file. Then we take the current contents of the MSJ folder and save it to the MSZ file. At the same time, if a DWG and MSZ file already exist then we rename the copy already on the hard drive. The DWG file becomes the BAK file, and the MSZ file becomes the MBZ file. This way you have backups of your work in case you need them. If a BAK file and MBZ file already exist then they are simply replaced by the newer copy.

As you work through a job you will create other files as well. The RTF file (log file) is saved automatically in the same folder as the DWG file. This file maintains a record of the survey commands run with their output. There is a toggle to control this file as well as the ability to blank the file.

If you do any work in the Modeling menu and you decide to save your surfaces then you will create a QSB file. We suggest you save it in the same folder as the DWG file as well. This QSB file is not automatically saved and must be done manually - also for loading it must be done manually each time you wish to use it in the job.

Backup Files

Each time you save the job you are taking the current information in memory and saving it to the DWG file. Then we take the current contents of the MSJ folder and save it to the MSZ file. At the same time, if a DWG and MSZ file already exist then we rename the copy already on the hard drive. The DWG file becomes the BAK file, and the MSZ file becomes the MBZ file.

This way you have backups of your work in case you need them. If a BAK file and MBZ file already exist then they are simply replaced by the newer copy.

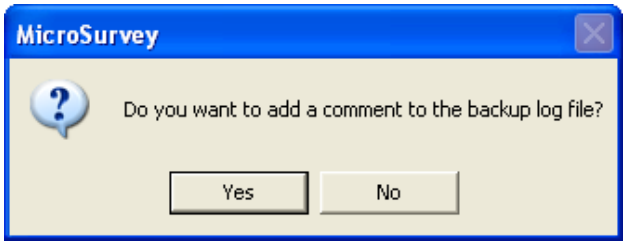
Autosave

When AutoSave is enabled, the program creates a copy of your drawing. The file is saved in the folder specified in Options | Paths/Files for Temporary Files, with the file extension specified in the AutoSave Drawing Extension box (by default, .SV$). The MSZ file is not backed up during this command. A second AutoSave will take the existing SV$ and rename it to BAK and then save the current SV$. Windows may need to be set for you to browse to or search for files inside this folder location. By default this folder is often set to be hidden by Windows.

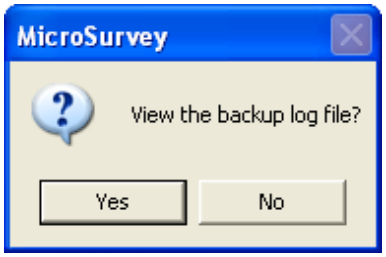
MSBACKUP

Use this command to create a backup copy of the last saved version of your drawing and database file. It might be a good idea to run the Qsave command first. A new directory named MicroSurvey Backup will be created automatically in the current project directory. It will then create a copy of the drawing and database to this location and rename the files starting at "_bak1". Subsequent backups will be saved with incrementing backup numbers.

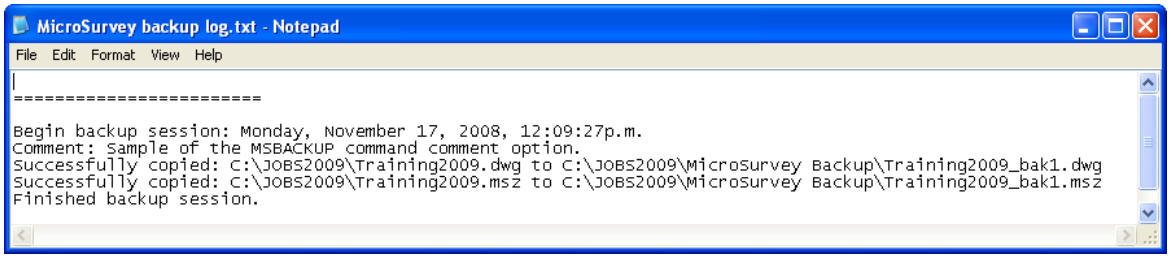
You also have the option of adding a note for the backup log file,



which can also be viewed after the backup.



The backup log file is viewed in Notepad and can be printed if desired



The original project isn't moved or altered in any way. After the backup is complete, the original project will still be open so you can continue working on it.

Other Files Created by MSCAD

Depending on the routine or function being used, MSCAD can create other important files, some of which are listed below.

Log File	→	.RTF
Helmert's Transformation	→	.BIN
Modeling Surfaces	→	.QSB
Horizontal Alignments	→	.HRZ
Vertical Alignments	→	.VRT
Cross-Section template	→	.TMP
MS Batch COGO	→	.BCH

Depending upon the routine you run, you can also manually add a file extension to some files. (ASCII and Data Collector outputs are good examples of these)

If you download a data collector you may have a Raw data file or a Coordinate file. You must tell us where to save these files on the hard drive and in some cases even what to call them.

Depending upon what type of collector you are using, the file names may be sent directly from the collector to our program. Other brands will require you to provide the name and extension. If you are providing the name then be sure that it reflects your job name, is unique and has an extension on it.

Suggested extensions might be RAW for raw data files and COR or TXT or ASC for coordinate files. (TDS collectors use RW5 for raw files and CR5 for coordinate files, and both use the name stored in the collector automatically) Or course there are many other files that you can create with MicroSurvey, they can range from Report files and closure files, to ASCII exported files and upload collector files, and even Legal Descriptions. You can name these anything you desire but we recommend that the naming structure be consistent and use appropriate extensions, and always keep the files together so you know where the files are. We allow you a lot of flexibility but you have the ultimate control and if you do not know how to work in Windows to create the correct folders then you may wish to receive some training in this area before jumping in too deep.

Note that for MicroSurvey CAD 2010 you can set the program to store all drawing files in DWG or DXF format from version 2.5 – version 2007/2008, as appropriate.

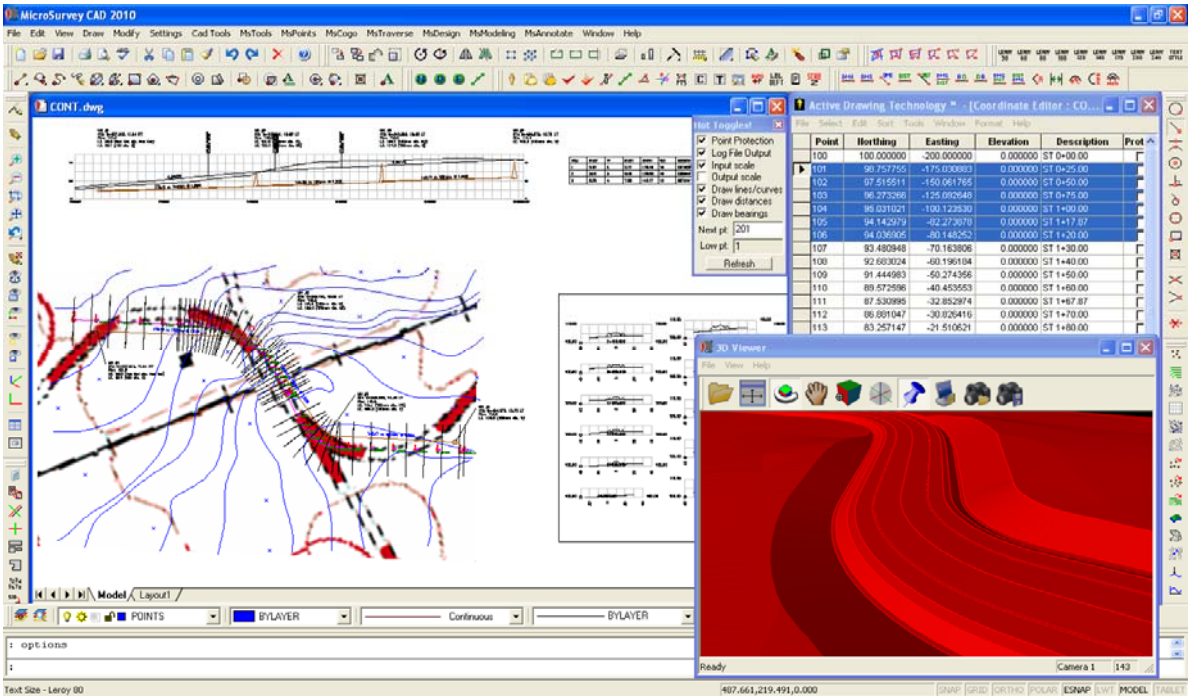
Program User Interface

The desktop contains a series of standard elements. These are the menu bar, the toolbars, the properties bar, and the status bar.

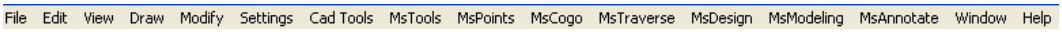
In addition, the desktop may also contain several toolbars.

The following picture shows a possible layout of the desktop, showing the Drawing Window, a sample of Toolbars, the pull down Menus, Hot Toggles, Active Coordinate Editor and our new 3D Viewer for Rendering. See the on-line help system for more details on each section.

This sample drawing shows a simple AutoRoute with a vertical profile (containing road and sewer information), cross sections, sewer table and a raster image under the plan view of the survey. The 3D Render window shows the surface tin being modeled in 3D. The Active Drawing Technology window shows the list of coordinates in the project.



Pull down Menus



The pull down menus are setup to group like commands together. The menus starting with Ms are generally survey related commands, and the others are generally CAD related commands. (There may be some cross over between the two grouping categories)

Command Line

The command line can be placed at the top of the screen (below the menu bar), or at the bottom of the screen (above the status line). It can also be placed pretty much anywhere else you desire, on the screen as a floating toolbar.

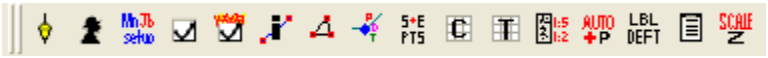
Properties

The property bar can be turned on or off. We recommend you turn it on. It allows you to control layering and related options.

Status Bar

The status bar can be turned on or off. We recommend you leave it on. It presents coordinate or direction and distance data, along with comments on what commands are being picked. It also has command setting options in the far right.

Customizing Toolbars



The toolbars assemble buttons that represent a common set of commands, or sequence of commands. There is a training movie showing how they can be customized.

Active Drawing Technology

This spreadsheet type dialog can display the Active Coordinate Editor, the Active Traverse Editor and the Active Batch Editor.

3D Viewer

This floating window allows you to see your drawing in a rendered 3D perspective, which you control via the mouse.

Help System

The help system is continually updated to keep current with all the advancements and new commands that are added on a regular basis. The help file also has Tutorials, Important Phone Numbers, Copyright Information, and Much more. Be sure to look through the whole help file as **it will always be more current and comprehensive than any printed manuals.**

A few tips about using Help:

You can find Help using any one of these 3 methods:

1. By clicking on the HELP button available on most dialogs within MicroSurvey CAD 2010. This will take you to the help topic on the command currently in use.
2. Quick tips are available on most dialogs within MicroSurvey CAD 2010 by using the What's This? Help.
3. Access the Help System from the top of the Help menu or using the F1 key. If you have highlighted a menu item, press F1 to jump to it in the on-line help.

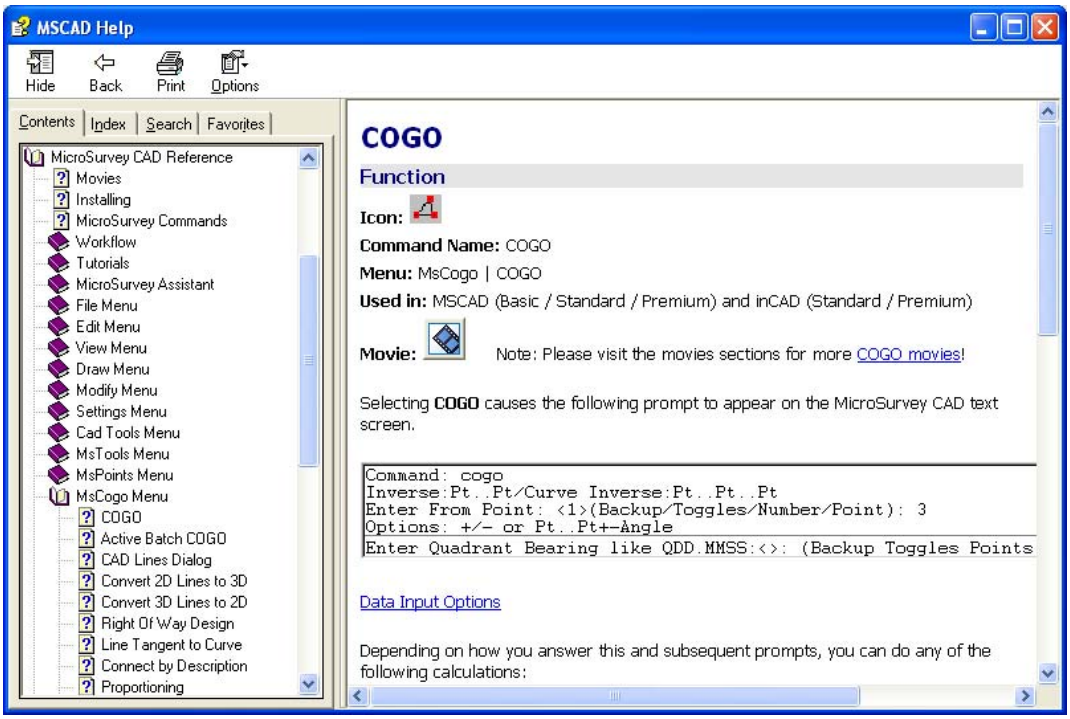
Have a look at the next image. The Help is arranged in the same basic order as the Menus.

- Notice that the topic for COGO is displayed. If you had located this topic using the Index or Search options, you should flip to the Contents option to locate the command in the menu system.

- Notice that the keyboard command is shown where possible as well as the corresponding toolbar button.

- The Back button will take you to the last page viewed and the forward and back arrows help you to navigate through the Help system in topic order as shown in the table of contents.

- Always look for the vertical scroll bar on the far right hand side. Its' presence indicates that there is more information below that is not currently visible. Some topics are several pages long!



What's This? Help

The little  in the corner of the dialog box allows you to pick it then pick the portion of the dialog that you want help on while running the command.

Use this to find out about any portion of the dialog box on screen.

MicroSurvey Assistant

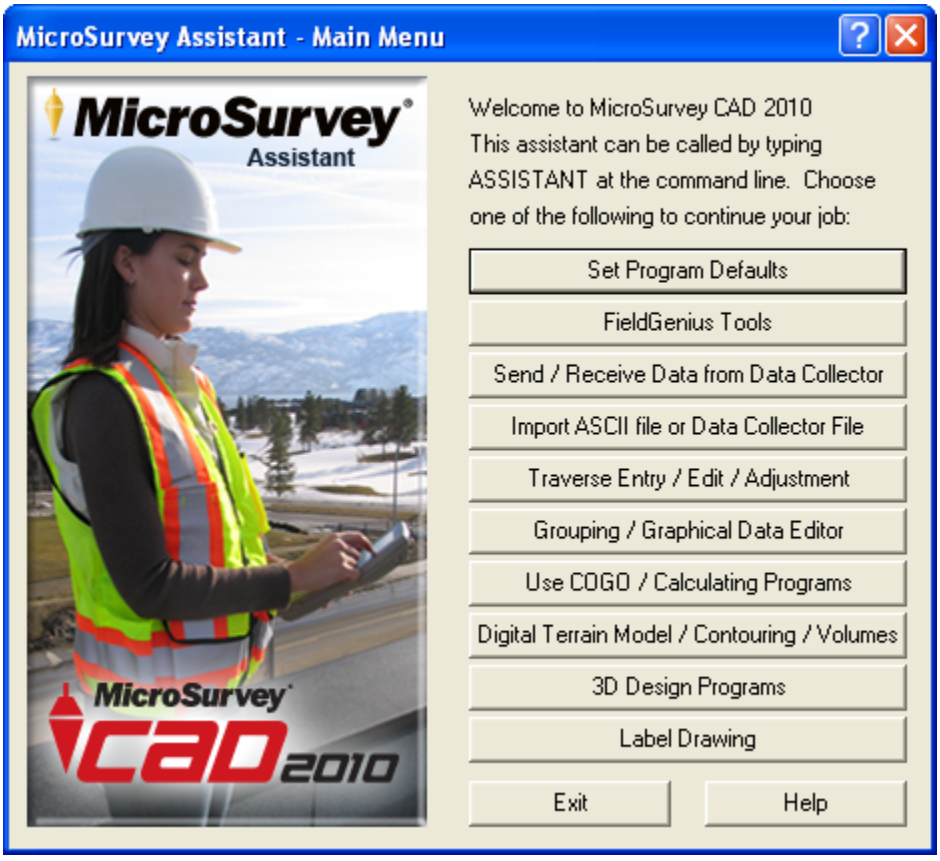
These dialog style menus are designed to assist you in developing a job from first principles to completed survey drawing, with minimal knowledge by the user.

The Assistant can be started by going to the MsTools menu | MicroSurvey Assistant or by picking this button  on the MS Main Control toolbar

Assistant Main Menu

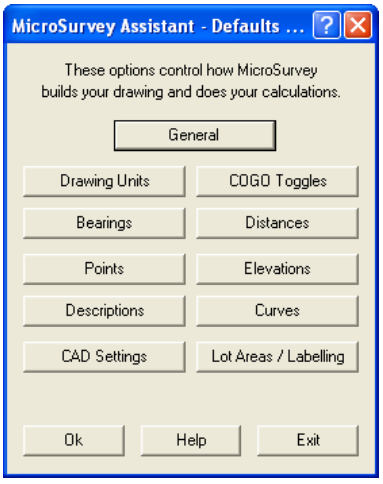
The main menu is structured so that no matter what survey related command you have to do to start a job, you should be able to do it directly from here.

As you move your mouse around on the assistant, you will see different pictures appear for each of the buttons. They are there to help you remember what each button will do for you. Picking on one of the buttons will take you to a second level of menus that provide more programs. Investigate them all so you will know where to find what you need.



Assistant - Set Program Defaults

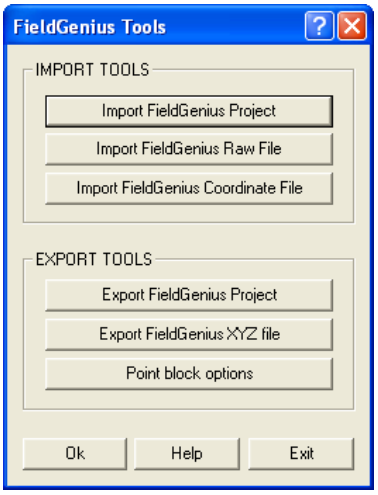
Use this dialog to modify the Program Defaults.



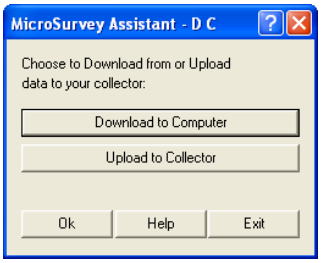
You can modify the Main Job Defaults under the General button. The Toggles are also available to you from this dialog, along with all the other defaults used to setup such things as distances, elevations, point numbers, etc. The CAD Settings and Drawing Units will display the appropriate options allowing you to set the working units, grid, snap, point style, OSNAPs, trim radius, highlighting options, mirror text options, and a whole lot more.

Assistant – FieldGenius Tools

MicroSurvey's FieldGenius line of data collectors has a super productive and easy to use interface. Our extensive experience with a variety of manufacturer's data collectors ensured that when we built an interface, it would be better than anything on the market. Our MicroSurvey Transfer Program, intergraded with ActiveSync, makes data transfer and import as painless as possible.



Assistant - Send/Receive Data from Data Collector



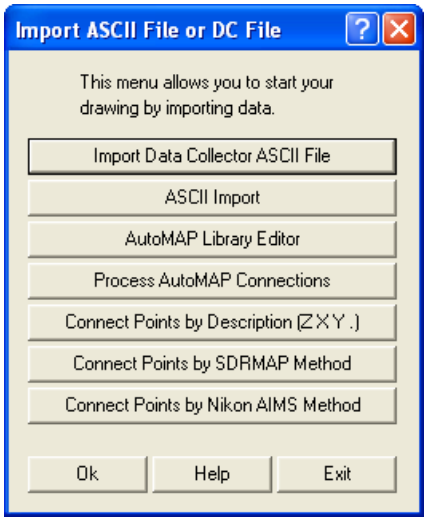
This short menu assists you if you are downloading a file from your serial data collector to the computer or uploading a file from the computer to your data collector.

Assistant - Import ASCII File or Data Collector File

Another method of importing point data into MicroSurvey CAD 2010 is via an ASCII file. This file would have information like; Point Numbers, Northings, Eastings, Elevations, Descriptions, each describing a point, and in one of several different formats in a text file known as an ASCII file.

You can also read a data collector file that you downloaded previously, incorporating the data into your job.

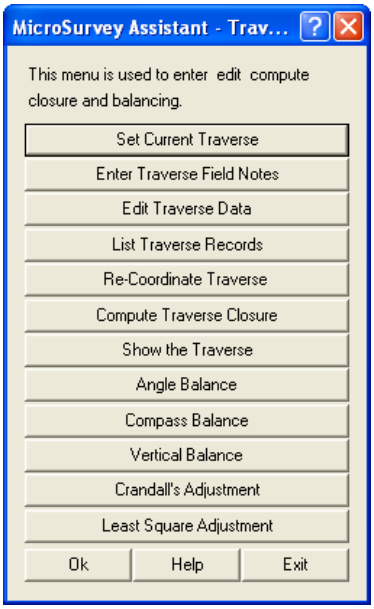
Several other tools have been added to this menu to allow you to join points by linework in an automated method.



Assistant - Traverse Entry / Edit / Adjustment

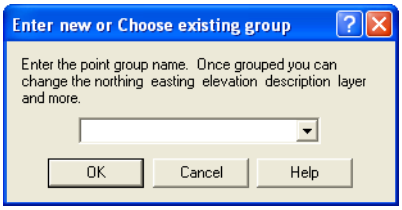
This menu option allows you to manually enter, edit, list, re-coordinate, or show a traverse. It also allows you to compute closures and balance the traverse.

Data collector files are also considered to be traverses and therefore you have the ability to manipulate those files as well. Especially useful for the data collector file is the Re-coordinate traverse option which is required to calculate coordinates from the original Raw data saved in your data collector files.



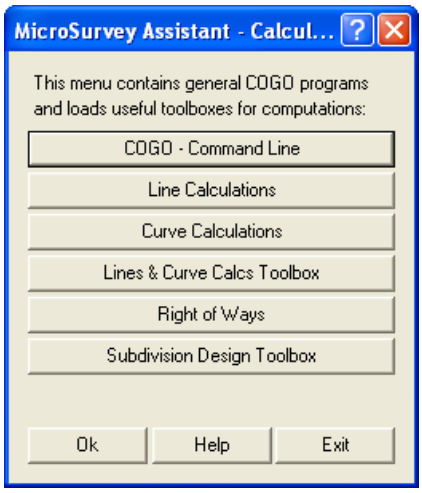
Assistant – Grouping / Graphical Data Editor

This option actually starts the command rather than bring up another dialog with sub-options on it.



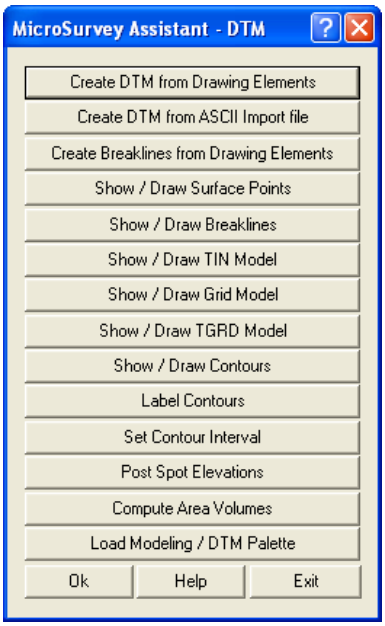
Assistant – Use COGO / Calculating Programs

Here are the shortcuts used by almost everyone. COGO is one of the most used portions of MicroSurvey CAD 2010. Working with lines and curves, generating streets from centerlines, and then taking those streets and adding blocks and lots to create a subdivision. Finally this section allows you to take the lots and place houses on them, with labeling of the lot numbers and areas.



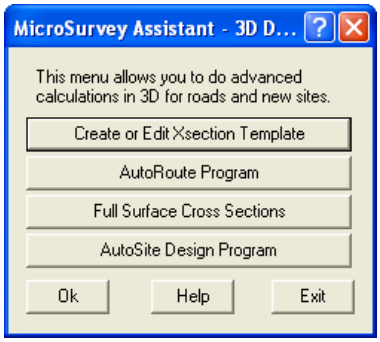
Assistant – Digital Terrain Model / Contouring / Volumes

For the customers that need to take their survey drawings a step further and create surfaces from the point and line data, we have made the transition to the Modeling program as seamless as possible. The more common activities of creating Surfaces, TINs, Contours, and continuing further to calculate volumes between multiple surfaces, are all made available to you here along with many other options.



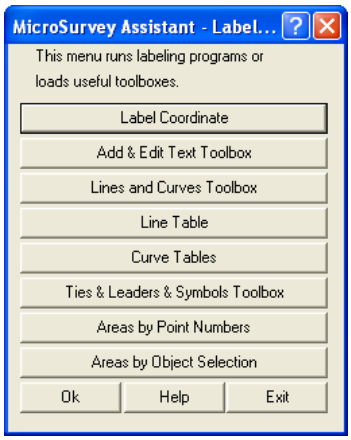
Assistant - 3D Design Programs

This menu is used for the more advanced design sections of MicroSurvey CAD 2008. These routines are explained in detail in the Help system.



Assistant - Label Drawing

This menu is a short cut to all of your text and labeling routines. Many of the Toolboxes can be accessed here to help make rapid labeling possible. Other routines such as line and curve tables and area calculations are added to assist you. The toolboxes, display many options and can be left on the screen for future usage.



Data Collector Tutorial

Because of the size and complexity of this tutorial we have broken it down into 12 smaller steps to make it easier for you to follow.

Step 1) Starting the Job

Step 2) Importing a Data Collector File

Step 3) Viewing the Drawing

Step 4) Line Connection – Z-coding

Step 5) Create Surfaces

Step 6) 3D Viewing and Advanced Rendering

Step 7) Cleanup of Screen

Step 8) Quick Contours

Step 9) Setting up a Boundary

Step 10) Final Contours

Step 11) Labeling Contours

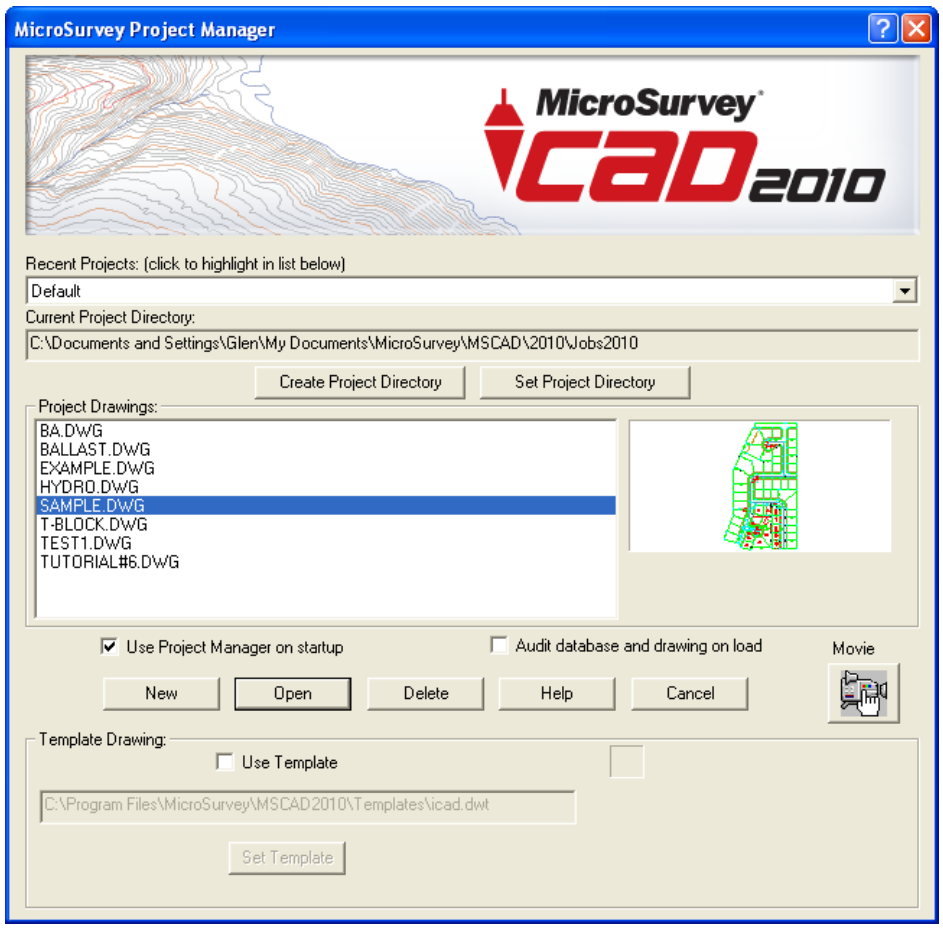
Step 12) Saving Your Work

Step 1) Starting the Job

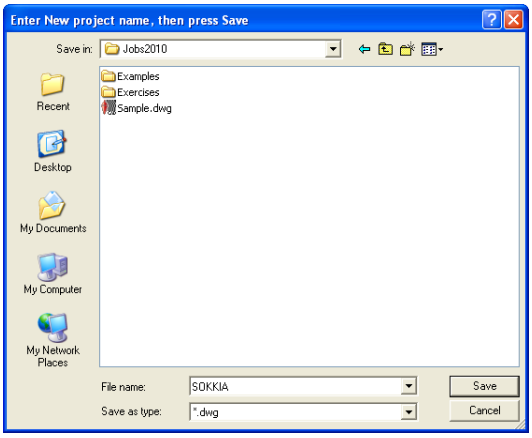
In this introductory tutorial we will load a data collector file and annotate the points, connect the break lines, then build a contoured topographic model of the surveyed site. We will start with a new empty drawing and project and build everything from scratch.

To begin, start a new drawing by going to the **File Menu** and executing the **Project Manager** command.

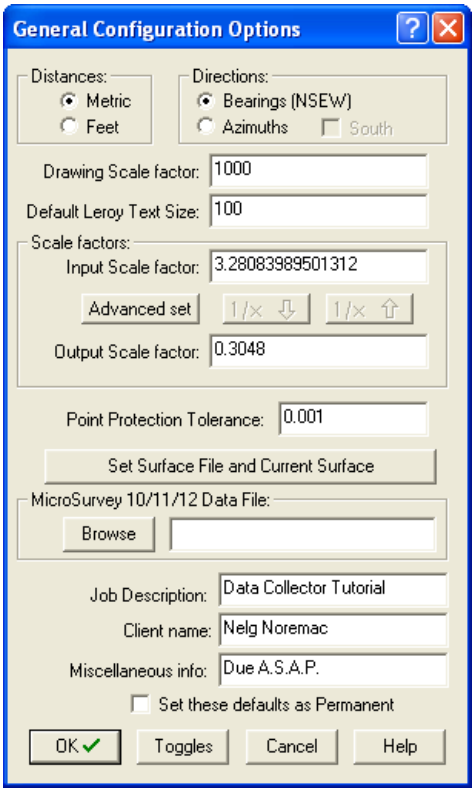
Pick the New button on the Project Manager:



Then fill in the name of the job and call it SOKKIA.DWG,



Pick on the **Save** button.
Next you will see the following dialog box.
Set the scale and other settings as shown below.

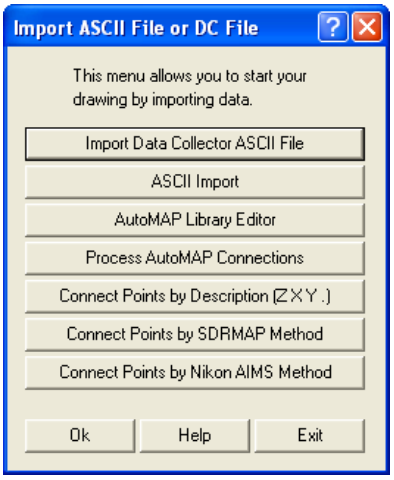


Pick on the **OK** button to continue.

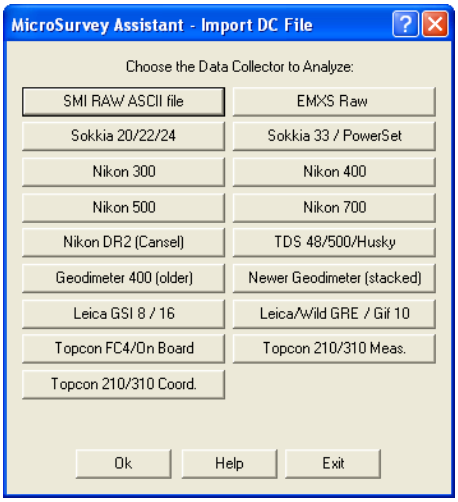
Step 2) Importing a Data Collector File

To work from the MicroSurvey Assistant, Go to the MsTools menu | MicroSurvey Assistant.

From the assistant pick the **Import ASCII File or Data Collector File** button.

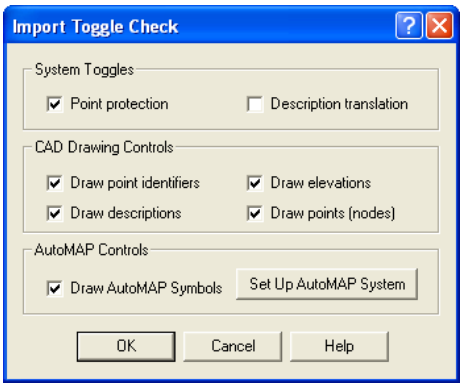


Then from this dialog pick the **Import Data Collector ASCII File** button.

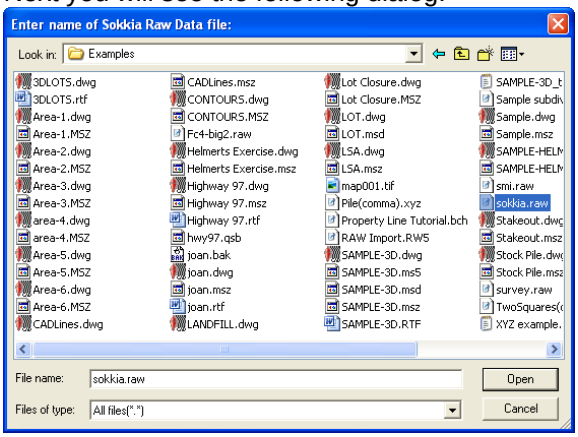


Now select the button that says **Sokkia 20/22/24**.

You will then be presented with the Toggle Check dialog box to confirm that they are correct or to change them if required.



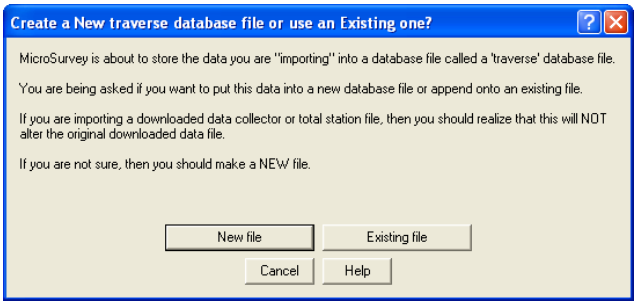
Pick the **OK** button to continue.
Next you will see the following dialog.



If required, change to the **C:\Documents and Settings\Glen\My Documents\MicroSurvey\MSCAD\2010\Jobs2010\Examples** folder and pick on the file named **SOKKIA.RAW**. (where \Glen\ would be your login name)

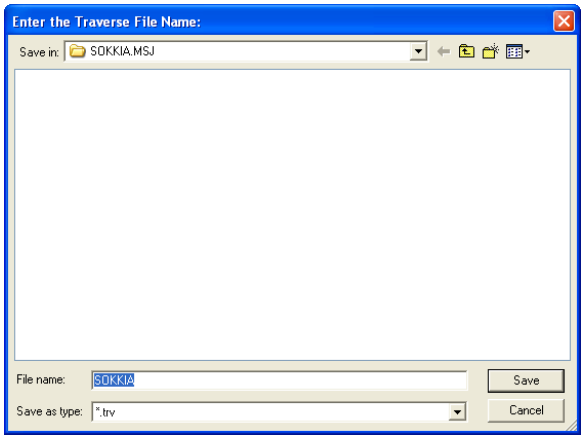
Then pick on the **OPEN** button to continue. This is a Sokkia coordinate data collector file.

Then you will see the following dialog box:

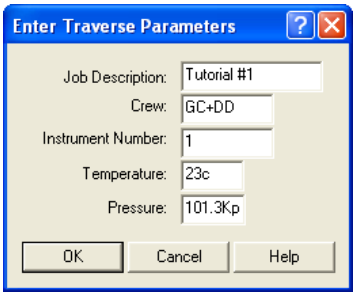


Select **New File**, because this is a new traverse database.

Enter **Sokkia** as the new traverse name in the following dialog box (it may already default to this name, if so just accept it), and pick the **SAVE** button to continue.

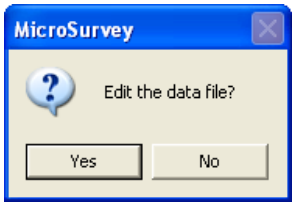


Fill in information about the job in the dialog box below and then pick the **OK** button.

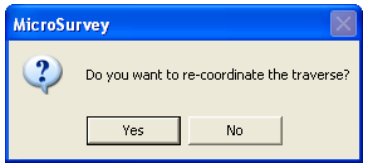


This collector file contains only coordinate information and therefore all the points are passed directly through to the database and screen. As the data points are loaded, you will see the data collector records scroll by in the text window, but because the view is not over the site, you don't see anything until the end when the program automatically does a zoom extents for us.

You will see this dialog box in the middle of the screen.

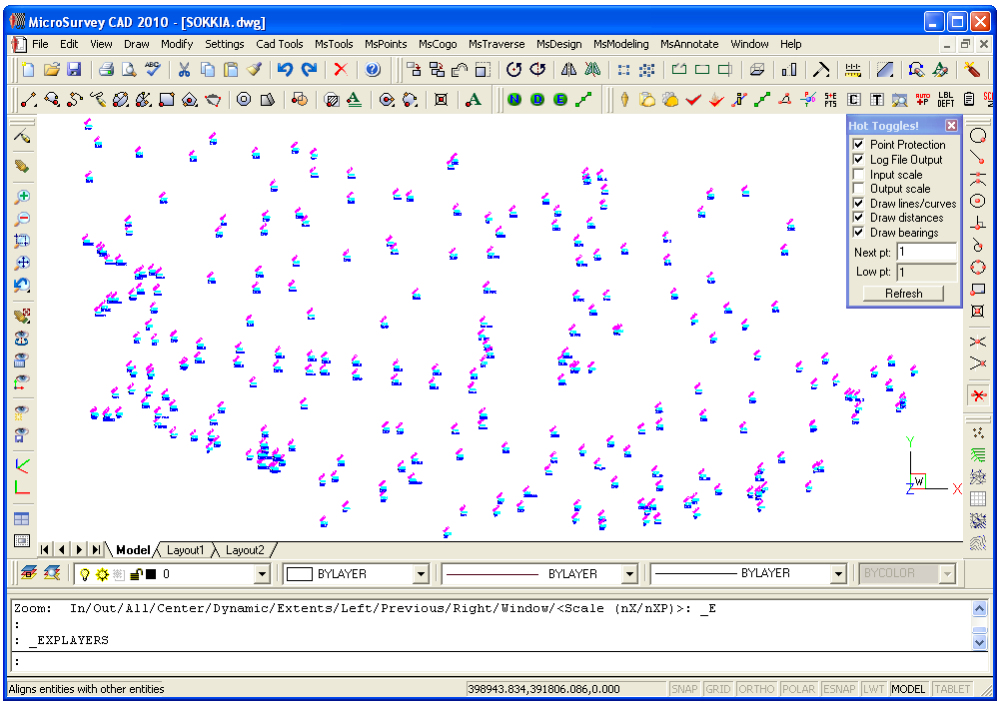


Pick on **NO**



And **NO**.

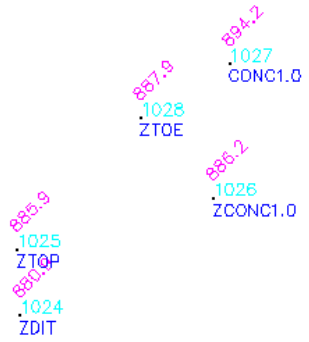
Then when the Assistant menus come back on screen – hit **EXIT** on each one until they are removed from screen and you are left with just the job on screen.



Step 3) Viewing the Drawing

(This step of the tutorial is to help show the points in the job in a view that will help you understand the program. This entire step is not required when doing your own jobs later)

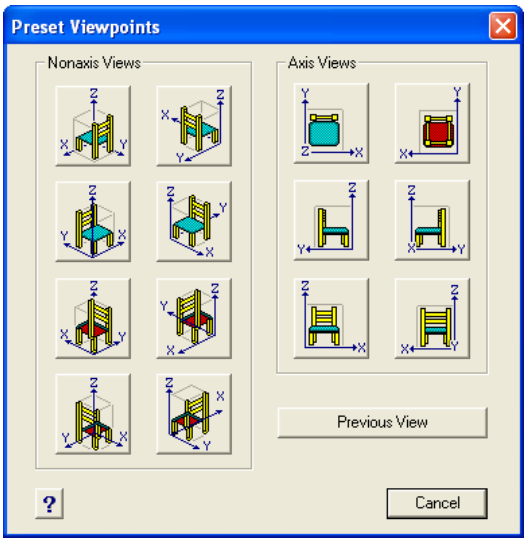
You will see all of the labeled points from the job. If you zoom in on a couple of points, they would look like this.



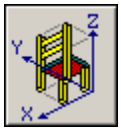
(The zoom commands are typically docked on the left side of the screen but contain these buttons)

The annotation (text) is drawn at the current elevation (usually zero), but the points are drawn at their actual 3D elevation. You can see this by looking at your drawing from an oblique view.

Let's set our drawing to an oblique view. Run the Preset Viewpoints… command, found in the **View drop-down menu**. You will see this dialog:

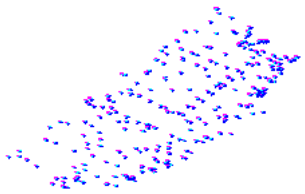


Now press this button (this is the ISO View SW button):

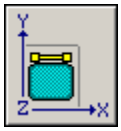


Then Press the OK button.

You will see from this oblique view that the points are at their elevation towards the top of the screen and the annotation is at an elevation of zero.



Run the Preset Viewpoints… command again, found in the **View drop-down menu**. Now pick the **Top View (Plan View)** icon button found in the 3D View… command, to return to a normal view.

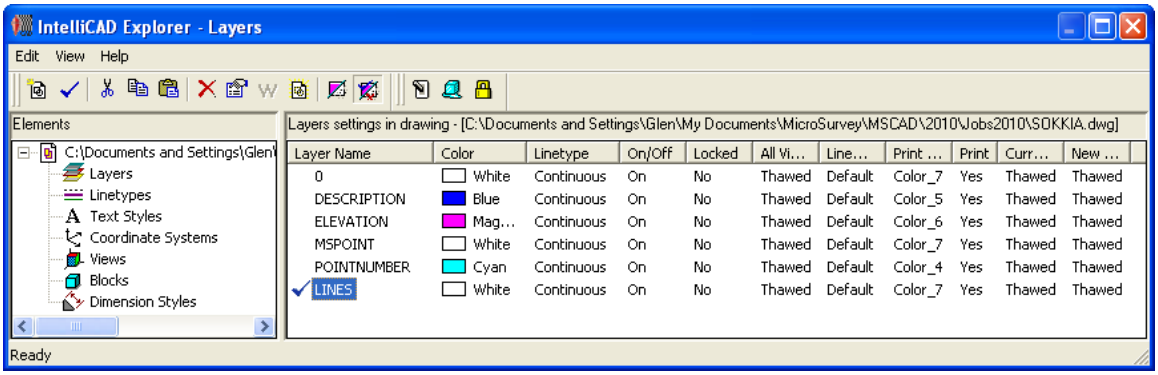


Step 4) Line Connection – Z-coding

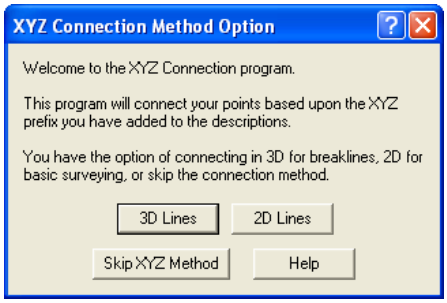
We are going to connect points sharing the same descriptions, with 3D break lines, so let's create a layer on which to place them. Select the layers icon in the bottom left portion of the screen, as shown here.

Make a new layer called "lines" and make it current as follows:

The window opens to the Layers table. Pick the New button at the top left end of the toolbar, and type in **LINES** as the new layer name. Double click on the layer name LINES to make it the current layer. The small blue check mark will be placed there to indicate the current layer. Close the IntelliCAD Explorer window.

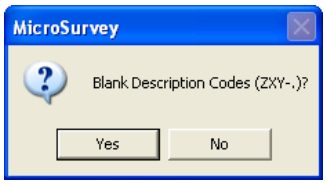


From the MsTraverse pulldown menu, select **AutoMAP System | Connect Points by XYZ,** and you will see



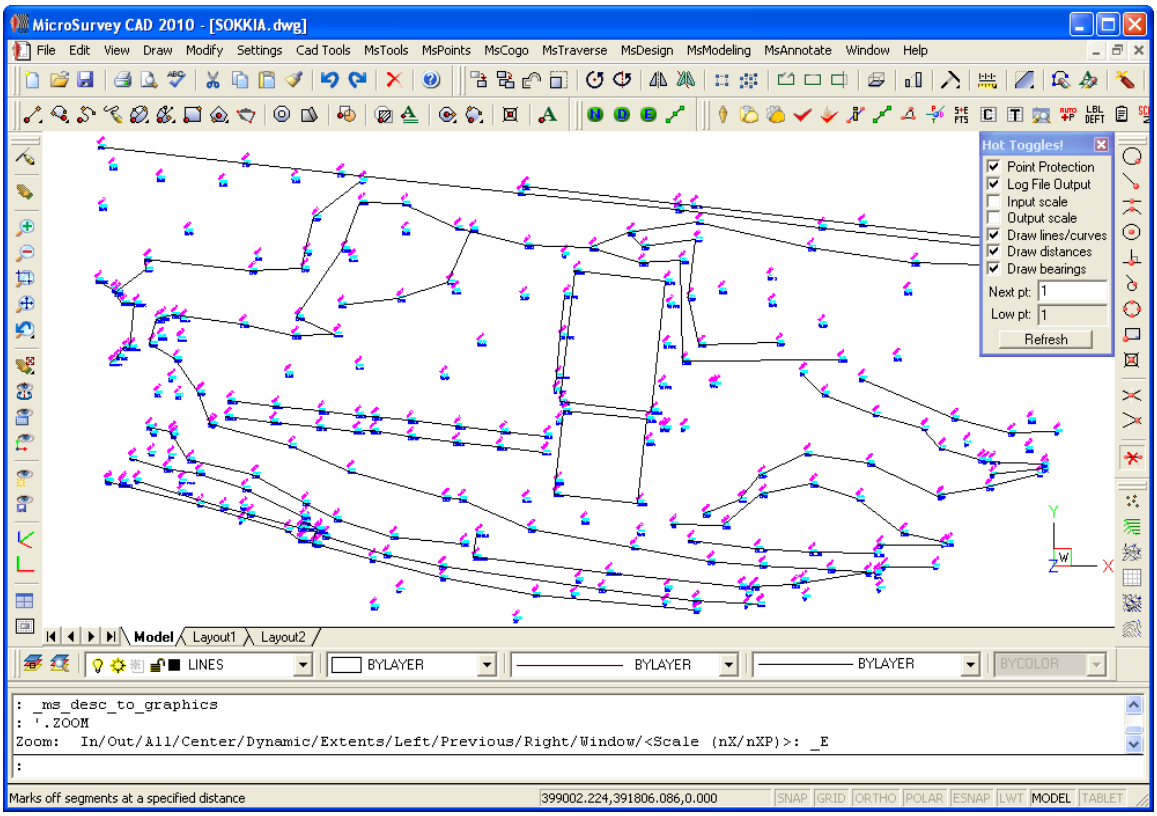
We will be using these as break lines for our topographic surface, so pick the **3D Lines** button.

You will see some linework being drawn on screen and then you will see the following dialog box.



The data collector file in this example uses Z coding to allow for fast automatic connection of points with lines. Normally, you would blank the description codes to remove the leading Z character, but for this demo, answer **NO** to blank description codes so you can see them.

Now your screen should look like this. The lines you see are in 3D, just like the points that were used to create the lines.

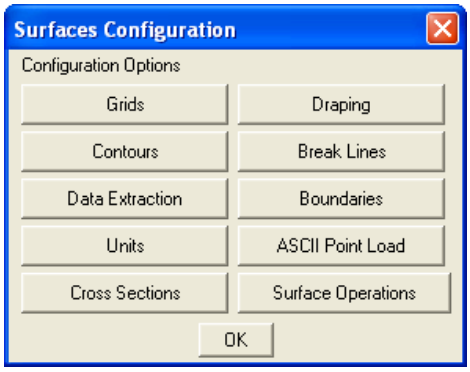


Step 5) Create Surfaces

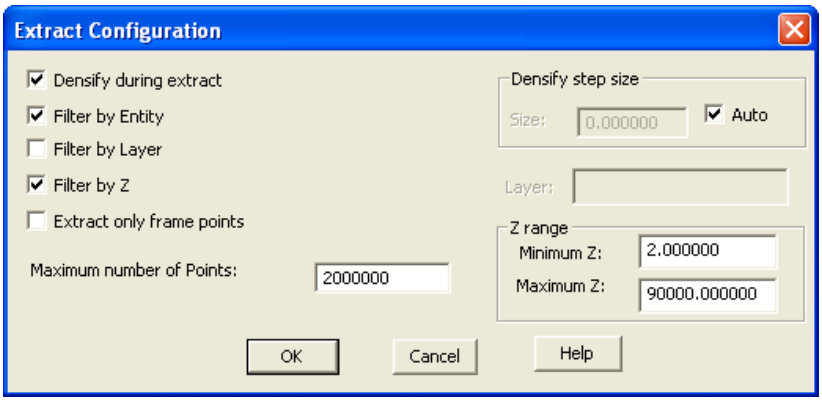
Now you have points and break lines, which is all you need for a topo map and surface. We will extract the data from which to make our map by using the Data Extraction filters in the Modeling routines. This allows us to be very specific on what we are using to create our surface. You do not always need to use the filters but doing so allows you full control.

Go to the MsModeling pulldown menu and pick on **Configuration Settings**.

This dialog will appear:

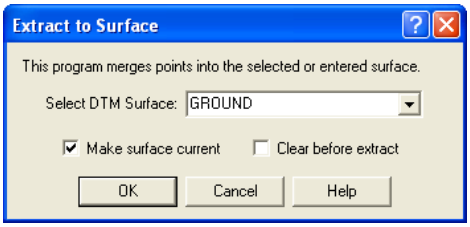


Pick on the **Data Extraction** button and this dialog box comes up.

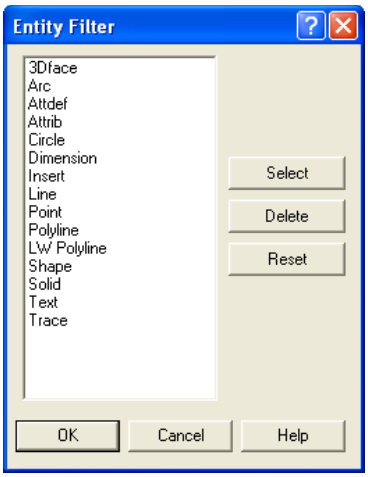


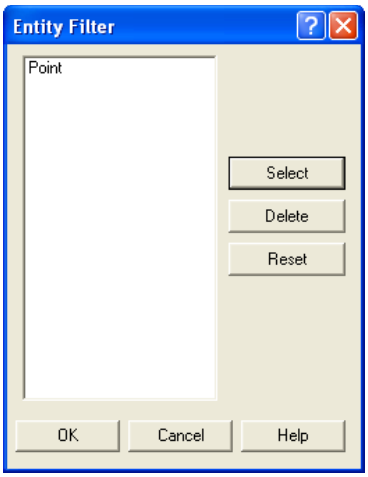
Pick on the **Filter by Entity** button and then pick **OK** to continue, and **OK** again to exit the previous dialog.

Next go to the MsModeling pulldown menu and select **Extract from Drawing | Extract to Surface**. You will see the dialog box shown here. Accept the surface name of **Ground** and pick the **OK** button to continue.



Now you will be asked what it is you are picking to create your surface. On this dialog pick **POINT** from the list – then pick the **SELECT** button and then the **OK** button to continue.



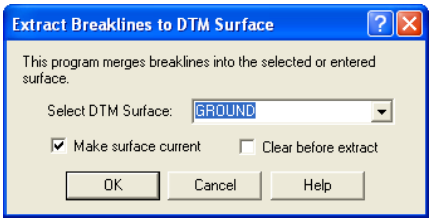


Next select the points, by windowing the entire drawing, or simply press **ENTER** and the routine will grab everything in the drawing automatically for you. Don't worry if you get the break lines too as we have told it to filter out just the points at this time.

264 points total in surface.

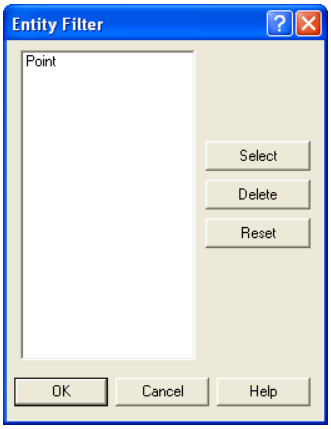
You have now placed all the points on the surface **Ground**. Now we need to do the same thing with the breaklines.

Pull down the MsModeling menu and select **Extract from Drawing | Extract Breaks**. This will show the following dialog box, similar to the one above.

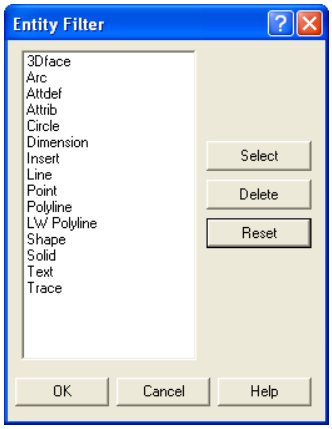


Pick **OK** to accept the surface name **Ground** as BOTH the points and breaklines must be on the same surface.

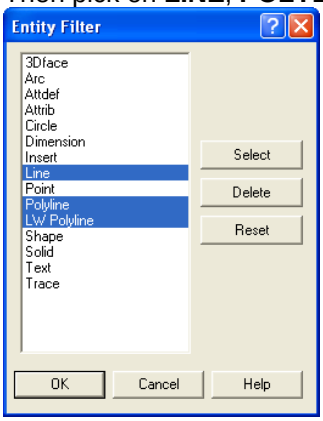
Now you will see the following dialog box.



Pick on the **RESET** button to see the complete list of filters.



Then pick on **LINE**, **POLYLINE and LW Polyline**, as shown below.



Then pick on the **SELECT** button. What you are doing is telling the routine that you no longer wish to pick points but now wish to pick lines and polylines to add them as breaklines to your surface.
Then pick on the **OK** button to continue.

Now you can select the breaklines by making a window around the drawing, or by simply pressing **ENTER** to select everything on screen. Don't worry if you get the points too as the filter will only use the 3D lines and polylines it finds.

179 additional points added to current surface.

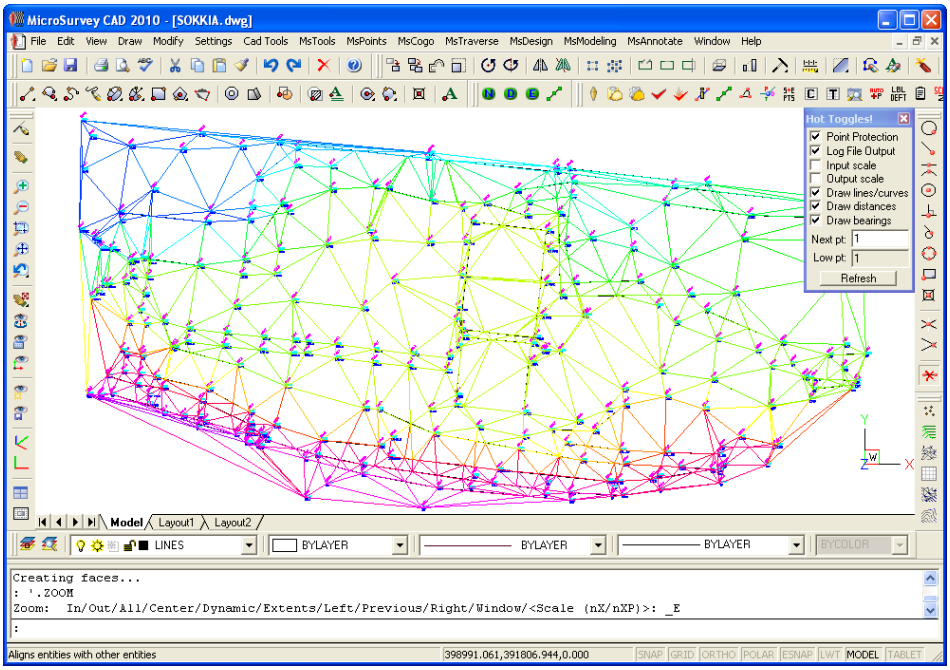
Note: The order is important here. Extract points first, then breaks. This puts the extracted data into a surface named what you decide. The default is GROUND. We don't see anything yet because we just created a surface in memory, but have not displayed it.

Step 6) 3D Viewing and Advanced Rendering

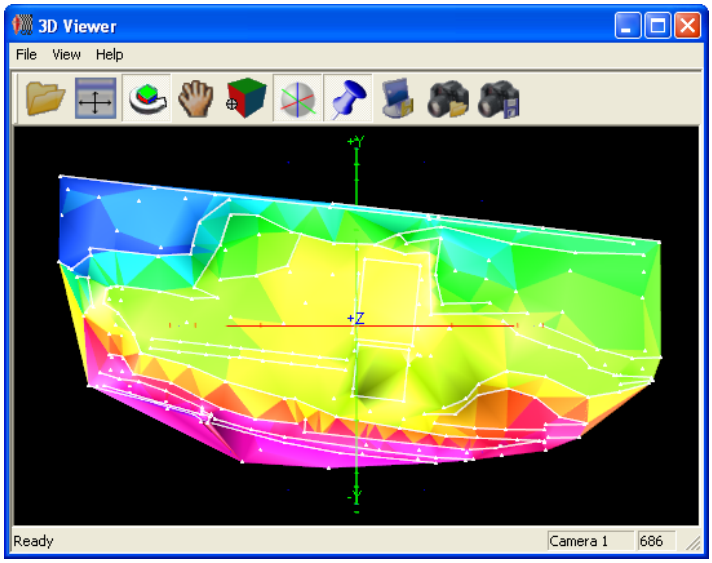
Most of the time you would just create and draw contours at this point, but we will take a two-minute side trip to explore basic site visualization in 3D.

To start with, we are going to create and draw a TIN (Triangulated Irregular Network) representing the topography by selecting **TIN** from the **MsModeling menu | TIN Create/Edit** option, pressing return to select the **<GROUND>** surface and then answering **D** to Draw the surface (rather than the temporary Show) and press return *twice* to draw it as a **polyface mesh** entity with invisibility as **NONE**. This is the 3D surface representing the points and breaks of the surface.

Here is what you should now see.

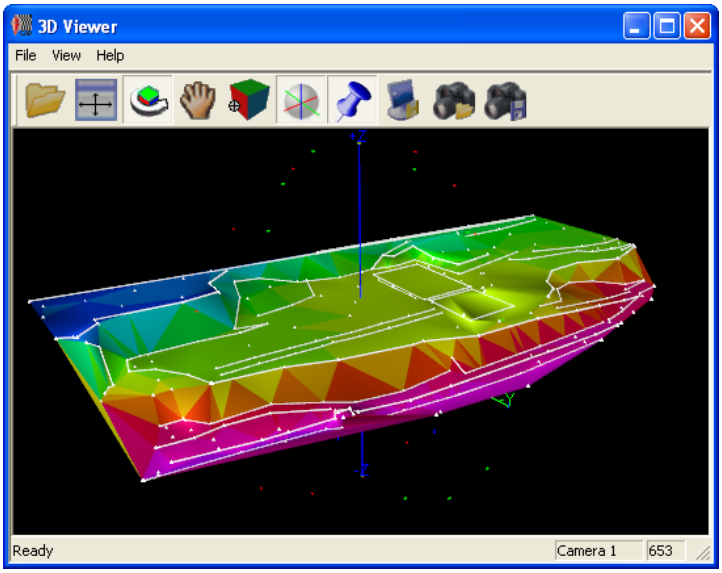


The 3D TIN is now on screen, and we can use a new command called RENDER to look at is in full 3D. Go to the View menu | Rendering | Render (or type in the command RENDER). You will see a 3D Viewer window pop up on screen.



This is where you can easily rotate the job in 3D to examine it from any direction you wish. Use the left mouse button and double click in the middle of the surface, then use the left mouse button to spin the job around, by picking and holding the button while moving the mouse.

You can zoom in and out and pan around as well. You are looking for anything that does not look correct, to allow you to go back and correct it to get a good surface. Experiment with the options – **HAVE FUN!**



Close the window when you are done viewing the drawing in 3D.

Step 7) Cleanup of screen

We will erase the TIN from the screen so we can see the rest of the job. We will use a shortcut to do this. Press an **E** (for erase) followed by **<enter>,** then when prompted to select objects, answer **L <enter>** to select the last object drawn, then press **<enter>** again. MicroSurvey has shortcuts called *selection sets* like **L**ast and **P**revious that can speed your work.

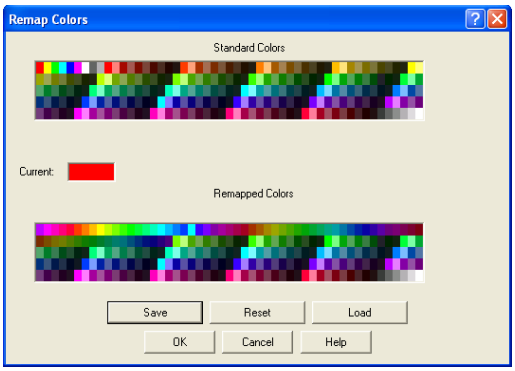
(If the Tin does not erase then try again and pick one of the triangles while in the erase command)

Occasionally you may need to redraw the display in MicroSurvey to clean up artifacts from erasing entities.

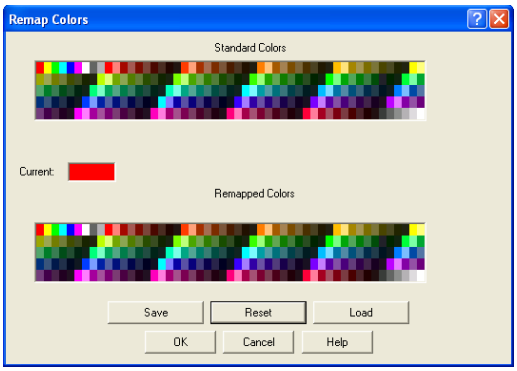
Pick the redraw button on the left side menu to run the redraw command.

Step 8) Quick Contours

Contours may be generated by three different methods. To set the correct method for what you require we need to do 2 things. First we need to set the color map to what we require. Go to the **MsModeling pulldown menu** | **Color Options** | **Reset Color Map**.



Before Reset



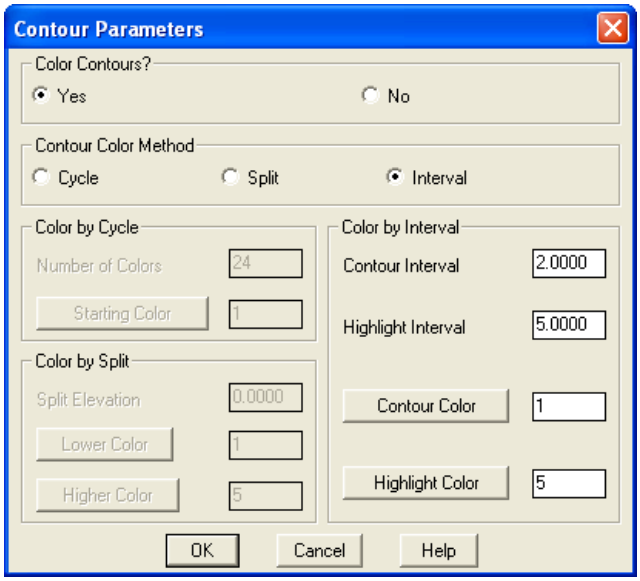
After Reset

Pick on the **RESET** button and then the **OK** button.

What this is doing is setting the colors to standard CAD colors so you can set your pen widths for plotting easily.

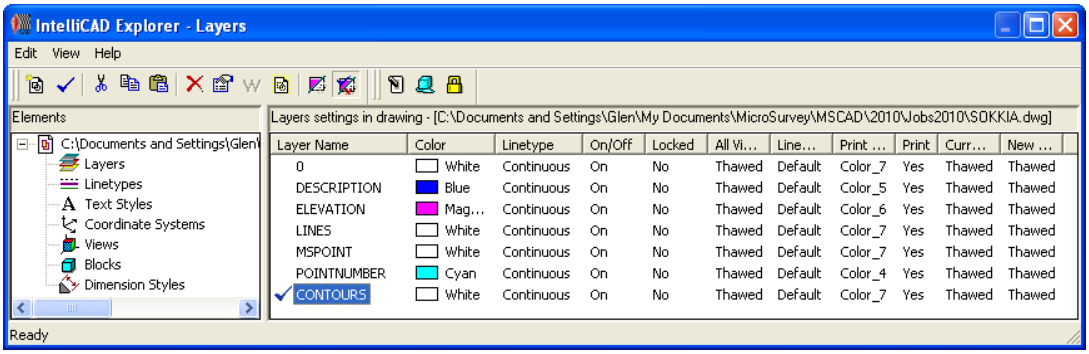
Now we need to tell the routine which method to use to color the contours and to set the interval.

Go to the **MsModeling pulldown menu** | **Color Options** | **Contour Color Settings**



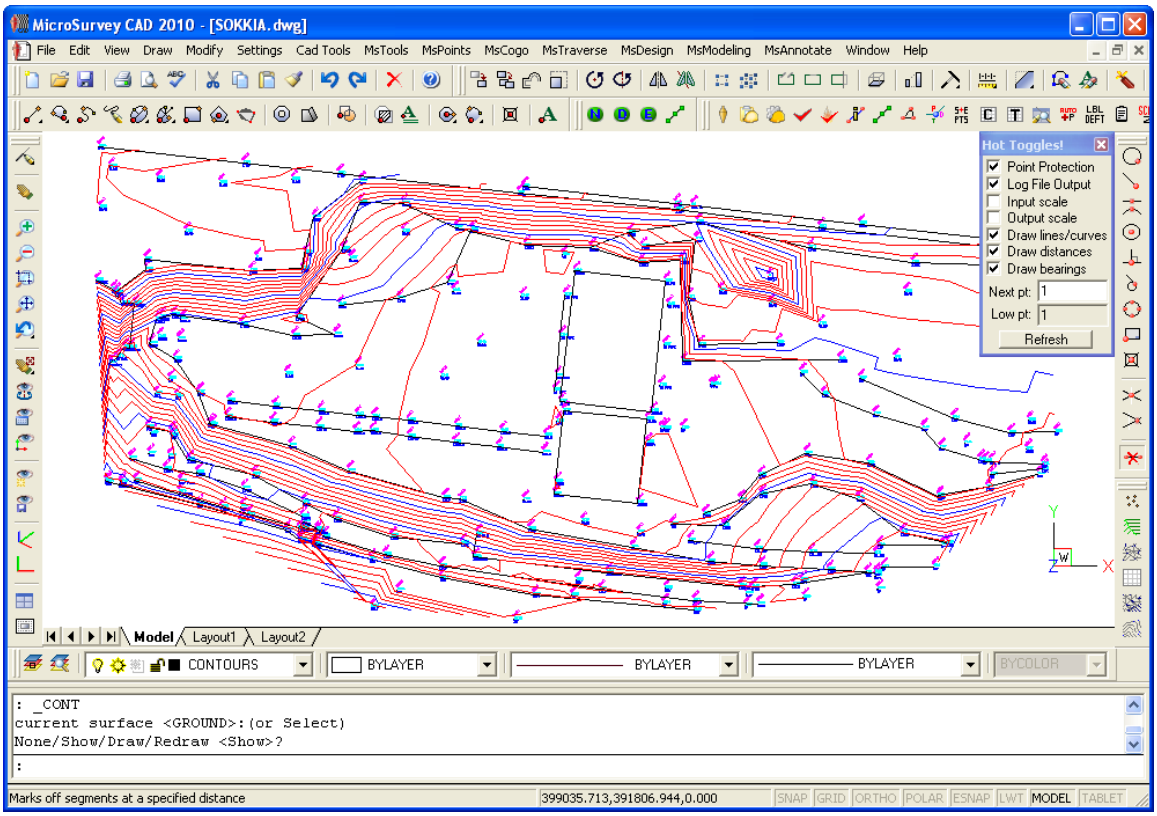
Set your defaults to match this dialog

We will draw our contours on their own layer. Make a new layer named contours and make it current, just like you did for the lines layer previously. Pick the Layer Management button. Pick the new button at the top left end of the Explorer toolbar. Type in **CONTOURS** in the edit box and press **Enter**. Double click on the **CONTOURS** layer to place the blue check button, to make it current.



Close the Explorer.

Select the **Contour** command from the **MsModeling pulldown menu**, press **<enter>** to accept the **<GROUND>** surface (the surface to which you extracted your points) and press **<enter>** to temporarily “show the contours".



The contours are NOT yet part of the drawing. They are only in memory and displayed temporarily on screen.

The contours are displayed temporarily until the next refresh of the screen, such as pan or zoom or redraw. If there was a problem with a bad elevation, you could fix it before drawing permanent contour lines.

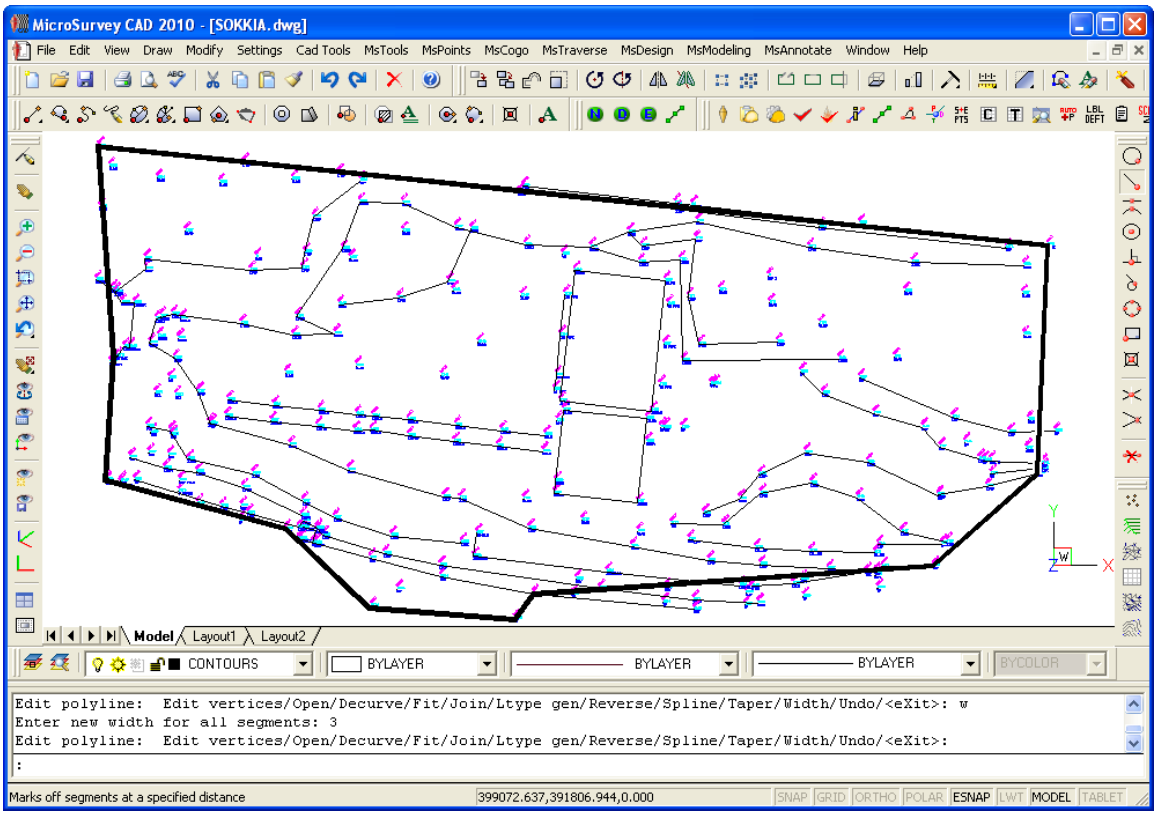
Step 9) Setting up a Boundary

Most of the time in a topo survey you will take shots outside of the actual property lines for control, but you may only want to display contours within the property outline. We will do this by setting up and using a boundary. A boundary acts like a Trim line, cropping the contours so they do not pass over the polyline. We will add a boundary polyline, then draw and label contours for this site.

Refresh the screen by picking on the redraw button on the left side menu.

The contours disappear because they were displayed temporarily with the show command. You can also use the mouse wheel to zoom out a bit, if you wish.

Draw a polyline similar in shape to the bold line shown below to use as a boundary. This line might represent a property line or an arbitrary trim line for the contours. (Your polyline will not be bold by default. We made this one bold so you could see it easily.)



If you are unfamiliar with the polyline command, type **PL** then left click on each location where you would like a vertex, then finish by typing a **C** to close the polyline into a closed polygon suitable for a boundary. (See the MicroSurvey help for more information).

Select this polyline as a boundary, by running the **Boundary Options | Set Boundary** command from the **MsModeling pulldown menu** and selecting the polyline boundary you just created. Press **<enter>** to complete the selection.

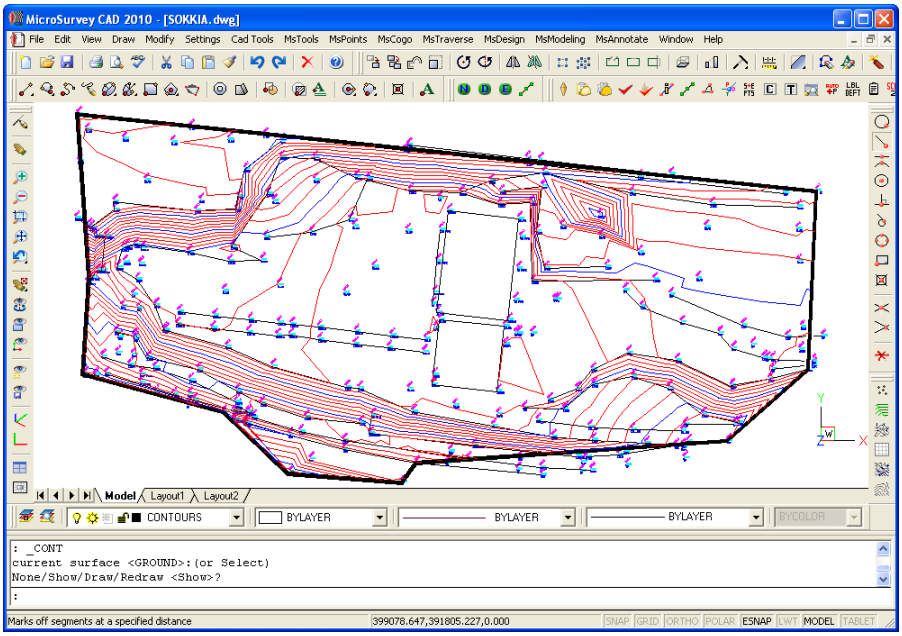
Now the contours will be limited to within this boundary, when we run the contour command again to draw them. (See the help file for more on boundaries, including nested boundaries)

Now we will draw the contours permanently, honoring our new boundary.

Step 10) Final Contours

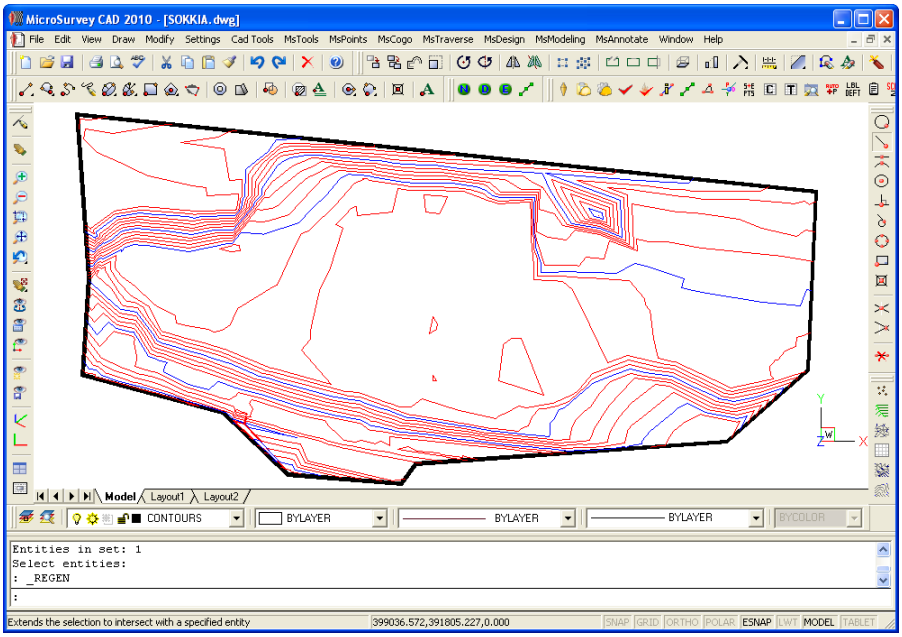
Select **Contour** from the **MsModeling pulldown menu**, press **<enter>** to accept the **<GROUND>** surface (the surface to which you extracted your points) and type **D** at the command line, and **NO** to the Close All prompt.

You will now see the following on screen.



The drawing is getting cluttered, so let's turn off all layers except the **Contours** layer. Go to the **MsTools | Layer Control | Isolate**. Then pick on one of the contours and press **<enter>**.

What you are left with is this:



Erase the polyline we drew for the boundary, as it is no longer needed, because the contours are now drawn and trimmed.

Type **E** enter and pick the boundary polyline, then press enter.

Step 11) Labeling Contours

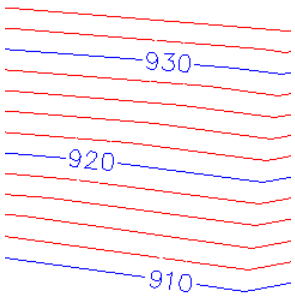
Zoom in on the steep slope in the NW part of the site. To zoom window, press **Z <enter> W <enter>** and specify two corners. (Or, you can use the  button on the left side of the screen to zoom window.)

The black box in the image below shows you where to pick for the Zoom Window command.

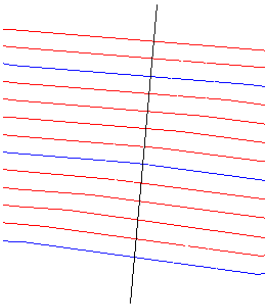
Select **Annotate | Label Contours** from the **MsModeling** pulldown menu. You will be prompted for a text height. You may specify one graphically by clicking on the screen to indicate the text height, or enter a number. In this case a height of 2.5 was used.

Next you will be repeatedly prompted for label locations.
Select label location (Undo/Control):

Click on contours where you would like labels, and the labels will be placed and the contours trimmed as needed.

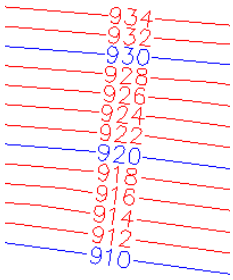


NOTE: To label many contours in a straight row, draw a 3Dpolyline across the contours where you wish to have them labeled.



Then run the Label Contours command again – this time after giving the text height, pick the **CONTROL** option by typing **C** and Enter.

Then by following the prompts, select all the contours to label (be sure to not pick the polyline to be used as control lines to label along). After picking all the contours to be labeled – press enter. Then pick the control polyline and you should see the labels start to draw on the contour lines exactly where the control polyline intersected them. The Control polyline is automatically removed from the drawing.



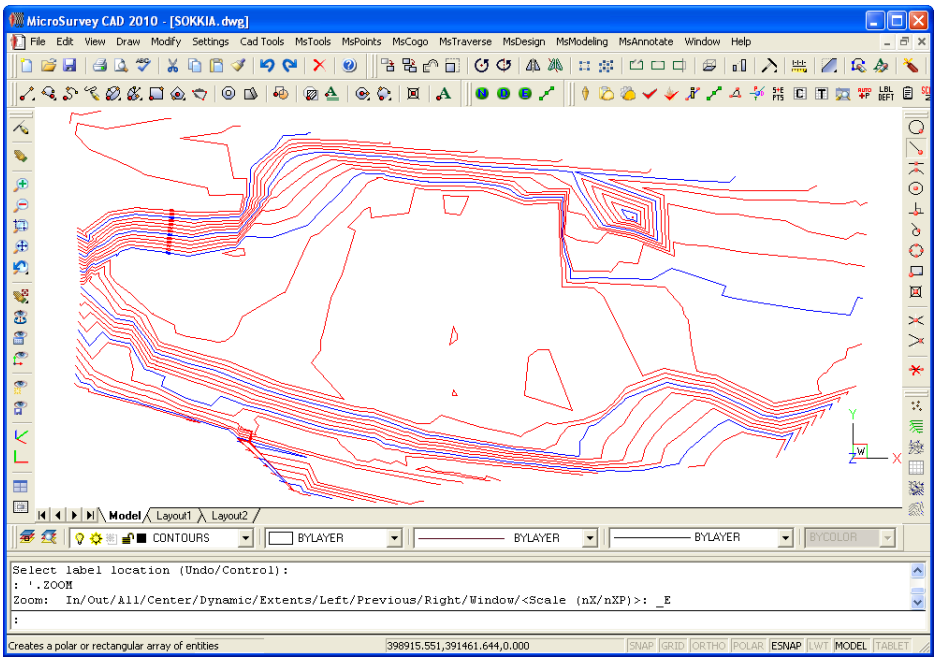
Now lets Zoom to the Extents of the drawing to see everything on screen.

Type **Z <enter>** then **E <enter>,** or pick the  .button.

Now we are going to Smooth the contours. Go to the **MsModeling pulldown menu | Annotate | Smooth Contours**.

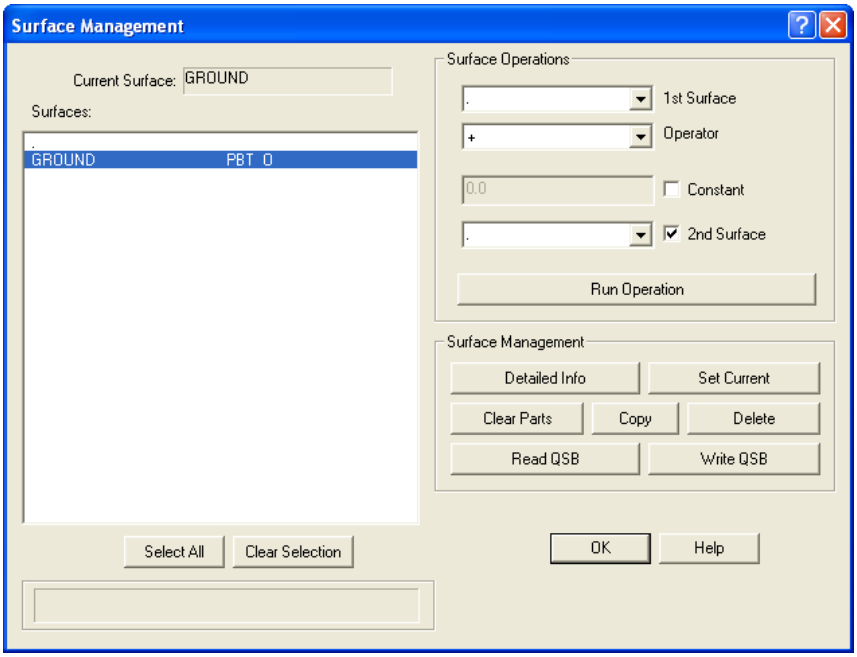
Either pick the contours to smooth or simply press <**enter>** to select them all automatically.

After smoothing your diagram should look like this.



Step 12) Saving Your Work

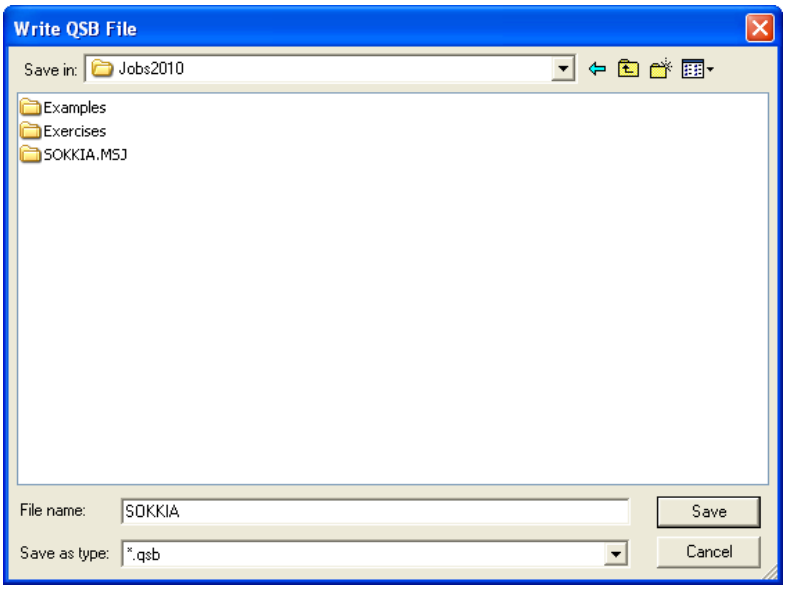
Now save your job by picking the save command on the file menu. You also need to save the surface by going to the **MsModeling pulldown menu | Surface Operations**.



Pick the surface name on the left side of the dialog and then select the **Write QSB button**.

Set the folder to the same location we started the job. Do not place the file in the SOKKIA.MSJ folder. Enter the name SOKKIA and press the **SAVE** button.

This keep the MSZ file quite small as well as making the QSB file available in other jobs, if desired.



Pick the **OK** button on the previous dialog to continue

Go to the File menu and pick on the command SAVE to ensure that the DWG and MSZ files are also saved.

Your drawing and the database are now saved along with the surface file.

You may now exit the program via the **File pulldown menu**.

Simple Traverse Tutorial

Because of the size and complexity of this tutorial we have broken it down into 9 smaller steps to make it easier for you to follow.

Step 1) Starting the Job

Step 2) Setting the Defaults

Step 3) Manual Traverse Entry

Step 4) Start Entering Shots

Step 5) List of Data to Enter

Step 6) Coordinating the Traverse

Step 7) Computing Closure

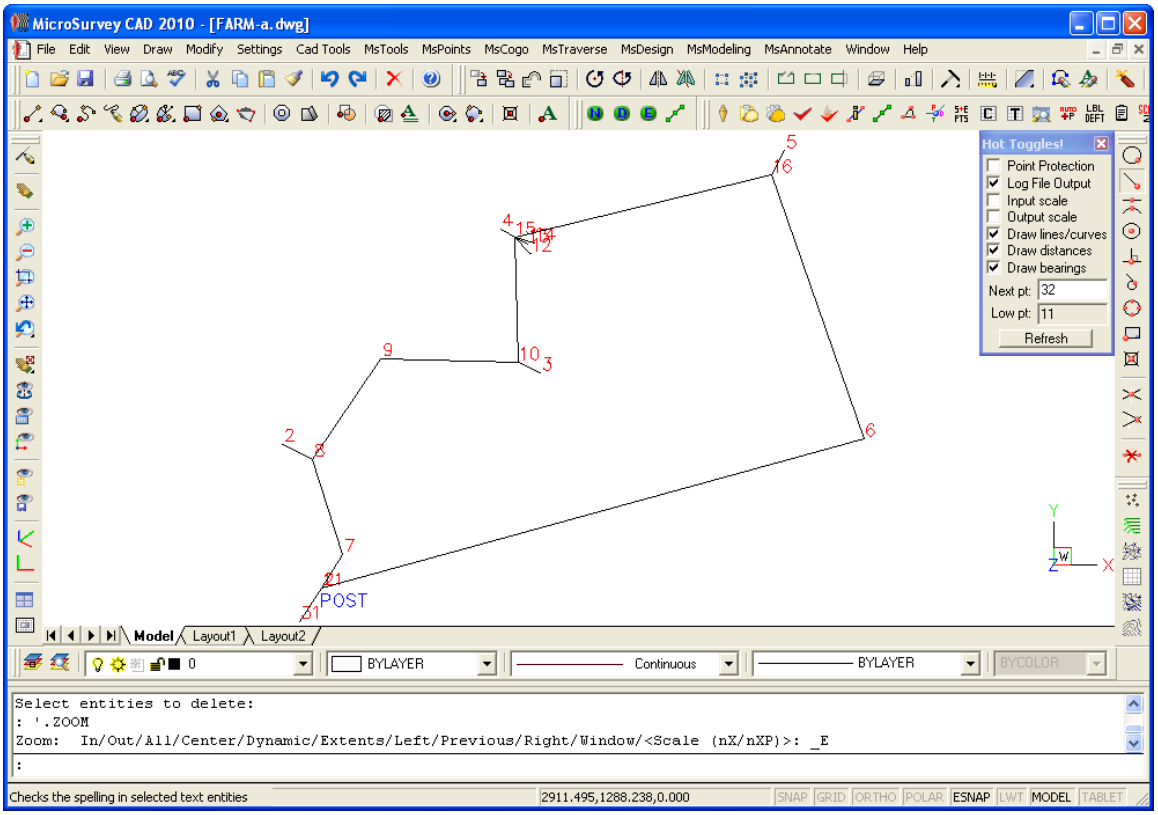
Step 8) Adjust Angles + Compass Balance

Step 9) Listing the Traverse

Step 1) Starting the Job

In this cookbook-style tutorial we will enter a simple 2D traverse around a farm. This traverse was done to locate the corners of the boundary, and to locate a building on the farm.

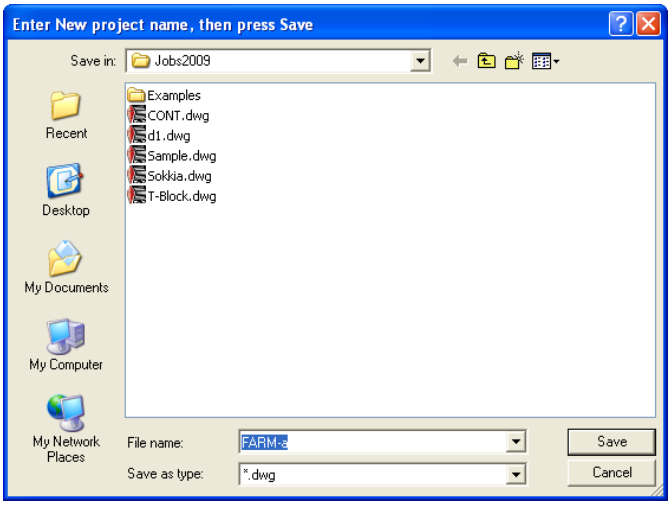
Here is what your finished product will look like.



Overview:
The surveyor began by setting up on one corner of the farm property and assigning a coordinate of North = 1000, East = 1000, Elev = 0, Point number = 1. He then backsighted an iron bar with a known direction of 214 degrees 12 minutes, 15 seconds. Since he could not directly set up on all the bars on the property because of rocks, hedges, and fences, he traversed around the property taking side shots into the corners. On the traverse, he also located three corners of a shed.

To Begin:
To begin, start a new drawing by running the MicroSurvey Project Manager command, found under the **File drop-down menu**.

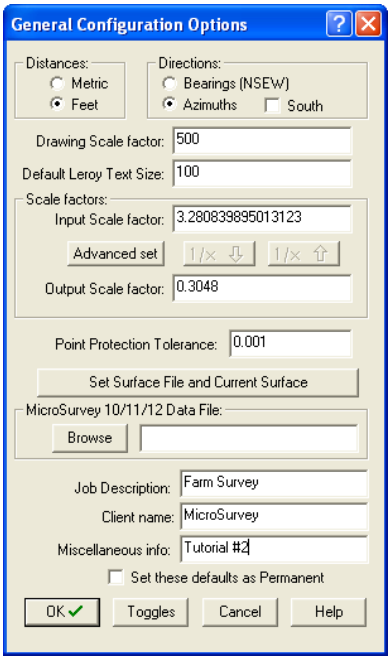
Pick the New button on the Project Manager, and fill in the name of the job and call it **FARM-a**. Then pick **Save** to continue.



Next you will see the General Configuration Options dialog box. Set the scale and other settings as shown below.

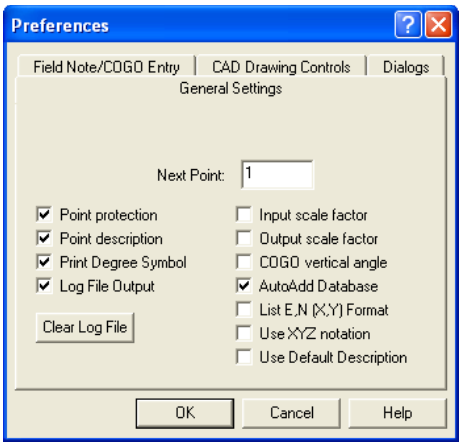
Step 2) Setting the Defaults

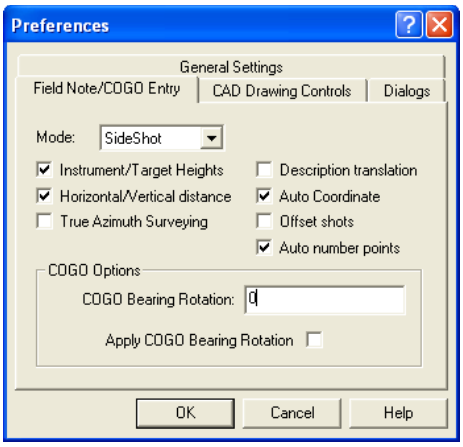
Once the new job opens you will be asked to fill out the following as shown, setting the units to **Feet, Azimuths** and the scale to **1=500'**. Do not pick the OK button yet!

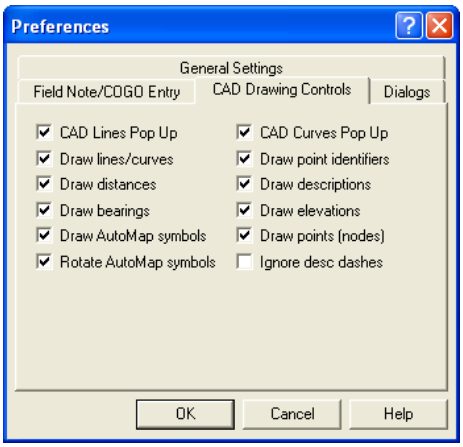


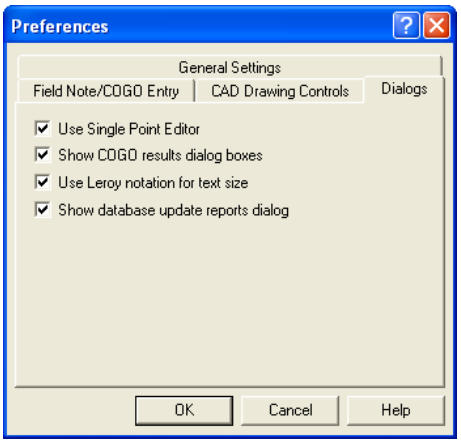
Main Job Defaults dialog box

From the bottom of this dialog box, select the **Toggles** button. Set the System Toggles as shown in the 4 Figures below.





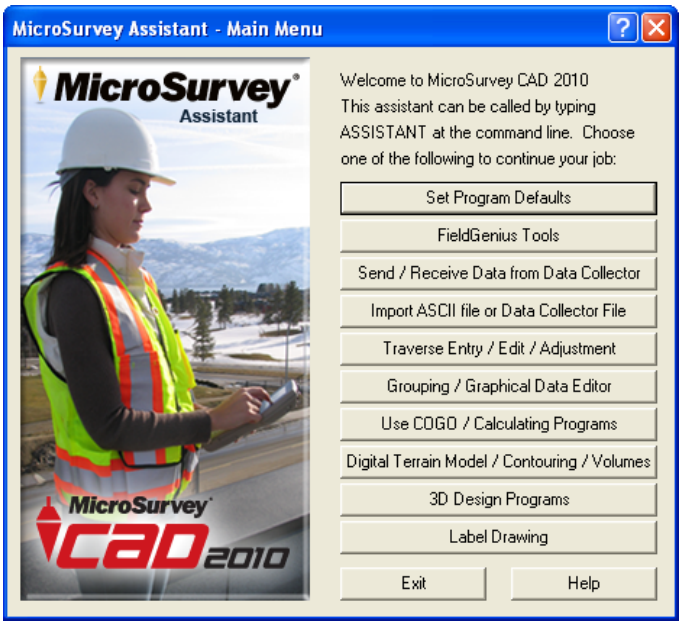




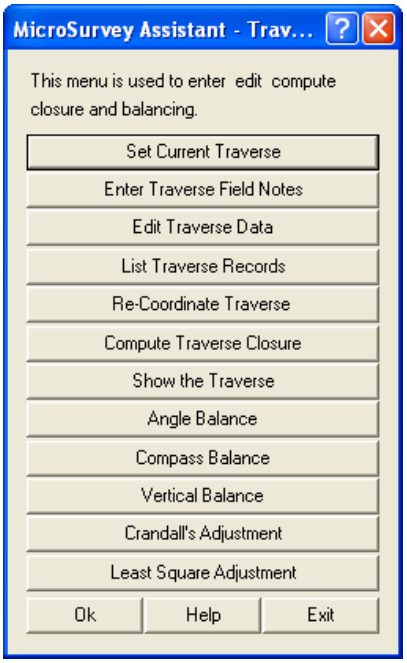
Now press the **OK** button to return to the previous dialog – and press the **OK** button again to continue.

Step 3) Manual Traverse Entry

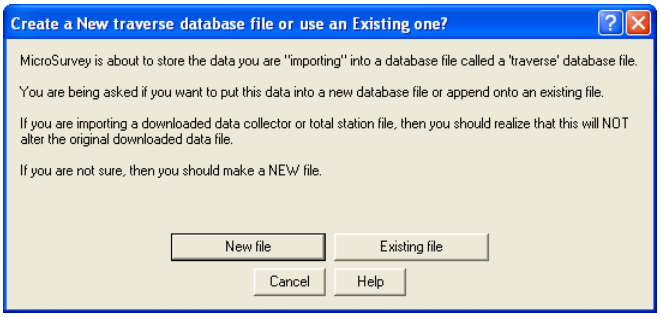
This is what your screen should now look like: (if the Assistant is not on screen then go to the MsTools menu | MicroSurvey Assistant, or type Assistant at the command line and press Enter.



Next, from the Assistant, pick the **Traverse Entry / Edit / Adjustment** button:

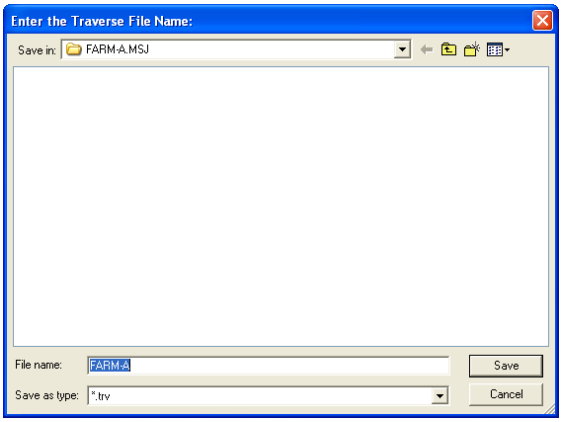


Pick the **Enter Traverse Field Notes** button.

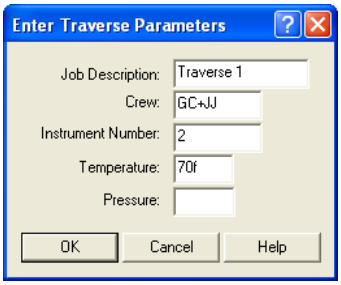


Pick on the **New File** button

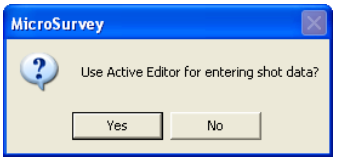
MicroSurvey will respond with a dialog box for you to enter your job name. Enter **FARM-a** in the dialog box as shown below (it may already default to this name):



Pick the **SAVE** button to continue. You will be prompted with a dialog box to fill out with information about the traverse:

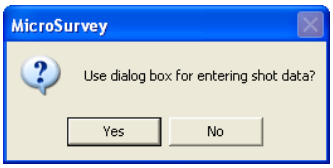


Pick OK and then you will be asked:

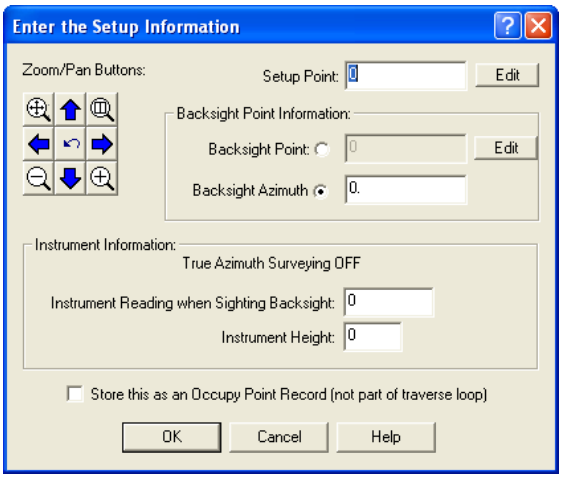


Answer NO, as we will use the normal dialog boxes to enter the traverse.

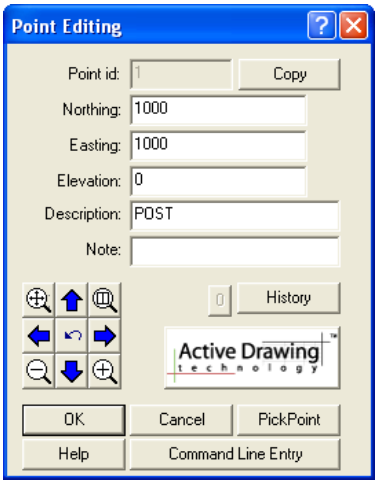
Answer Yes to the following dialog, so we start entering data with dialog boxes:



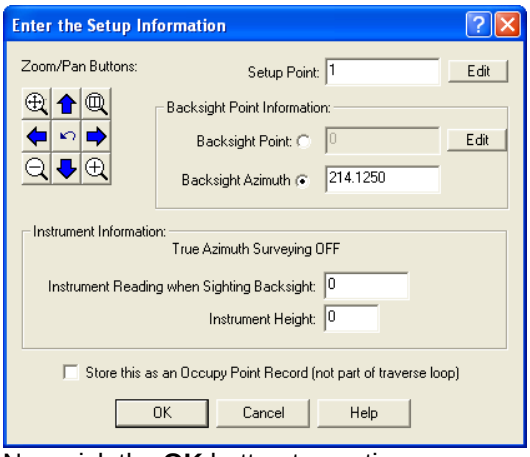
Now you are asked to enter the information for your first setup station, with appropriate backsight information.



We have a Setup Point of 1 with coordinates of N=1000, E=1000, Z=0 so enter the **Setup Point Number** as 1 and then pick the **EDIT** button to the right of the point number. Fill in the new Dialog as shown below and pick OK to finish.
NOTE: Use the TAB key to move between fields:



We have a backsight azimuth of 214 degrees 12 minutes 50 seconds from where we set up, so a backsight azimuth of **214.1250** in the edit box, as shown below: (Leave the other entries as shown)

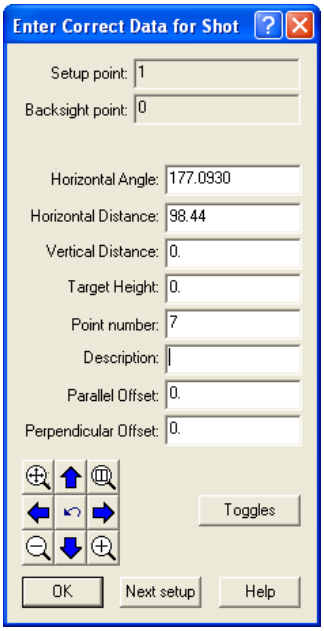


Now pick the **OK** button to continue.

The program will go immediately into the data entry mode.

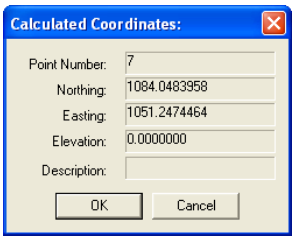
Step 4) Start Entering Shots

Enter the first shot information into the dialog box as shown below.



(If the above dialog asks for Vertical Angles and Slope Distances instead of the Horizontal Distance and Vertical Distance, then you did not set the system toggles correctly. Exit out of the Traverse Entry Mode, change the Toggles to match what was given earlier and start the traverse entry over again)
Pick the **OK** button or press **<enter>** to continue

The program will compute the coordinate and display the information in a dialog box:



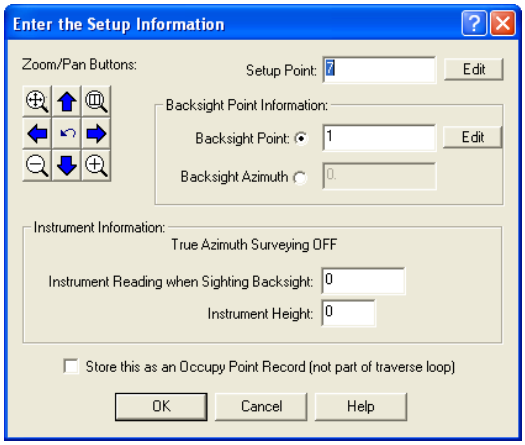
Pick **OK** to accept this information.

MicroSurvey allows you to switch back and forth between entering traverse legs and entering side shots at any time. We will enter the traverse and side shots together.

Rather than fill up this entire manual with screen shots showing the information to type into this tutorial, we are going to list the shots and setup information to enter. (To start a new setup, just pick **Next Setup** or press **Esc** at the **Enter Correct Data For Shot** dialog box. The program will return to the setup dialog box.)

At this point you will be asked for the next side shot to be entered from the same setup. We have no more shots from this setup so we need to traverse forward to the last shot we just finished entering.

Pick the **Next Setup** button or press the **Esc** key on your keyboard to return to the **Enter the Setup Information** dialog box.



Step 5) List of Data to Enter

You will notice it has automatically updated the **setup point number** and the **backsight point number** with the following data:

Set up on Point **7** and backsight **1**.
Pick the **OK** button to accept these values.

Now you can enter the next Shot

Horizontal Angle :**131.0316**
Horizontal Distance :**248.31**
Vertical Distance :**0**
Point Number :**8**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.
Next pick the **Next Setup** button to go back to the setup dialog box.

Set up on Point **8** and backsight **7**.
Pick the **OK** button to accept these values.

Enter the following Shot:

Horizontal Angle :**134.2554**
Horizontal Distance :**83.92**
Vertical Distance :**0**
Point Number :**2**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.
Do **NOT** Pick the **Next Setup** button.

Enter the following Shot:

Horizontal Angle :**231.5652**
Horizontal Distance :**302.5**
Vertical Distance : **0**
Point Number :**9**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.
Next pick the **Next Setup** button to go back to the setup dialog box.

Setup on Point **9** and backsight **8**.
Pick the **OK** button to accept these values.

Enter the following Shot:

Horizontal Angle :**237.1721**
Horizontal Distance :**341.71**
Vertical Distance : **0**
Point Number :**10**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.
Next pick the **Next Setup** button to go back to the setup dialog box.

Setup on Point **10** and backsight **9**.
Pick the **OK** button to accept these values.

Enter the following Shot:

Horizontal Angle :**203.2344**
Horizontal Distance :**60.18**
Vertical Distance : **0**
Point Number :**3**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.
Do **NOT** Pick the **Next Setup** button.

Enter the following Shot:

Horizontal Angle :**86.3210**
Horizontal Distance **:312.35**
Vertical Distance : **0**
Point Number :**15**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.
Next pick the **Next Setup** button to go back to the setup dialog box.

Setup on Point **15** and backsight **10**.
Pick the **OK** button to accept these values.

Enter the following shot:

Horizontal Angle :**123.1746**
Horizontal Distance :**40.19**
Vertical Distance : **0**
Point Number : **4**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.
Do **NOT** Pick the **Next Setup** button.

Enter the following Shot:

Horizontal Angle :**317.1045**
Horizontal Distance :**56.92**
Vertical Distance : **0**
Point Number :**12**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.
Do **NOT** Pick the **Next Setup** button.

Enter the following Shot:

Horizontal Angle :**300.1321**
Horizontal Distance :**38.54**
Vertical Distance : **0**
Point Number :**13**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.
Do **NOT** Pick the **Next Setup** button.

Enter the following Shot:

Horizontal Angle :**287.3017**
Horizontal Distance :**51.68**
Vertical Distance : **0**
Point Number :**14**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.

Do **NOT** Pick the **Next Setup** button.

Enter the following Shot:

Horizontal Angle :**258.1506**
Horizontal Distance :**658.78**
Vertical Distance : **0**
Point Number :**16**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.

Next pick the **Next Setup** button to go back to the setup dialog box.

Set up on Point **16** and backsight **15**.
Pick the **OK** button to accept these values.

Enter the following Shot:

Horizontal Angle :**131.4731**
Horizontal Distance :**69.42**
Vertical Distance : **0**
Point Number :**5**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.
Do **NOT** Pick the **Next Setup** button.

Enter the following Shot:

Horizontal Angle :**264.1350**
Horizontal Distance :**695.37**
Vertical Distance : **0**
Point Number : **6**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.

Next pick the **Next Setup** button to go back to the setup dialog box.

Setup on Point **6** and backsight **16**, and
Pick the **OK** button to accept these values.

Enter the following Shot that is back to the original setup point:

Horizontal Angle :**273.5655**
Horizontal Distance :**1399.37**
Vertical Distance : **0**
Point Number :**21**
Description :

Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.

Next pick the **Next Setup** button to go back to the setup dialog box.

Setup on Point **21** and backsight **6**.

Pick the **OK** button to accept these values.

Now take the final shot to the closing foresight point. This is the starting backsight point.

Horizontal Angle :**139.3500**
Horizontal Distance :**100**
Vertical Distance : **0**
Point Number :**31**
Description :

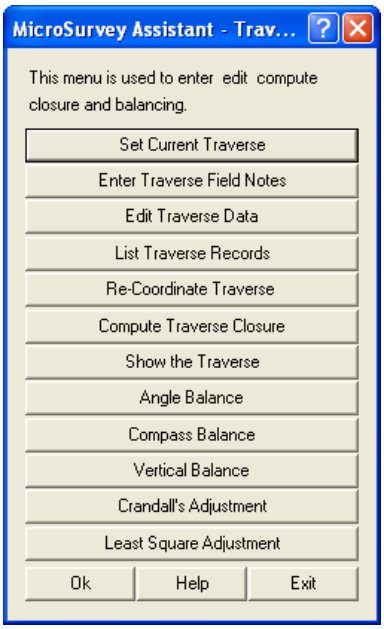
Pick the **OK** button to continue. Press the **OK** button to accept the calculated coordinate.

Next pick the **Next Setup** button to go back to the setup dialog box.

This concludes the survey data entry. You can exit by picking the **CANCEL** button.

Step 6) Coordinating the Traverse

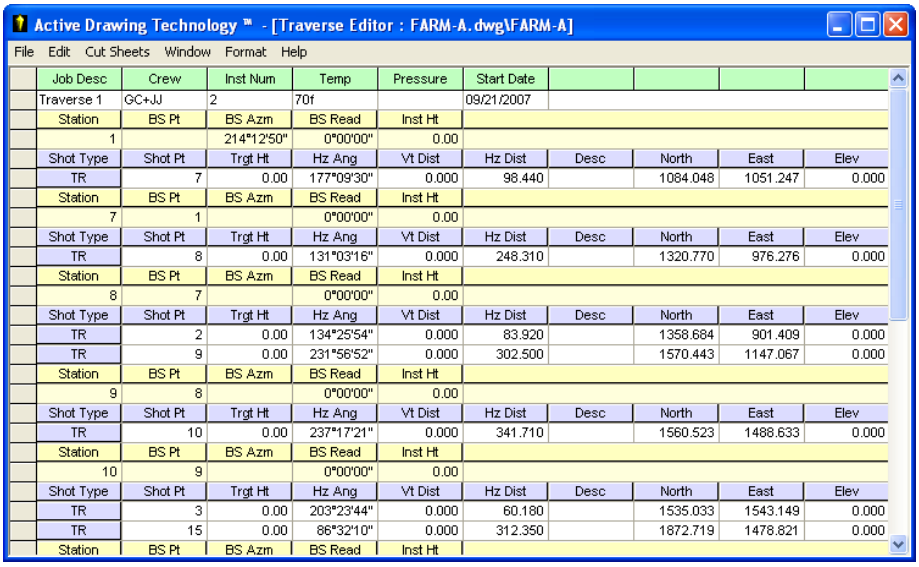
You should be back to the assistant menu shown below:



We are going to Edit your Traverse Data to ensure you have not made any mistakes in entry

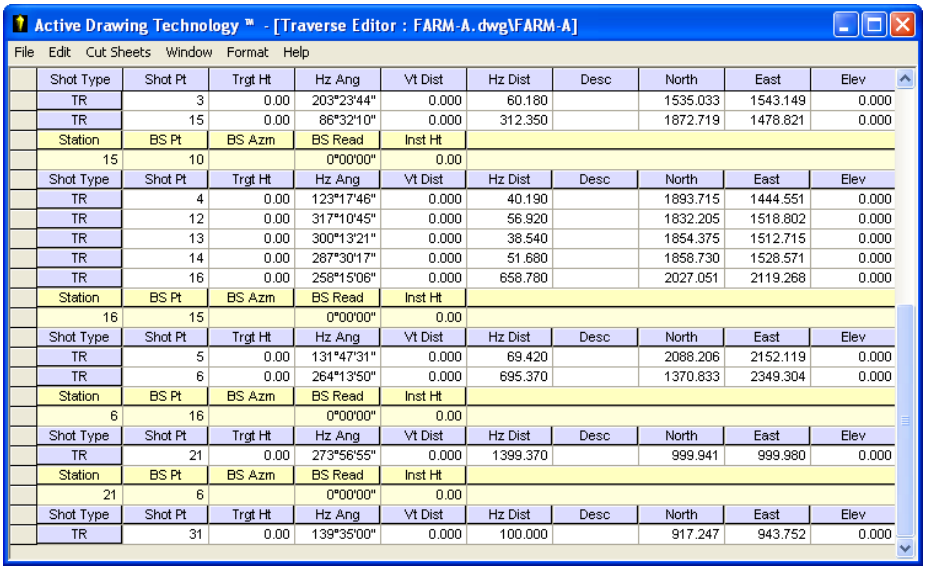
Pick on the **Edit Traverse Data** button.

You will see the following Summary:



Job Desc	Crew	Inst Num	Temp	Pressure	Start Date				
Traverse 1	GC+JJ	2	70f		09/21/2007				
Station	BS Pt	BS Azm	BS Read	Inst Ht					
1		214°12'50"	0°00'00"	0.00					
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	North	East	Elev
TR	7	0.00	177°09'30"	0.000	98.440		1084.048	1051.247	0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht					
7	1		0°00'00"	0.00					
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	North	East	Elev
TR	8	0.00	131°03'16"	0.000	248.310		1320.770	976.276	0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht					
8	7		0°00'00"	0.00					
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	North	East	Elev
TR	2	0.00	134°25'54"	0.000	83.920		1358.684	901.409	0.000
TR	9	0.00	231°56'52"	0.000	302.500		1570.443	1147.067	0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht					
9	8		0°00'00"	0.00					
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	North	East	Elev
TR	10	0.00	237°17'21"	0.000	341.710		1560.523	1488.633	0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht					
10	9		0°00'00"	0.00					
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	North	East	Elev
TR	3	0.00	203°23'44"	0.000	60.180		1535.033	1543.149	0.000
TR	15	0.00	86°32'10"	0.000	312.350		1872.719	1478.821	0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht					

Close the Assistant dialog that appeared on top of the window.
Scroll down using the bar on the right to see the rest of the listing as shown below:

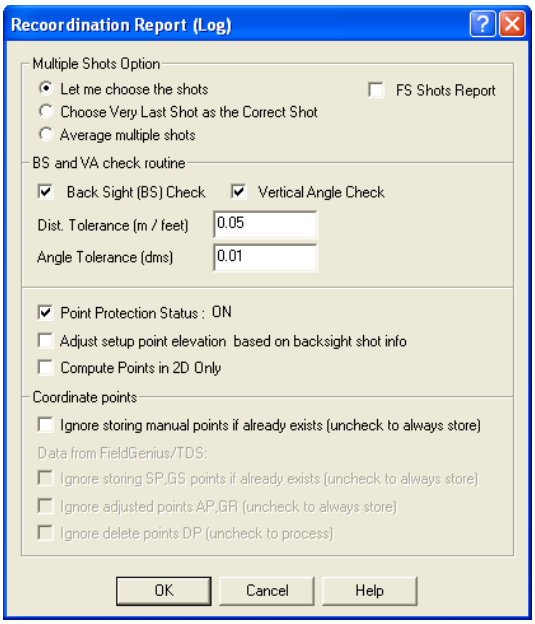


Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	North	East	Elev
TR	3	0.00	203°23'44"	0.000	60.180		1535.033	1543.149	0.000
TR	15	0.00	86°32'10"	0.000	312.350		1872.719	1478.821	0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht					
15	10		0°00'00"	0.00					
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	North	East	Elev
TR	4	0.00	123°17'46"	0.000	40.190		1893.715	1444.551	0.000
TR	12	0.00	317°10'45"	0.000	56.920		1832.205	1518.802	0.000
TR	13	0.00	300°13'21"	0.000	38.540		1854.375	1512.715	0.000
TR	14	0.00	287°30'17"	0.000	51.680		1858.730	1528.571	0.000
TR	16	0.00	258°15'06"	0.000	658.780		2027.051	2119.268	0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht					
16	15		0°00'00"	0.00					
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	North	East	Elev
TR	5	0.00	131°47'31"	0.000	69.420		2088.206	2152.119	0.000
TR	6	0.00	264°13'50"	0.000	695.370		1370.833	2349.304	0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht					
6	16		0°00'00"	0.00					
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	North	East	Elev
TR	21	0.00	273°56'55"	0.000	1399.370		999.941	999.980	0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht					
21	6		0°00'00"	0.00					
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	North	East	Elev
TR	31	0.00	139°35'00"	0.000	100.000		917.247	943.752	0.000

(If you do have errors then you can edit the entry and make the correction now.)

Select Re-coordinate Traverse from the Edit Menu on the Active Drawing Editor. Or you can type Ctrl-R if the editor window is current.

You will be given the option of creating a Re-coordination Report or Log. Accept the defaults as shown and pick OK.

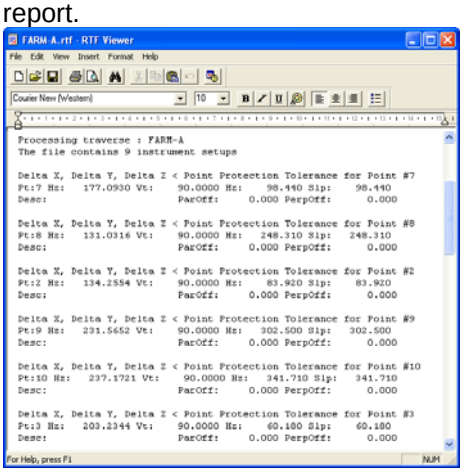


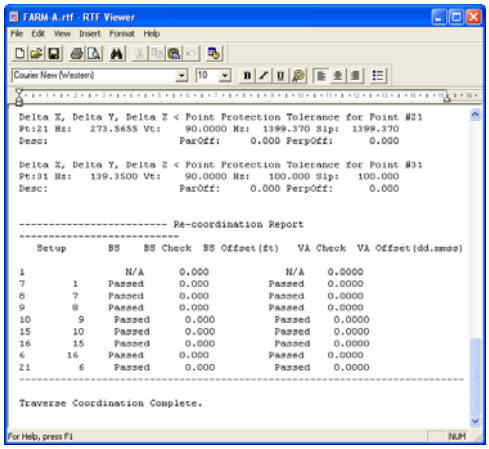
After the traverse has been coordinated you will be returned to the Assistant. Pick the **EXIT** button to leave the Assistant.

You can also close the Active Traverse Dialog, at his point.

Next go to the **MsTools | Print / Edit / View Reports | View Log File** command**:**

You will see the following Window appear. You can scroll up and down in it to see the entire report.



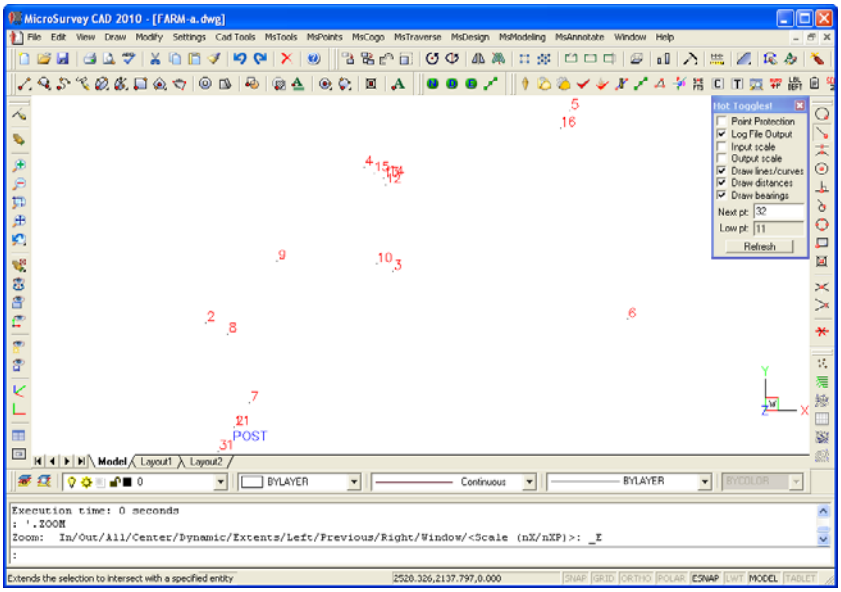


You may print this report now by going to the **File** pulldown menu on this window, and pick the **Print** command.

Pick the **X** in the top right of the window to close it.

Pick the Zoom Extents Button on the right of the screen, 

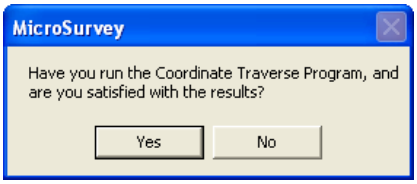
Now your screen should look like this:



Save the project by entering the **SAVE** command.

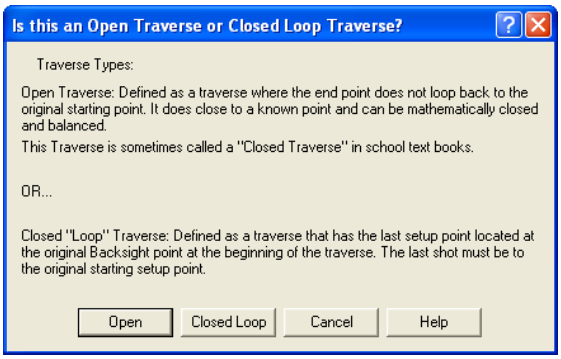
Step 7) Computing Closure

Now we will compute the closure error. Select the **ASSISTANT** from the MS Main Control toolbar  (or MicroSurvey Assistant from the MsTools menu), then pick **the Traverse Entry /Edit/ Adjustment** button. Then pick the **Compute Traverse Closure** button. You will be asked:



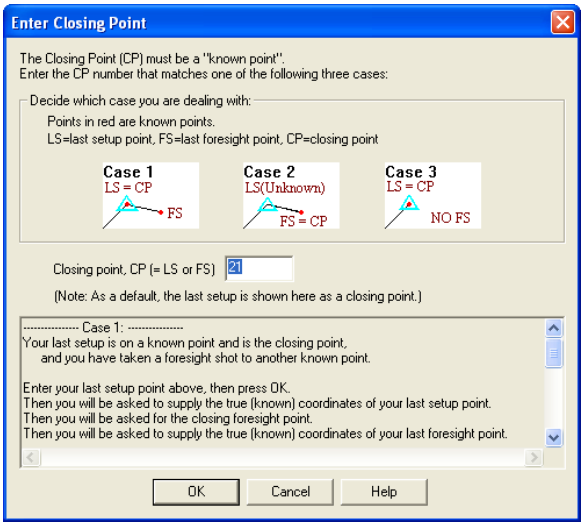
Pick the **YES** button to continue.

Now you will be asked if you have a **Closed Loop** or **Open** traverse.



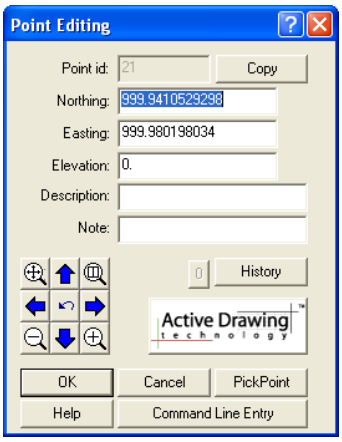
Select **Open** Traverse, because we have an external backsight and closing foresight on this traverse.

MicroSurvey quickly analyzes the traverse and finds the last instrument setup point number. It offers this as the closing point number: Our traverse matches the first of the 3 scenarios presented:



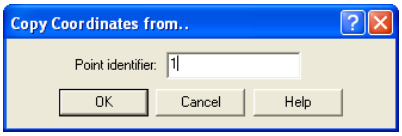
Pick the **OK** button to continue.

You will be shown the calculated coordinates of point 21:



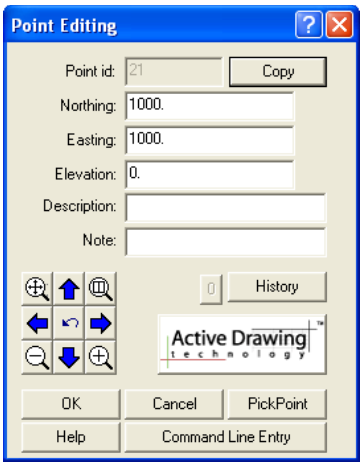
You must change these to reflect the true coordinates of point 21.
To make this easy for you pick on the button marked **Copy.**

This brings up another dialog that allows you to enter in the point number that has the correct coordinates for point 21.



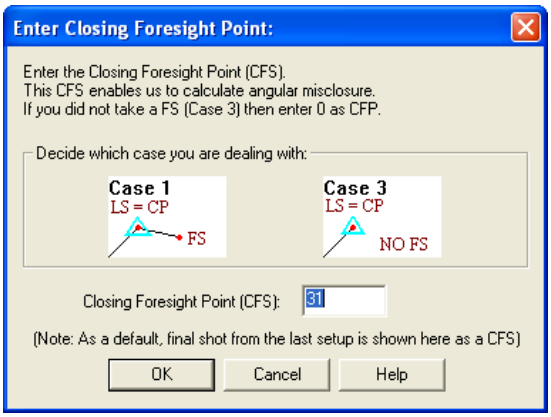
21 is the same point as 1 so enter point number 1 and Pick **OK** to return to the previous dialog.

It will now look like this:



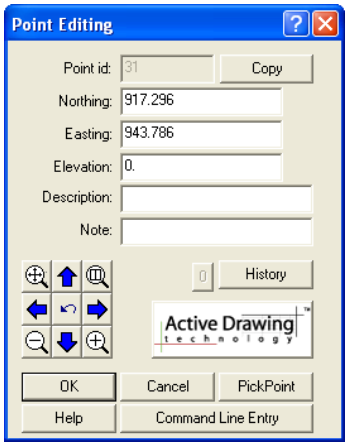
Pick the **OK** button to continue.

Enter Closing Foresight Point 31, as shown below:



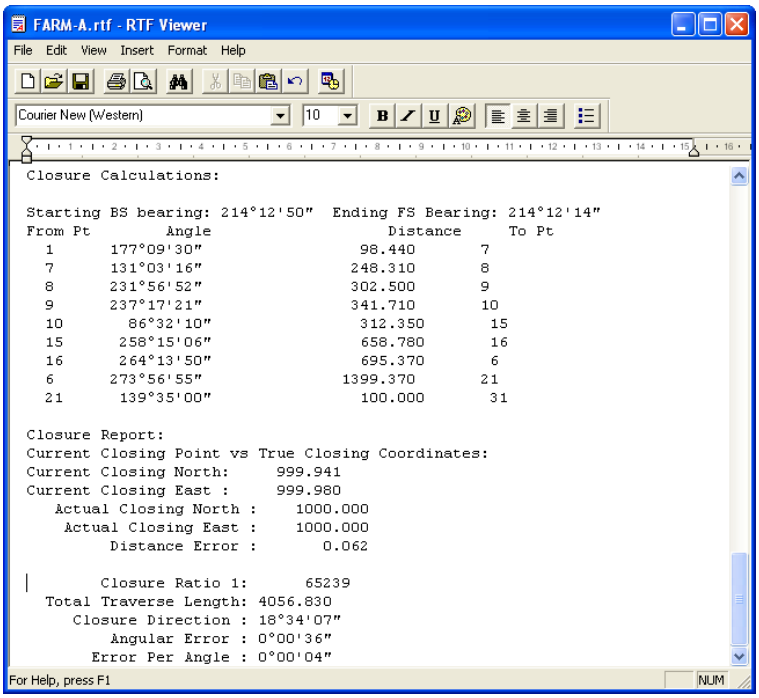
Pick the **OK** button to continue.

You are asked for the actual coordinates of point 31. The numbers shown are the calculated values. Enter in the following **KNOWN** values, as shown:



Pick the **OK** button to continue and the Traverse Closure Report will be generated on the Command Window.

Then pick the **EXIT** button on the Assistant.



Open the View Log (you can also open this with a button on the Ms Main Control Toolbar) and then scroll down using the slide bar on the right, until you see the following. (Remember you can print this by going to the **File** pulldown menu on the Log Window and run the **Print** command.)

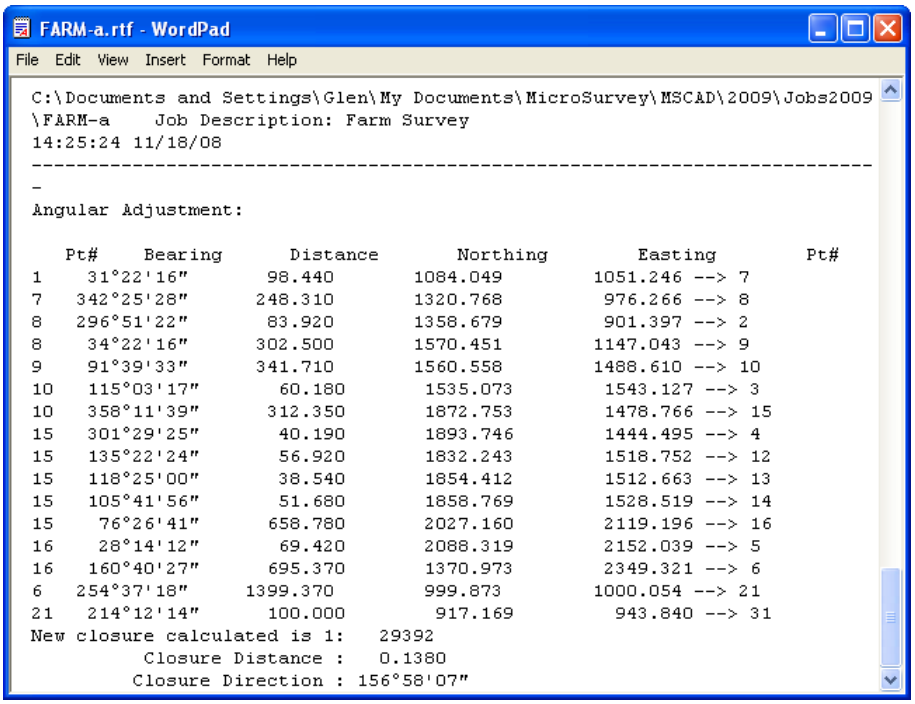
Pick the **X** in the top right corner of the window to close it.

Step 8) Adjust Angles + Compass Balance

We are now going to do an Angular Balance on this traverse. First, turn the Point Protection toggle off using the Hot Toggles.

Then go to the **MsTraverse drop-down menu | Traverse Calculations** and pick on the **Angle Balance** option.

The angles on this traverse will be balanced. The closure will be recomputed and displayed. Pick on the **ViewLOG** button again and scroll down to the bottom to see the results shown here.

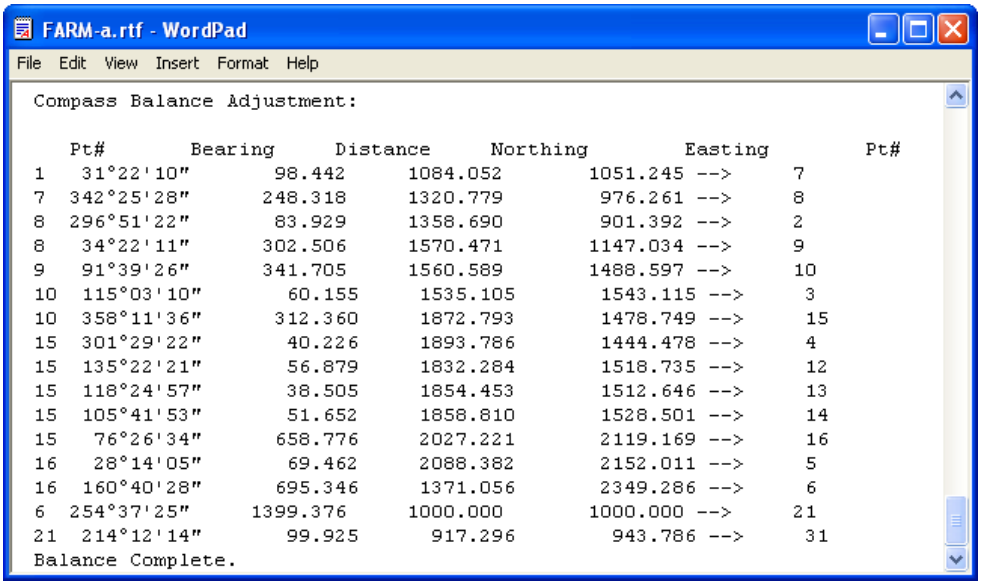


Pick the **X** in the top right corner of the window to close it.

Next you can perform a compass balance by going to the **MsTraverse drop-down menu | Traverse Calculations** and pick on the **Compass Method Adjustment** option.

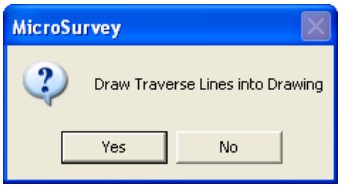
The traverse will be balanced according to the Compass Rule. The coordinates for the main traverse and any side shots will be adjusted.

Now Pick on the **ViewLOG** button again and scroll down to the bottom to see the results shown here.

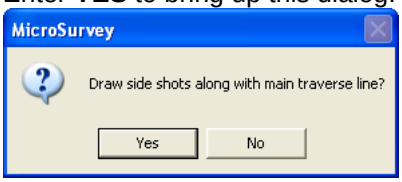


Pick the **X** in the top right corner of the window to close it.

Now lets see the traverse on the screen. to the **MsTraverse drop-down menu | Traverse Entry/Editing** and pick on the **Show Traverse Graphically** option.



Answer NO if you wish to see the linework temporarily until a redraw command cleans up the screen. Answer **YES** if you wish to draw every line into the drawing permanently (with the toggles and labeling defaults controlling their appearance).
Enter **YES** to bring up this dialog:

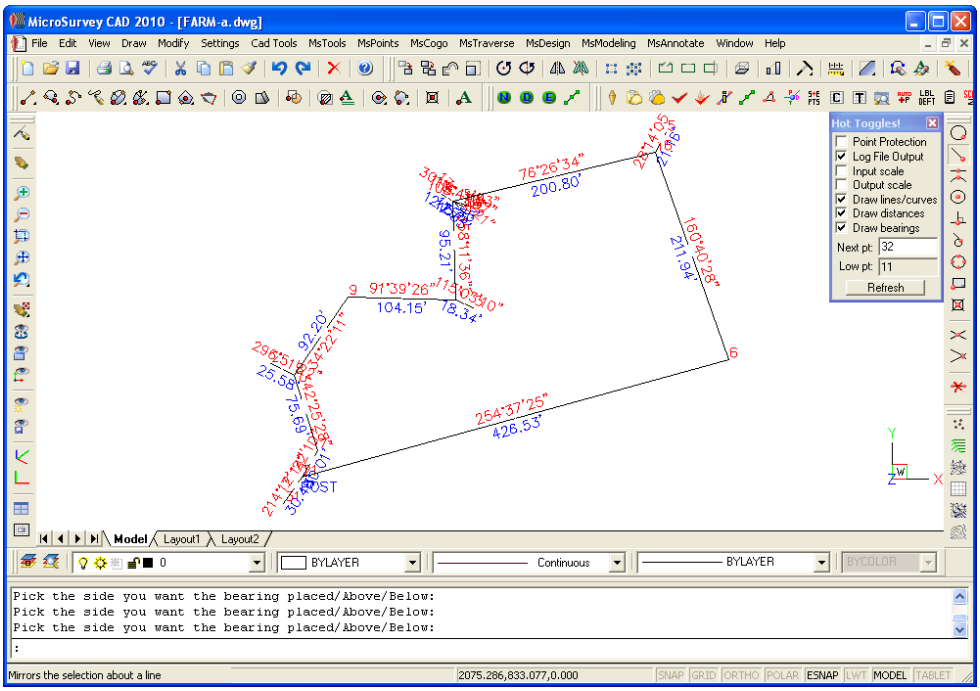


Enter **YES** to draw all lines.

With your Hot Toggles set as shown below, you will be asked:

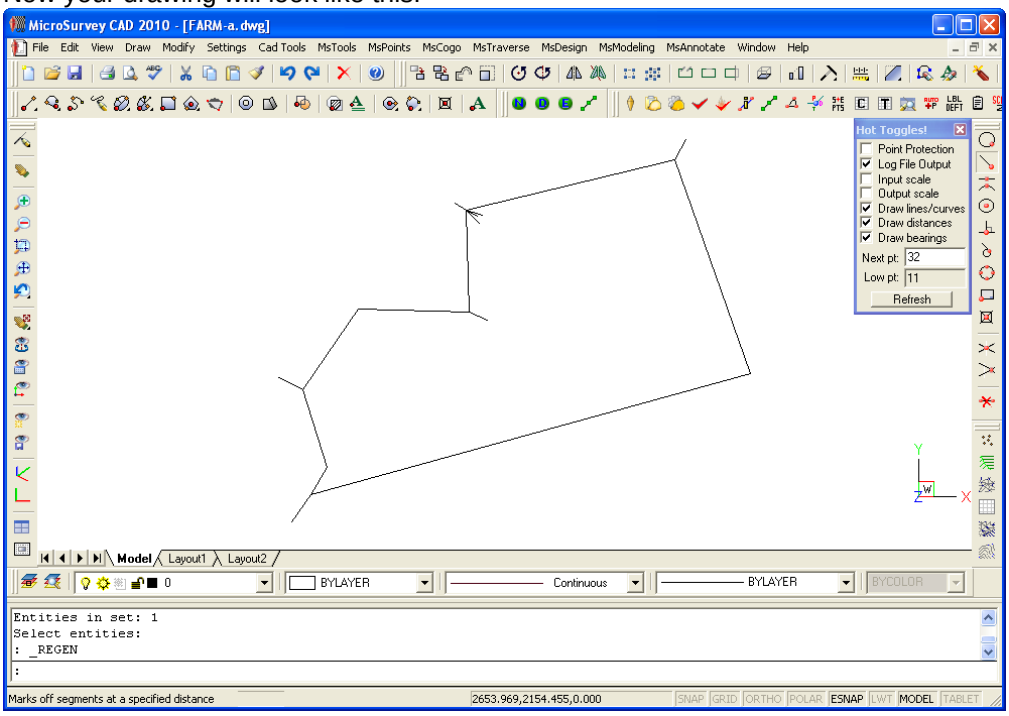
Pick the side you want the bearing placed/Above/Below: <enter>

Press Enter on each prompt and you will get a drawing like this:



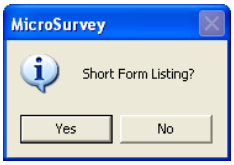
You can isolate the line work layer only, by going to the MsTools menu | Layer Control | Isolate, and then pick on one of the lines only. This will leave you will a cleaner looking drawing, with the rest of the information on the other layers being frozen for you.

Now your drawing will look like this:



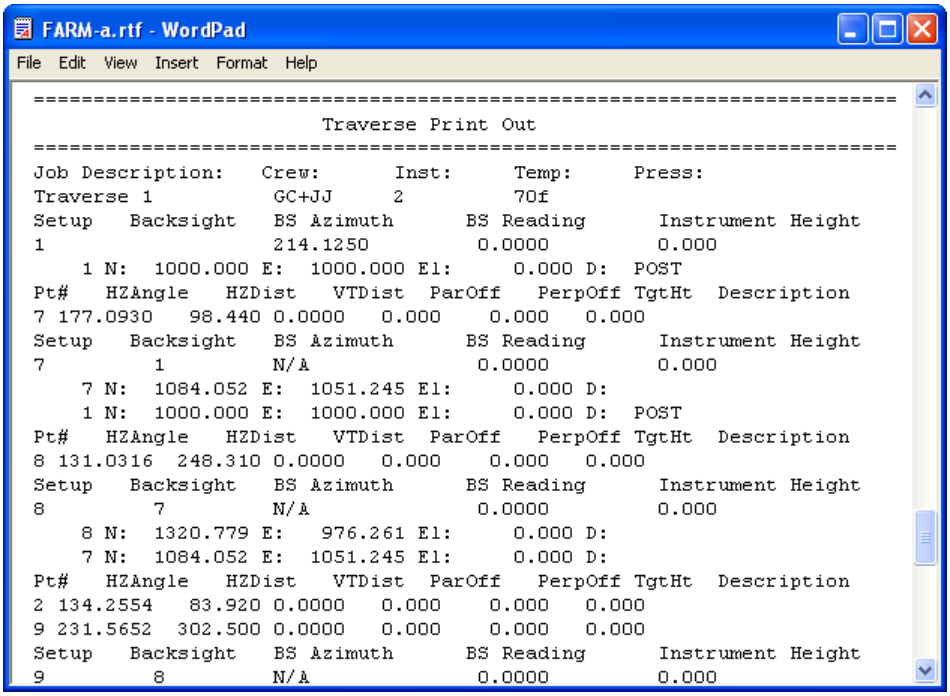
Step 9) Listing the Traverse

Finally, we will dump a listing of the traverse to the Log file. Go to the **MsTraverse** menu **| Traverse Entry/Editing** and pick on the **List Traverse File** option.
There are two formats of the listing: long and short.



Pick **YES** for the Short Listing.

Now Pick on the **ViewLOG** button again and scroll down to the bottom to see the results shown here.

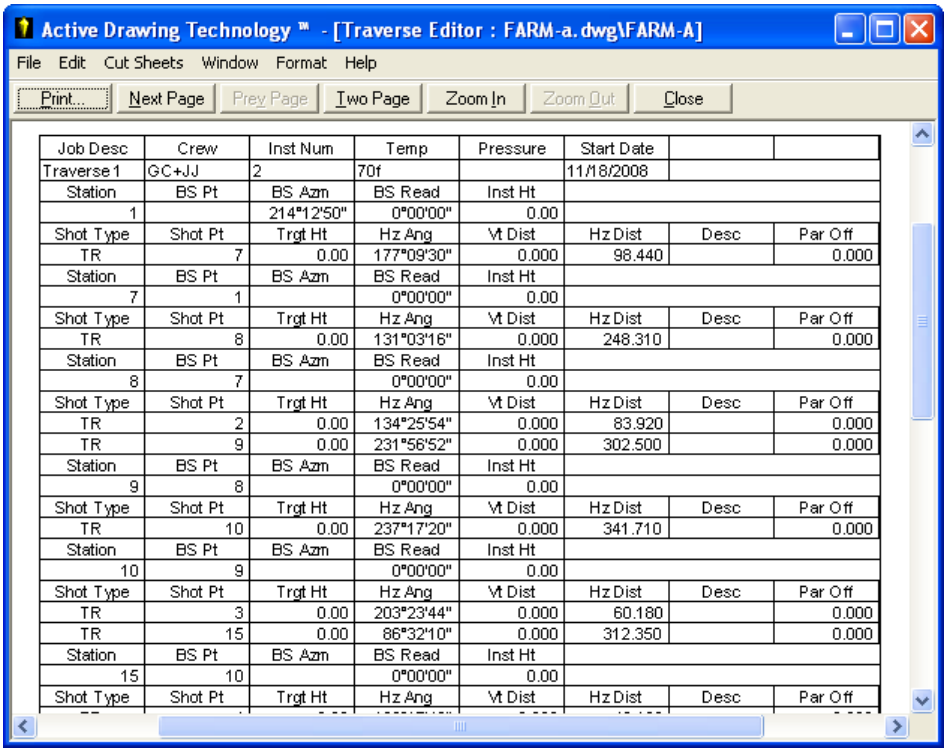


Keep scrolling to see the entire listing.

(Remember you can print this by going to the **File** pulldown menu and picking on the **Print** command.) Pick the **X** in the top right corner of the window to close it.

The new Active Drawing Technology Editor offers formatted listings of much higher quality than ever available before. To start the ADT editor, run the **Active Traverse Editor** command found in the **MsTraverse menu**.

The following is a print preview from the File menu of the Editor:



Job Desc	Crew	Inst Num	Temp	Pressure	Start Date		
Traverse1	GC+JJ	2	70f		11/18/2008		
Station	BS Pt	BS Azm	BS Read	Inst Ht			
1		214°12'50"	0°00'00"	0.00			
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	Par Off
TR	7	0.00	177°09'30"	0.000	98.440		0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht			
7	1		0°00'00"	0.00			
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	Par Off
TR	8	0.00	131°03'16"	0.000	248.310		0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht			
8	7		0°00'00"	0.00			
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	Par Off
TR	2	0.00	134°25'54"	0.000	83.920		0.000
TR	9	0.00	231°56'52"	0.000	302.500		0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht			
9	8		0°00'00"	0.00			
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	Par Off
TR	10	0.00	237°17'20"	0.000	341.710		0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht			
10	9		0°00'00"	0.00			
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	Par Off
TR	3	0.00	203°23'44"	0.000	60.180		0.000
TR	15	0.00	86°32'10"	0.000	312.350		0.000
Station	BS Pt	BS Azm	BS Read	Inst Ht			
15	10		0°00'00"	0.00			
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Dist	Hz Dist	Desc	Par Off

Exit the dialog.

Go to the File menu and pick on the command SAVE to ensure that the DWG and MSZ files are saved, and then you can exit the program.

(End of tutorial)

Property Line Tutorial

Because of the size and complexity of this tutorial we have broken it down into 15 smaller steps to make it easier for you to follow.

Step 1) Starting the Job

Step 2) COGO Calcs (Property Boundaries)

Step 3) Distance/Distance Intersection

Step 4) 3 Point Curve

Step 5) More COGO

Step 6) Bearing/Distance Intersection

Step 7) And More COGO

Step 8) COGO One More Time

Step 9) More 3 Point Curves

Step 10) Setting the Toggles

Step 11) Locating the Buildings (Using OFFSETS)

Step 12) Work on the SHED

Step 13) Line Inverse

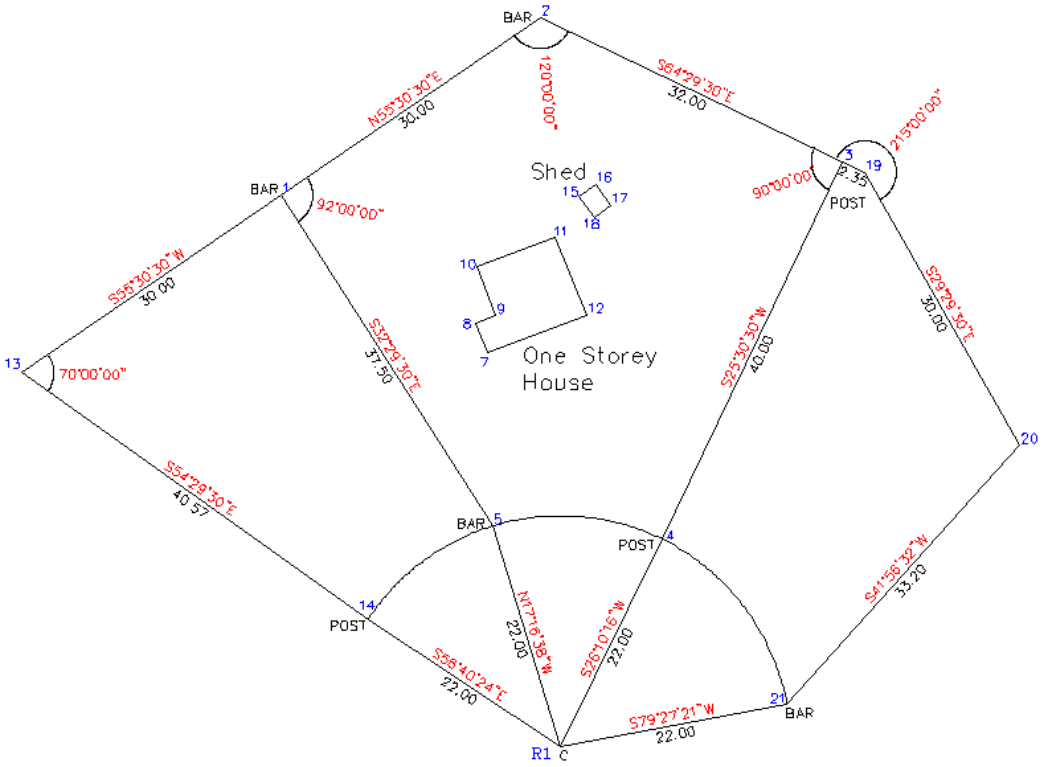
Step 14) Job Complete

Step 15) Batch COGO Completed

Step 1) Starting the Job

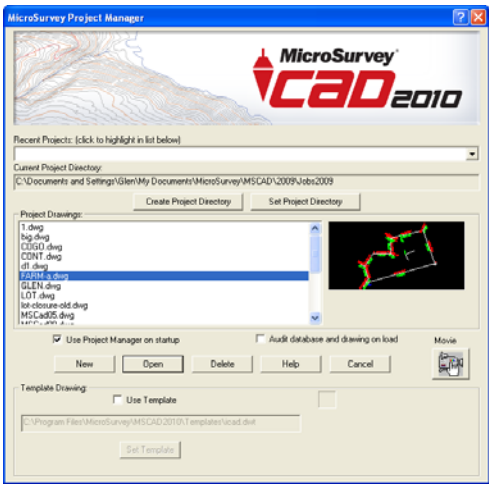
In this tutorial, we will be using COGO Only, to calculate a drawing of three adjacent properties with a house and shed on the center property. During this tutorial, we will record our entry into the new **Active Batch Cogo System**.

The figure below illustrates some of the field notes taken by a survey party to give you a feeling for what you are entering. You do not need to keep this diagram open as the following steps will walk you through entry of the data.

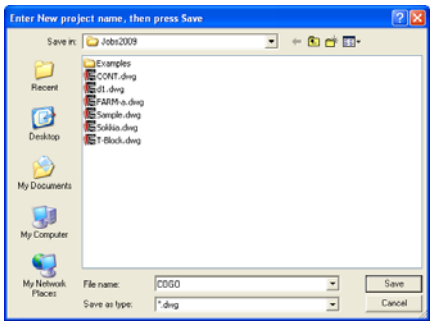


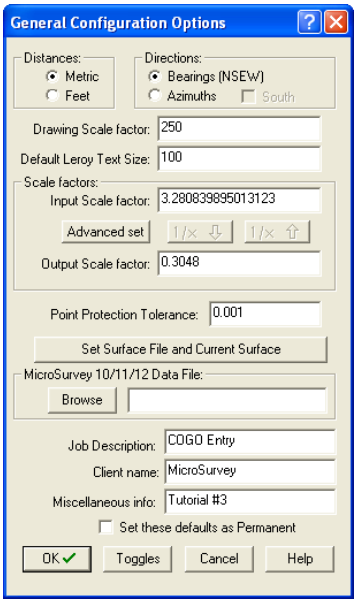
Property field notes

To begin, start a new drawing by running the MicroSurvey Project Manager command, found under the **File drop-down menu**.



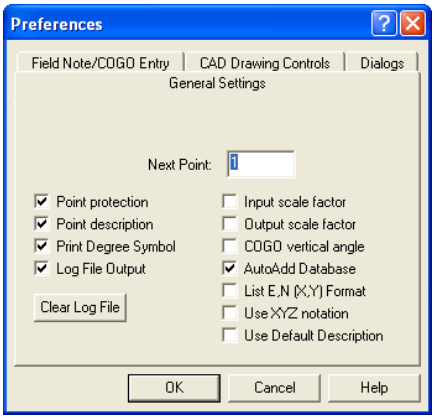
Pick the New button in the MicroSurvey Project Manager, and name the project **COGO**. Then pick **Save** to continue.

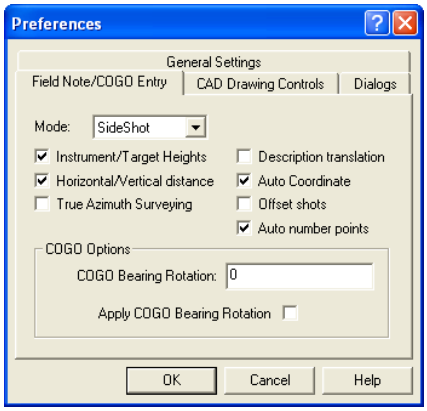


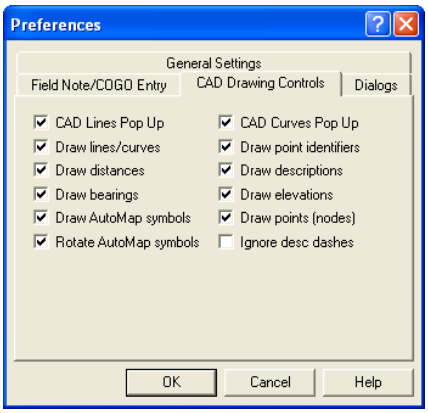


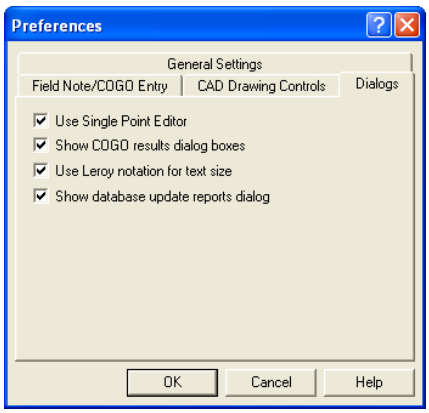
Set the MicroSurvey General Configuration Options to **Metric, Bearings** with a scale factor of **1:250**. This scale is chosen so the bearings and distances will be clear in MicroSurvey.

Using the same procedure as the Traverse tutorial, set up the MicroSurvey system toggles as shown.





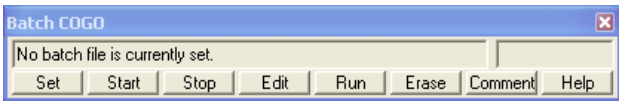




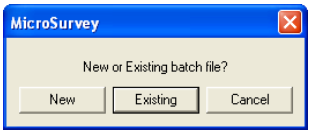
If the Assistant appears on screen, pick the EXIT button to remove it.

Step 2) COGO Calcs (Property Boundaries)

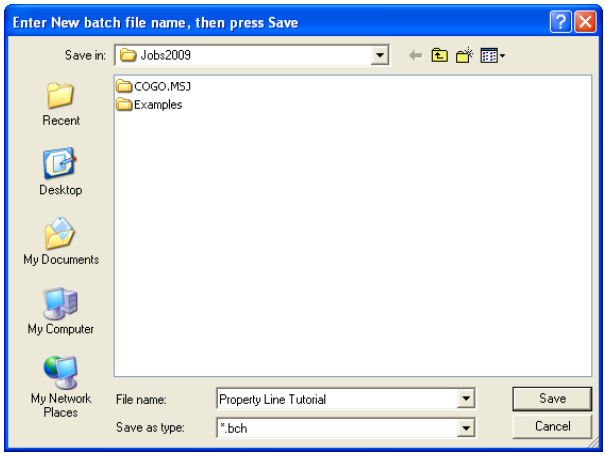
Before we start performing COGO calculations, turn on the Batch COGO recording control by typing: **MS_BATCH** or select it from the **MsCogo | Active Batch COGO | Load Control Dialog**. The following dialog should appear



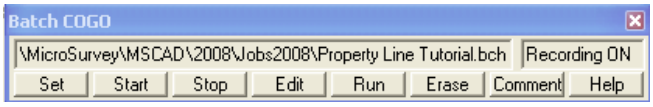
Pick the **Set** button and choose **New**:



You will be prompted to enter a batch file name. **Enter "Property Line Tutorial" and press Save**.



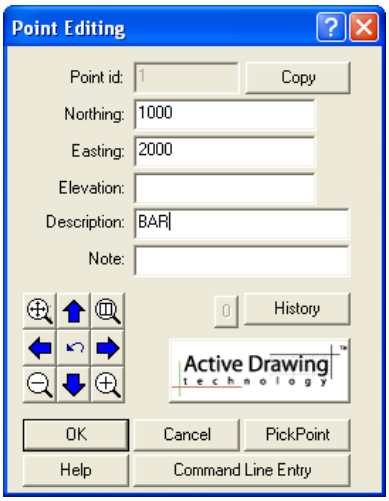
Now, **Pick the Start button**, and the dialog should show Recording ON.



To begin calculating the property boundaries, Type COGO at the MicroSurvey command prompt. Respond as shown to these prompts:

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
(RECORDING) Enter From Point: <1>(Backup/Toggles/Curve/CB/CS/CF): **1 <enter>**
That coordinate is not in the file. Please enter it now.

Fill out the dialog as shown (be sure to use the mouse or the TAB key to move between fields in the dialog)



Pick the **OK** button to continue.

Because point #1 did not exist, MicroSurvey automatically asked you to define its location. Then it assumed you were starting from point 1 and asked you for the bearing next.

Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **155.3030 <enter>**
-->Bearing used = N55°30'30"E
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **30 <enter>**
-->Distance used = 30.000000
Pick or Enter the Solve Point: <2>(Backup Toggles): **2 <enter>**
Enter Description:<>: **BAR <enter>**
1 N55°30'30"E dist= 30.000 N= 1016.989 E= 2024.726 2
Bearing input=155.3030 Distance Input=30
Pick the side you want the bearing placed/Above/Below:**A <enter>**

The bearing you just entered can be read as: First Quadrant (1), Fifty-five degrees, Thirty minutes, Thirty seconds, or N 55° 30’30" E.

At this point pick the Zoom Extents button  **on the left side menu so we can see the info already entered on screen**

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
(RECORDING) Enter From Point: <2>(Backup/Toggles/Curve/CB/CS/CF): **<enter>**
Options: +/- or Pt..Pt+-Angle

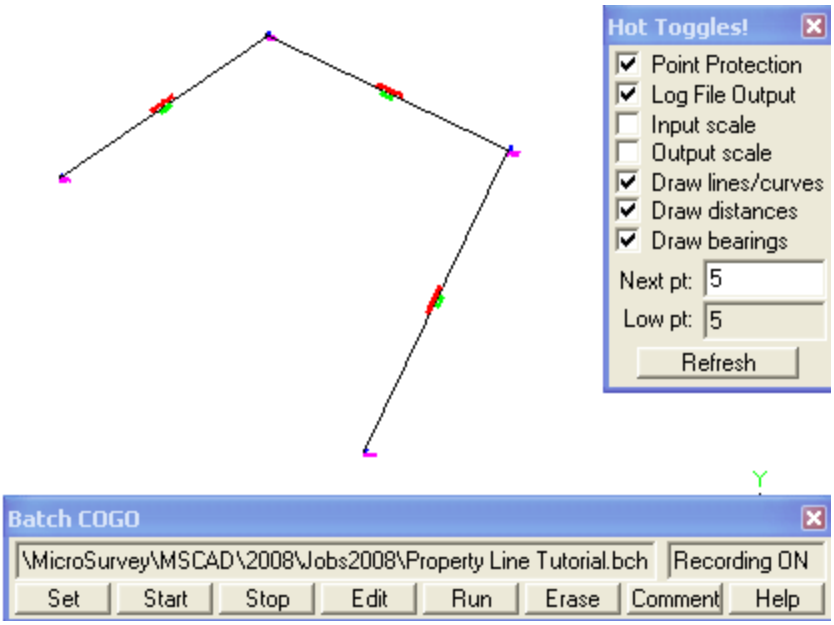
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **2..1-120 <enter>**
-->Bearing used = S64°29'30"E
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **32 <enter>**
-->Distance used = 32.000000
Pick or Enter the Solve Point: <3>(Backup Toggles): **<enter>**
Enter Description:<>: **POST <enter>**
2 S64°29'30"E dist= 32.000 N= 1003.208 E= 2053.607 3
Bearing input=2..1-120 Distance Input=32
Pick the side you want the bearing placed/Above/Below:**A <enter>**

By replying to ENTER BEARING with **"2..1-120"**, you told MicroSurvey to take the bearing from point 2 to point 1 and turn a counterclockwise angle of 120 degrees. Now let's continue…

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
(RECORDING) Enter From Point: <3>(Backup/Toggles/Curve/CB/CS/CF): **<enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **2..3+90 <enter>**
-->Bearing used = S25°30'30"W
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **40 <enter>**
-->Distance used = 40.000000
Pick or Enter the Solve Point: <4>(Backup Toggles): **<enter>**
Enter Description:<POST>: **<enter>**
3 S25°30'30"W dist= 40.000 N= 967.107 E= 2036.381 4
Bearing input=2..3+90 Distance Input=40
Pick the side you want the bearing placed/Above/Below: **<enter>**

Pick the Zoom Extents button from the View toolbar: 

At this point the screen should look something like this:



Rather than continuing from point 4, we are going to jump back to point 1 and started a new calculation:

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
(RECORDING) Enter From Point: <4>(Backup/Toggles/Curve/CB/CS/CF): **1 <enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **1..2+92 <enter>**
-->Bearing used = S32°29'30"E
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **37.5 <enter>**
-->Distance used = 37.500000
Pick or Enter the Solve Point: <5>(Backup Toggles): **5 <enter>**
Enter Description:<BAR>: **<enter>**
1 S32°29'30"E dist= 37.500 N= 968.370 E= 2020.144 5
Bearing input=1..2+92 Distance Input=37.5
Pick the side you want the bearing placed/Above/Below: **<enter>**

Step 3) Distance/Distance Intersection

Next is a DISTANCE - DISTANCE calculation so we can establish the center point of the curve at the front of the property.

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
(RECORDING) Enter From Point: <5>(Backup/Toggles/Curve/CB/CS/CF): **4 <enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **<enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **22 <enter>**
-->Distance used = 22.000000
Pick or Enter the Solve Point: <6>(Backup Toggles): **R1 <enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter Distance2: <>:(Backup Toggles Points Line): **22 <enter>**
-->Distance used = 22.000000
Pick or Enter the To Point: <5>:(Backup Toggles): **5 <enter>**
Point :119126896 North : 947.363 East : 2026.678
Do you want to use this solution (Y/N) (N for other solution) **y <enter>**
4 S26°10'16"W dist= 22.000 N= 947.363 E= 2026.678 R1
Enter Description:<BAR>: **C <enter>**
Pick the side you want the bearing placed/Above/Below: **<enter>**
6 N17°16'38"W dist= 22.000 N= 968.370 E= 2020.144 5
Pick the side you want the bearing placed/Above/Below: **<enter>**
Point :119126896 North : 947.363 East : 2026.678
Distance1 input=22 Distance2 input=22

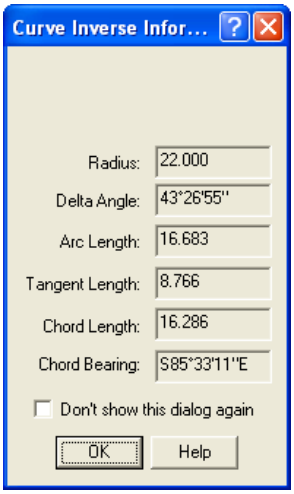
Pick the zoom extent button  to see the entire drawing.

Note that no special commands were required to do the DISTANCE - DISTANCE calculation; MicroSurvey knew to do this when you replied to a bearing prompt with the **<enter>** key. This logic is followed for all intersection calculations. Since this calculation yields two possible solutions, you were offered the opportunity to use the "other" solution. Generally MicroSurvey works in a clockwise manner, so the first solution offered is usually the clockwise solution.

Step 4) 3 Point Curve

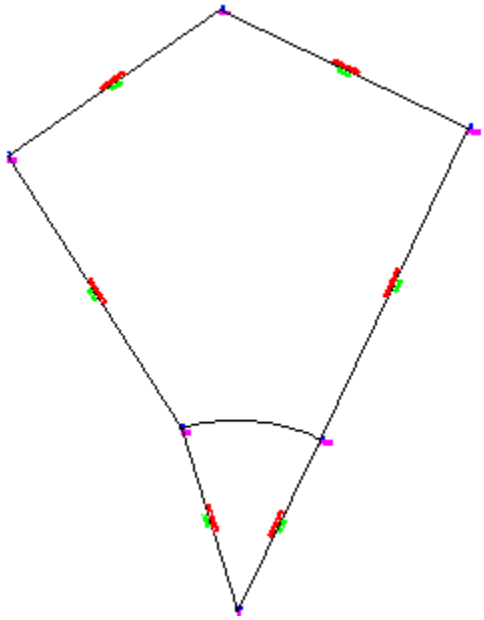
Now we do a 3 point inverse to draw the curve and get the curve information:

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <R1>(Backup/Toggles/Curve/CB): **5..R1..4 <enter>**
Arc: 16.683 Chord: 16.286 Tangent: 8.766 Delta: 43.2655 Radius: 22.000



By entering three numbers as shown above, you told MicroSurvey to compute an angle clockwise from point 5 to point 4 with point R1 as the center of curvature.

You should see this now:



Step 5) More COGO

Enter From Point: <R1>(Backup/Toggles/Curve/CB): **1 <enter>**
Options: +/- or Pt..Pt+-Angle

Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **2..1 <enter>**
-->Bearing used = S55°30'30"W
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **2..1 <enter>**
-->Distance used = 30.000000
Pick or Enter the Solve Point: <6>(Backup Toggles): **13 <enter>**
Enter Description:<C>: **POST <enter>**
1 S55°30'30"W dist= 30.000 N= 983.011 E= 1975.274 13
Bearing input=2..1 Distance Input=2..1
Pick the side you want the bearing placed/Above/Below:**a <enter>**

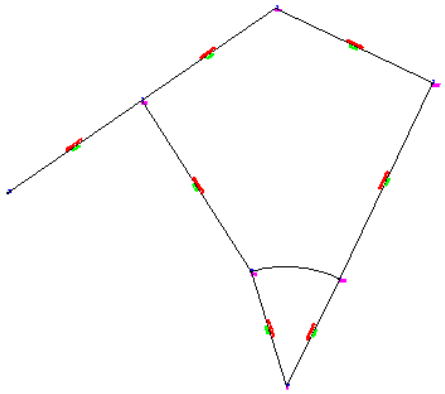
Entering the distance as "2..1" tells MicroSurvey to use the distance from point 2 to point 1, or 30 meters in this case.

Step 6) Bearing/Distance Intersection

Next we want to do a BEARING - DISTANCE calculation from point 13 and point R1. Again, we will get two possible solutions and this time the "other" solution will be the one we want.

Pick the zoom extent button  to see the entire drawing.

At this point your drawing should look like this:



Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <13>(Backup/Toggles/Curve/CB): **<enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **13..1+70 <enter>**
-->Bearing used = S54°29'30"E
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **<enter>**
Pick or Enter the Solve Point: <14>(Backup Toggles): **<enter>**
Options: Pt..Pt+-Angle
Enter Quadrant Bearing #2 like QDD.MMSS: <>:(Backup Toggles Points Line): **<enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter Distance2: <>:(Backup Toggles Points Line): **22 <enter>**
-->Distance used = 22.000000
Pick or Enter the To Point: <14>:(Backup Toggles): **R1 <enter>**
Point :119126896 North : 933.912 East : 2044.087
Do you want to use this solution (Y/N) (N for other solution) **n <enter>**
Point :119126896 North : 959.450 East : 2010.296
Do you want to use this solution (Y/N) (N for other solution) **y <enter>**
13 S54°29'30"E dist= 40.566 N= 959.450 E= 2010.296 14
Enter Description:<>: **POST <enter>**
Pick the side you want the bearing placed/Above/Below: **<enter>**

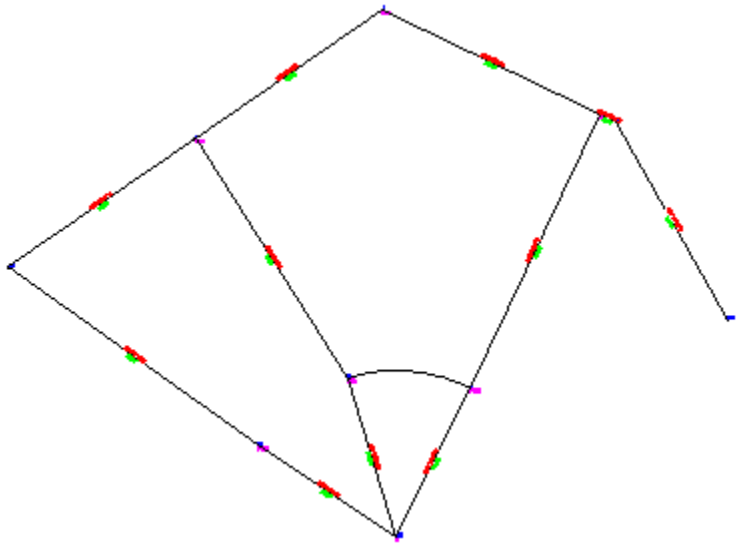
14 S56°40'24"E dist= 22.000 N= 947.363 E= 2026.678 R1
Pick the side you want the bearing placed/Above/Below: **<enter>**
Bearing input=13..1+70 Distance input=22

Step 7) And More COGO

Now we calculate point 19:

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <14>(Backup/Toggles/Curve/CB): **3 <enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **2..3 <enter>**
-->Bearing used = S64°29'30"E
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **2.35 <enter>**
-->Distance used = 2.350000
Pick or Enter the Solve Point: <6>(Backup Toggles): **19 <enter>**
Enter Description:<POST>: **POST <enter>**
3 S64°29'30"E dist= 2.350 N= 1002.196 E= 2055.728 19
Bearing input=2..3 Distance Input=2.35
Pick the side you want the bearing placed/Above/Below: **<enter>**
Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <19>(Backup/Toggles/Curve/CB): **<enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **229.2930 <enter>**
-->Bearing used = S29°29'30"E
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **1..2 <enter>**
-->Distance used = 30.000000
Pick or Enter the Solve Point: <6>(Backup Toggles): **20 <enter>**
Enter Description:<BAR>: **<enter>**
19 S29°29'30"E dist= 30.000 N= 976.083 E= 2070.497 20
Bearing input=229.2930 Distance Input=1..2
Pick the side you want the bearing placed/Above/Below: **<enter>**

Here is what should be on your screen, so far!

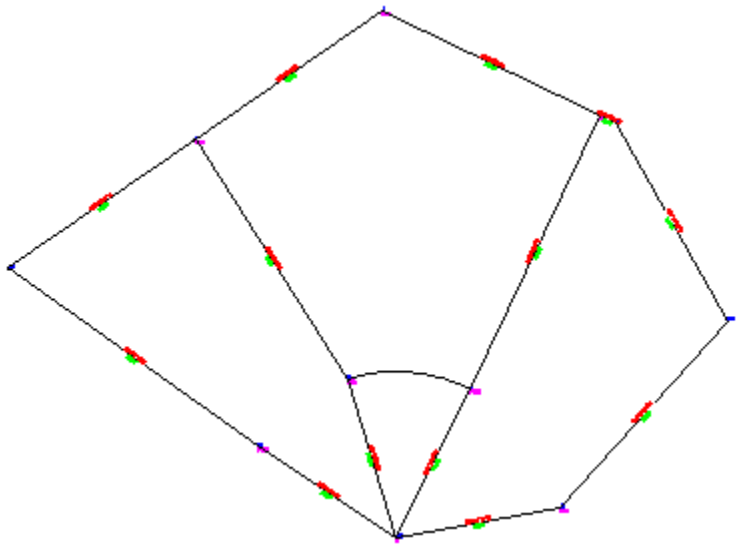


Step 8) COGO One More Time

Now we will calculate Point 21 using a Distance-Distance Intersection. Take the second distance from the points on the drawing by entering a two point inverse:

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <20>(Backup/Toggles/Curve/CB): **<enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **<enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **33.2 <enter>**
-->Distance used = 33.200000
Pick or Enter the Solve Point: <21>(Backup Toggles): **<enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter Distance2: <>:(Backup Toggles Points Line): **4..R1 <enter>**
-->Distance used = 22.000000
Pick or Enter the To Point: <21>:(Backup Toggles): **R1 <enter>**
Point :119126896 North : 951.388 East : 2048.307
Do you want to use this solution (Y/N) (N for other solution) **Y <enter>**
20 S41°56'32"W dist= 33.200 N= 951.388 E= 2048.307 21
Enter Description:<>: **BAR <enter>**
Pick the side you want the bearing placed/Above/Below: **<enter>**
21 S79°27'21"W dist= 22.000 N= 947.363 E= 2026.678 R1
Pick the side you want the bearing placed/Above/Below: **<enter>**
Point :119126896 North : 951.388 East : 2048.307
Distance1 input=33.2 Distance2 input=4..R1

Here is what should be on your screen, so far!

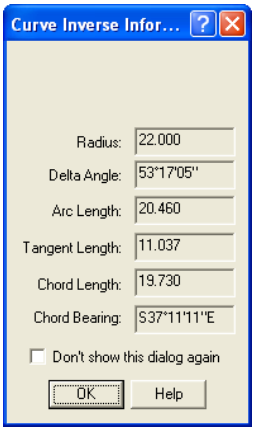


Step 9) More 3 Point Curves

Next we do a 3 point inverse to draw the curve between points 4 and 21 and get the curve information:

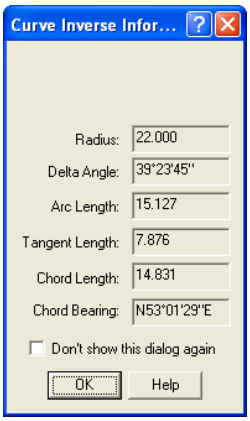
Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <21>(Backup/Toggles/Curve/CB): **4..R1..21 <enter>**

Arc: 20.460 Chord: 19.730 Tangent: 11.037 Delta: 53.1705 Radius: 22.000



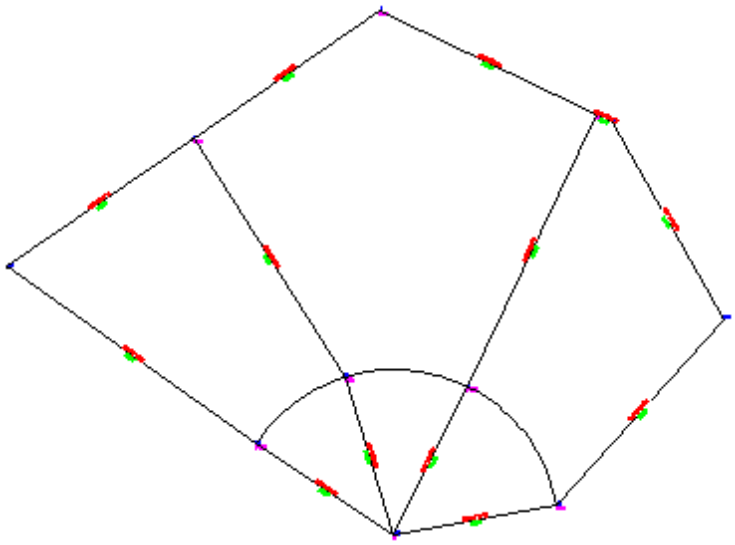
And the last curve can be calculated between points 14 and 5.

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <21>(Backup/Toggles/Curve/CB): **14..R1..5 <enter>**
Arc: 15.127 Chord: 14.831 Tangent: 7.876 Delta: 39.2345 Radius: 22.000



Step 10) Setting the Toggles

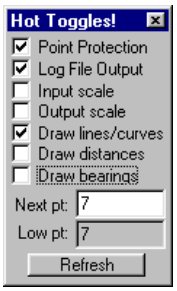
At this point your job should look like this:



Now we will use the Hot Toggles dialog to change the toggles so that MicroSurvey will not draw bearings and distances on the sides of the house and shed.

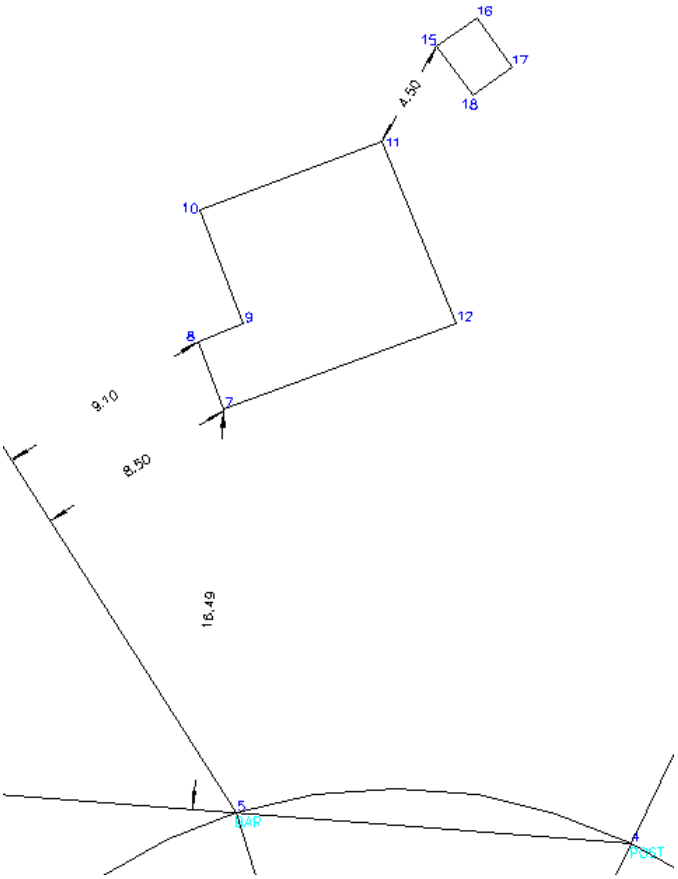
Click the **Draw Bearings** toggle.
Click the **Draw Distances** toggle.

The Hot Toggles dialog should now look like this:



Step 11) Locating the Buildings (Using OFFSETS)

Now we will locate the house and shed on the center property. The figure below shows these structures in expanded detail as defined by the field notes.



We begin locating the structures with a BEARING - BEARING intersection with OFFSETS. The bearings are taken from the lines by doing two point inverses. The offset distances are entered by

using a % sign. Long ago one of our customers said they always write their field notes with o/s to signify offsets so they recommend we use the % sign. It works…

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <21>(Backup/Toggles/Curve/CB): **5 <enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **5..1%8.5 <enter>**
-->offset1 used = 8.500000
-->Bearing used = N32°29'30"W
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **<enter>**
Pick or Enter the Solve Point: <6>(Backup Toggles): **7 <enter>**
Options: Pt..Pt+-Angle
Enter Quadrant Bearing #2 like QDD.MMSS: <>:(Backup Toggles Points Line): **5..4%-16.49 <enter>**
-->offset2 used = -16.490000
-->Bearing used = S85°33'11"E
Pick or Enter the To Point: <6>:(Backup Toggles): **5 <enter>**
Enter Description:<>: **<space><enter>**
5 N01°39'31"W dist= 16.584 N= 984.947 E= 2019.664 7
7 S01°39'31"E dist= 16.584 N= 968.370 E= 2020.144 5
Bearing1 input=5..1%8.5 Bearing2 input=5..4%-16.49

To review: the % sign used in the bearings tells MicroSurvey that you are entering information on an offset. Positive is to the right and negative is to the left of the reference line.

Next is a BEARING - DISTANCE intersection with an OFFSET.

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <7>(Backup/Toggles/Curve/CB): **5 <enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **5..1%9.1 <enter>**
-->offset1 used = 9.100000
-->Bearing used = N32°29'30"W
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **<enter>**
Pick or Enter the Solve Point: <6>(Backup Toggles): **8 <enter>**
Options: Pt..Pt+-Angle
Enter Quadrant Bearing #2 like QDD.MMSS: <>:(Backup Toggles Points Line): **<enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter Distance2: <>:(Backup Toggles Points Line): **3 <enter>**
-->Distance used = 3.000000
Pick or Enter the To Point: <6>:(Backup Toggles): **7 <enter>**
Point :119126896 North : 987.749 East : 2018.591
Do you want to use this solution (Y/N) (N for other solution) **y <enter>**
5 N32°29'30"W dist= 19.441 N= 987.749 E= 2018.591 8
Enter Description:<>: **<enter>**
8 S20°57'17"E dist= 3.000 N= 984.947 E= 2019.664 7
Bearing input=5..1%9.1 Distance input=3

Now lets finish the house entry.

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <8>(Backup/Toggles/Curve/CB): **<enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **8..7-90 <enter>**

-->Bearing used = N69°02'43"E
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **2 <enter>**
-->Distance used = 2.000000
Pick or Enter the Solve Point: <9>(Backup Toggles): **<enter>**
Enter Description:<>: **<enter>**
8 N69°02'43"E dist= 2.000 N= 988.464 E= 2020.459 9
Bearing input=8..7-90 Distance Input=2

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <9>(Backup/Toggles/Curve/CB): **<enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **9..8+90 <enter>**
-->Bearing used = N20°57'17"W
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **5 <enter>**
-->Distance used = 5.000000
Pick or Enter the Solve Point: <10>(Backup Toggles): **<enter>**
Enter Description:<>: **<enter>**
9 N20°57'17"W dist= 5.000 N= 993.133 E= 2018.671 10
Bearing input=9..8+90 Distance Input=5

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <10>(Backup/Toggles/Curve/CB): **<enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **10..9-90 <enter>**
-->Bearing used = N69°02'43"E
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **8 <enter>**
-->Distance used = 8.000000
Pick or Enter the Solve Point: <11>(Backup Toggles): **<enter>**
Enter Description:<>: **<enter>**
10 N69°02'43"E dist= 8.000 N= 995.994 E= 2026.142 11
Bearing input=10..9-90 Distance Input=8

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <11>(Backup/Toggles/Curve/CB): **<enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **<enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **8.1 <enter>**
-->Distance used = 8.100000
Pick or Enter the Solve Point: <12>(Backup Toggles): **<enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter Distance2: <>:(Backup Toggles Points Line): **10.2 <enter>**
-->Distance used = 10.200000
Pick or Enter the To Point: <12>:(Backup Toggles): **7 <enter>**
Point :119126896 North : 988.504 East : 2029.224
Do you want to use this solution (Y/N) (N for other solution) **y <enter>**
11 S22°21'59"E dist= 8.100 N= 988.504 E= 2029.224 12
Enter Description:<>: **<enter>**
12 S69°35'36"W dist= 10.200 N= 984.947 E= 2019.664 7
Point :119126896 North : 988.504 East : 2029.224
Distance1 input=8.1 Distance2 input=10.2

Step 12) Work on the SHED

This completes the house; now we proceed to the shed. For the following DISTANCE - DISTANCE calculation, we will select the "other", or NEAR solution.

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <12>(Backup/Toggles/Curve/CB): **11 <enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **<enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **4.5 <enter>**
-->Distance used = 4.500000
Pick or Enter the Solve Point: <15>(Backup Toggles): **<enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter Distance2: <>:(Backup Toggles Points Line): **17.5 <enter>**
-->Distance used = 17.500000
Pick or Enter the To Point: <12>:(Backup Toggles): **2 <enter>**
Point :119126896 North : 999.541 East : 2023.372
Do you want to use this solution (Y/N) (N for other solution) **n <enter>**
Point :119126896 North : 999.881 East : 2028.410
Do you want to use this solution (Y/N) (N for other solution) **y <enter>**
11 N30°16'10"E dist= 4.500 N= 999.881 E= 2028.410 15
Enter Description:<>: **<enter>**
15 N12°09'07"W dist= 17.500 N= 1016.989 E= 2024.726 2
Point :119126896 North : 999.881 East : 2028.410
Distance1 input=4.5 Distance2 input=17.5

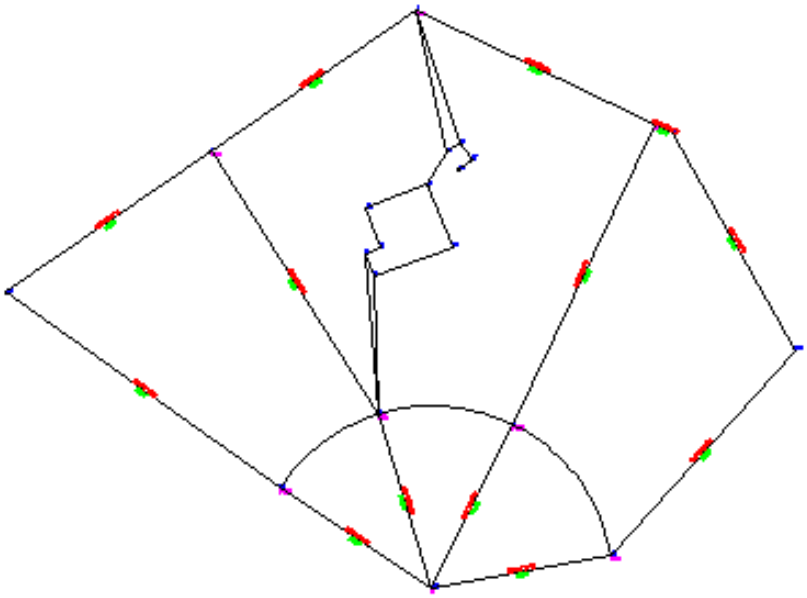
Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <15>(Backup/Toggles/Curve/CB): **2 <enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **<enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **16.8 <enter>**
-->Distance used = 16.800000
Pick or Enter the Solve Point: <6>(Backup Toggles): **16 <enter>**
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter Distance2: <>:(Backup Toggles Points Line): **2 <enter>**
-->Distance used = 2.000000
Pick or Enter the To Point: <3>:(Backup Toggles): **15 <enter>**
Point :119126896 North : 1001.049 East : 2030.033
Do you want to use this solution (Y/N) (N for other solution) **y <enter>**
2 S18°24'55"E dist= 16.800 N= 1001.049 E= 2030.033 16
Enter Description:<POST>: **<space><enter>**
16 S54°15'40"W dist= 2.000 N= 999.881 E= 2028.410 15
Point :119126896 North : 1001.049 East : 2030.033
Distance1 input=16.8 Distance2 input=2

Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <16>(Backup/Toggles/Curve/CB): **<enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **16..15-90 <enter>**
-->Bearing used = S35°44'20"E
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **2.5 <enter>**

-->Distance used = 2.500000
Pick or Enter the Solve Point: <17>(Backup Toggles): **<enter>**
Enter Description:<>: **<enter>**
16 S35°44'20"E dist= 2.500 N= 999.020 E= 2031.494 17
Bearing input=16..15-90 Distance Input=2.5

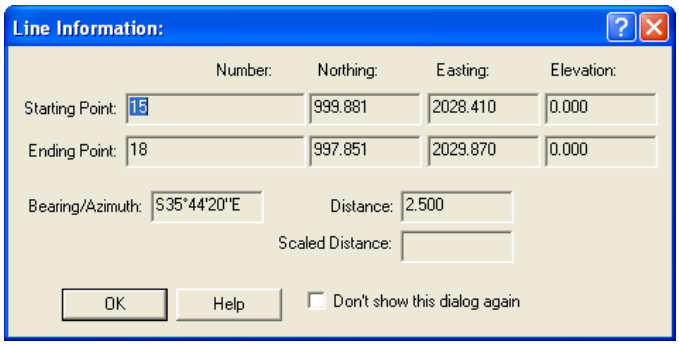
Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <17>(Backup/Toggles/Curve/CB): **<enter>**
Options: +/- or Pt..Pt+-Angle
Enter Quadrant Bearing like QDD.MMSS:<>: (Backup Toggles Points Line): **17..16-90 <enter>**
-->Bearing used = S54°15'40"W
Options: C#=-*/sin/cos/tan... or Pt..Pt(+-*/) a Distance
Enter the Distance: <>:(Backup Toggles Points Line): **15..16 <enter>**
-->Distance used = 2.000000
Pick or Enter the Solve Point: <18>(Backup Toggles): **<enter>**
Enter Description:<>: **<enter>**
17 S54°15'40"W dist= 2.000 N= 997.851 E= 2029.870 18
Bearing input=17..16-90 Distance Input=15..16

We need to erase a few extra lines that are on the drawing, but at this point your drawing should look like this:



Step 13) Line Inverse

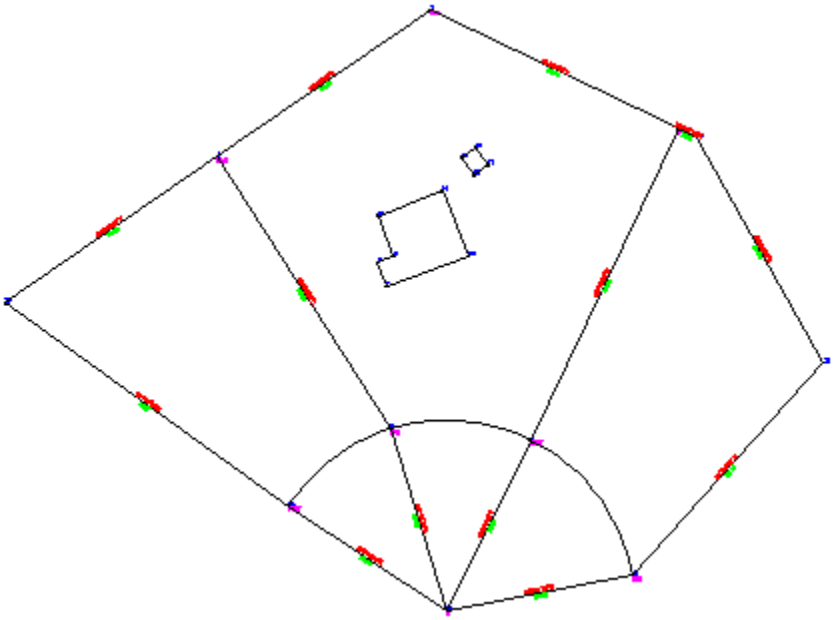
Inverse:Pt..Pt/Curve Inverse:Pt..Pt..Pt
Enter From Point: <18>(Backup/Toggles/Curve/CB): **15..18 <enter>**
15 S35°44'20"E dist= 2.500 N= 997.851 E= 2029.870 18



You should see this information dialog. Press the Ok button:

Press **Esc** to exit from COGO.

Step 14) Job Complete



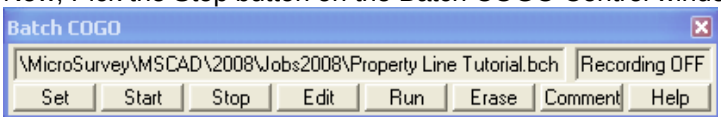
The shed is now complete.

Finally, by deleting unneeded lines, we get the property drawing shown here.

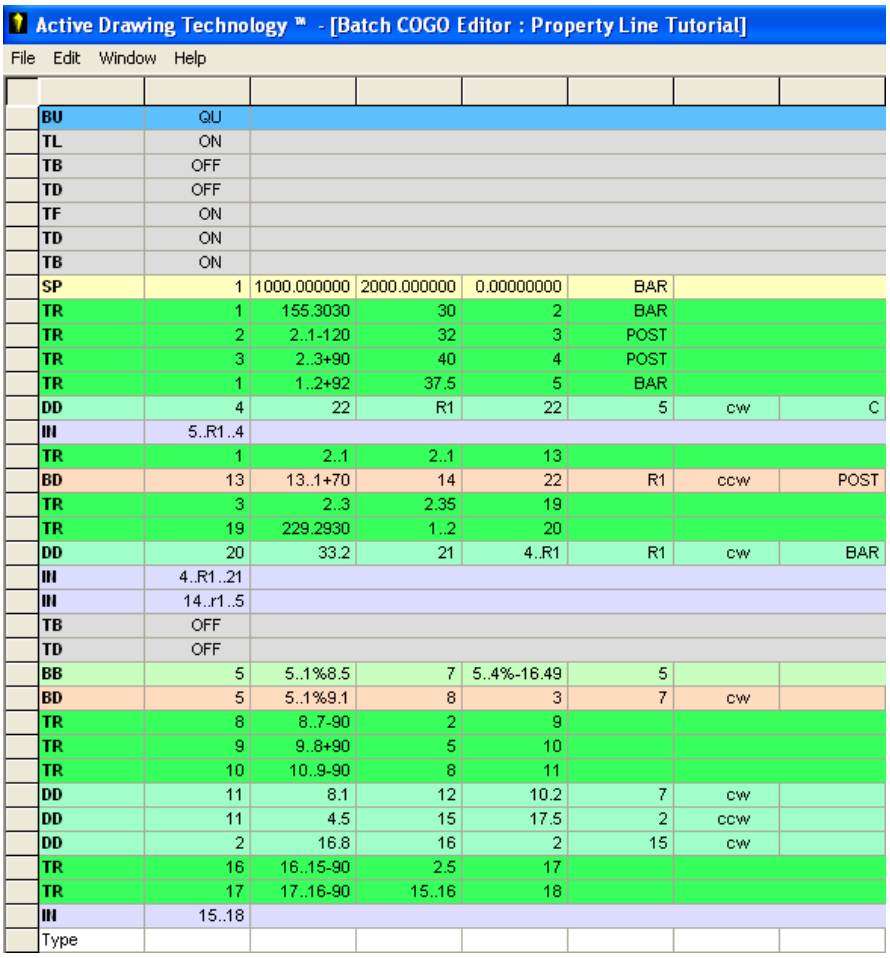
Save your job by picking the **SAVE** command from the **File pulldown menu**.

Step 15) Batch COGO Completed

Now, Pick the Stop button on the Batch COGO Control window. It should show Recording OFF.



Pick the Edit button and you should see something like this window.

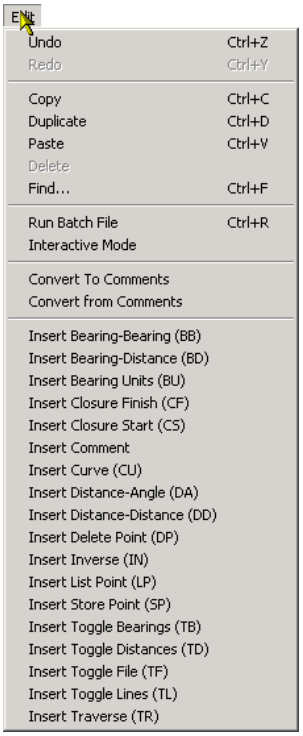


BU	QU							
TL	ON							
TB	OFF							
TD	OFF							
TF	ON							
TD	ON							
TB	ON							
SP	1	1000.000000	2000.000000	0.00000000	BAR			
TR	1	155.3030	30	2	BAR			
TR	2	2..1-120	32	3	POST			
TR	3	2..3+90	40	4	POST			
TR	1	1..2+92	37.5	5	BAR			
DD	4	22	R1	22	5	cw	C	
III	5..R1..4							
TR	1	2..1	2..1	13				
BD	13	13..1+70	14	22	R1	ccw	POST	
TR	3	2..3	2.35	19				
TR	19	229.2930	1..2	20				
DD	20	33.2	21	4..R1	R1	cw	BAR	
III	4..R1..21							
III	14..r1..5							
TB	OFF							
TD	OFF							
BB	5	5..1%8.5	7	5..4%-16.49	5			
BD	5	5..1%9.1	8	3	7	cw		
TR	8	8..7-90	2	9				
TR	9	9..8+90	5	10				
TR	10	10..9-90	8	11				
DD	11	8.1	12	10.2	7	cw		
DD	11	4.5	15	17.5	2	ccw		
DD	2	16.8	16	2	15	cw		
TR	16	16..15-90	2.5	17				
TR	17	17..16-90	15..16	18				
III	15..18							
Type								

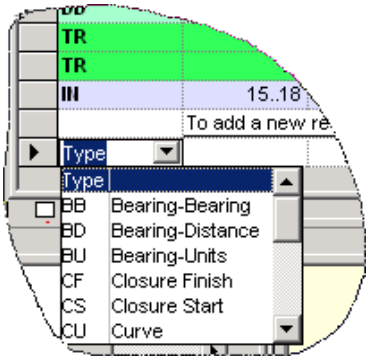
Pick the SP and you can edit the starting coordinates.

Store Pt	Pt Num	North	East	Elev	Description
SP	1	1000.000000	2000.000000	0.00000000	BAR

Pick the Edit menu and you can see all the commands available for building a batch file:



Scroll to the Bottom of the Grid and Pick the Type Cell: it will change to a pull down combo box with all the record types listed:



(End of tutorial)

Earthwork Surface Volume Tutorial

Because of the size and complexity of this tutorial we have broken it down into 15 smaller steps to make it easier for you to follow.

Step 1) Starting the Job

Step 2) Setting the Defaults and Toggles

Step 3) Importing a Data Collector File

Step 4) Creating the Traverse File

Step 5) Processing and Editing the Traverse File

Step 6) Coordinate the Traverse

Step 7) Working with AutoMAP

Step 8) Start the First Surface

Step 9) Make the First TIN

Step 10) Start the Second Surface

Step 11) Extract the Second Surface

Step 12) Make the Second TIN

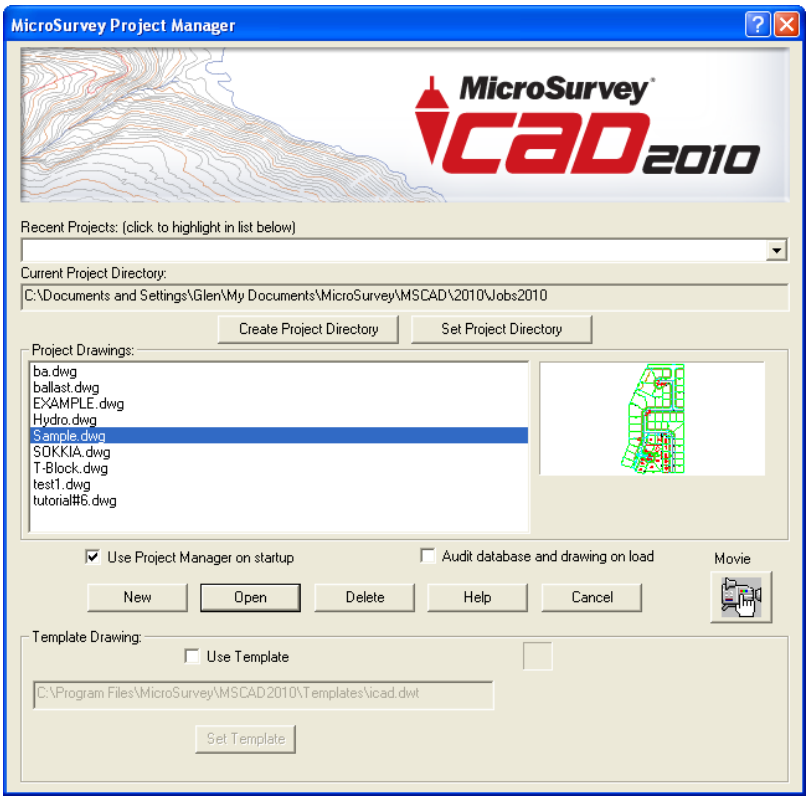
Step 13) Calculate Surface Volumes between the 2 Surfaces

Step 14) Rendering the Top Surface

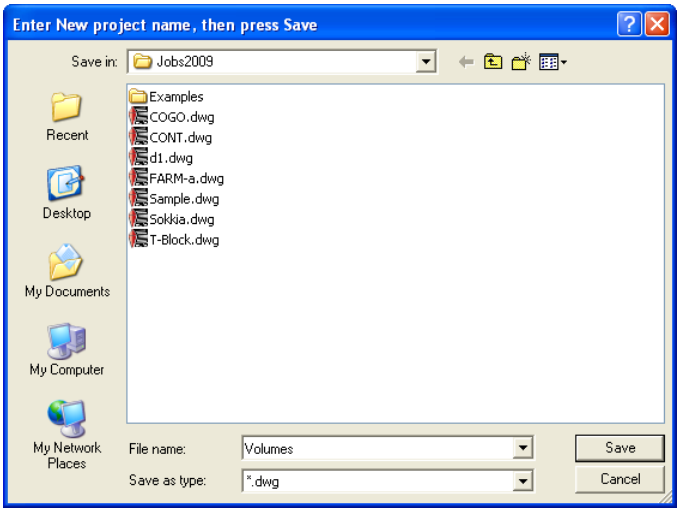
Step 15) Cross Sections across the Job

Step 1) Starting the Job

To begin, start a new drawing by running the MicroSurvey Project Manager command, found under the **File drop-down menu**.



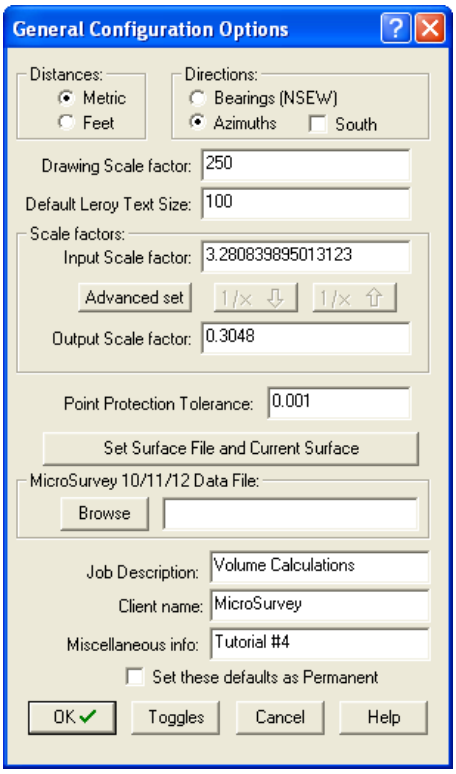
Pick the New button on the Project Manager. Fill in the name of the job and call it **VOLUMES**.



Then pick **Save** to continue.

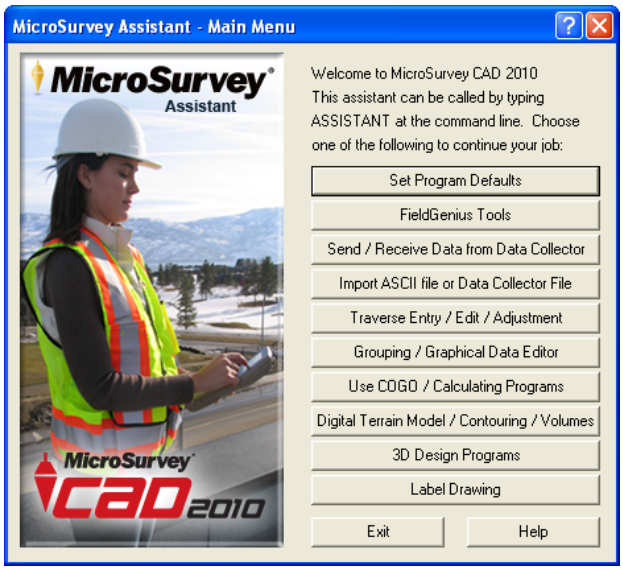
Step 2) Setting the Defaults and Toggles

As soon as the job is open you are asked to check or set the General Defaults.



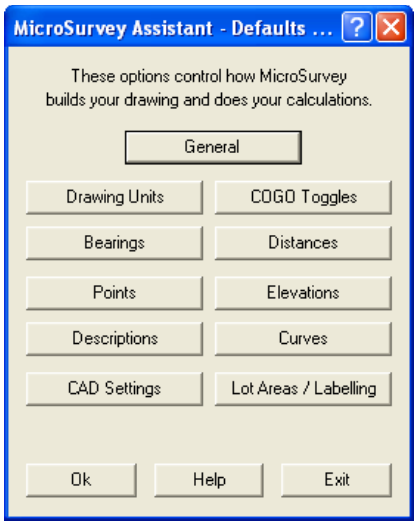
Please take the time to make your General Defaults the same as shown here. Pick the **OK** button to continue.

Now that your job is open, you have many options presented to you. The first set of options are available from the **MicroSurvey Assistant – Main Menu**. The MicroSurvey Assistant can be loaded by going to the MsTools menu. This is a floating dialog box with commands on it that you can pick.

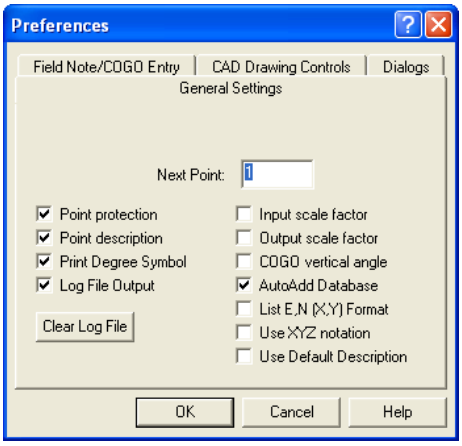


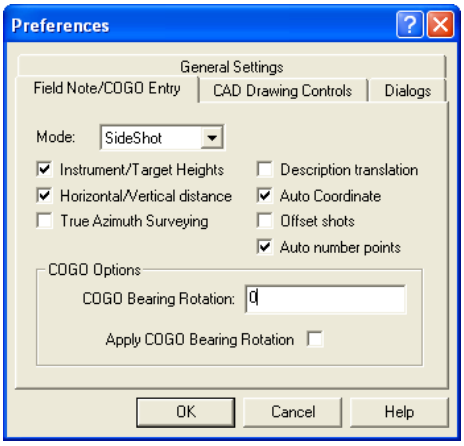
We will go and check and set the program defaults. To do this, pick the button **Set Program Defaults**. Next you will be given another dialog box to choose from.

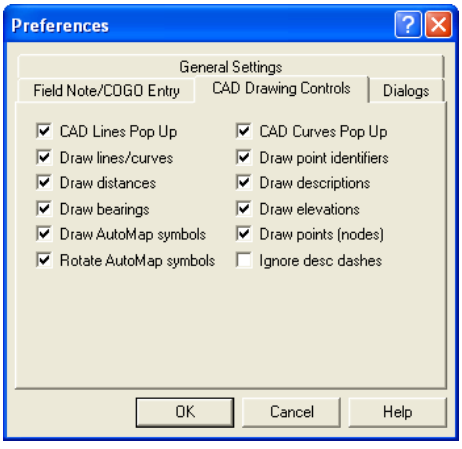
In this dialog box we can choose to set any of the drawing defaults that we may need. In this tutorial we are going to assume that everything we do not look at is considered okay for this job.

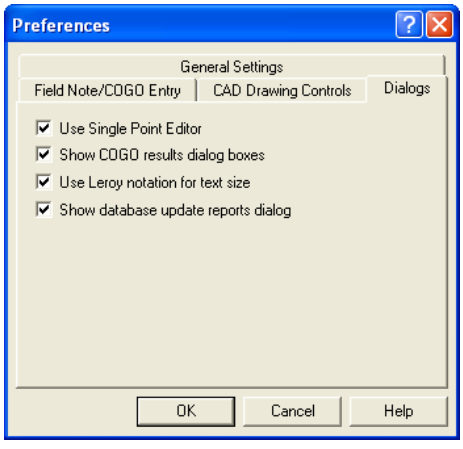


We need to check our Toggles so pick the **COGO Toggles** button. This will show you the following dialog boxes. Please make yours look the same as ours shown here. When done pick the **OK** button.







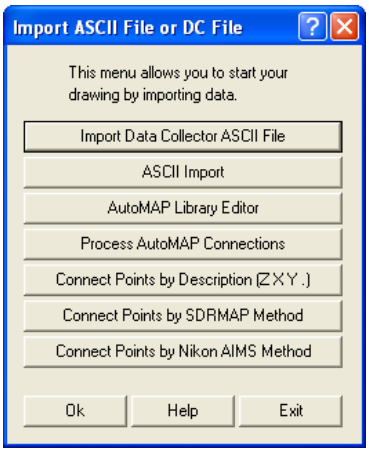


Pick the **OK** button to continue. This will take you back again to the **MicroSurvey Assistant – Defaults Menu**. Press the **OK** button to return to the **MicroSurvey Assistant – Main Menu**.

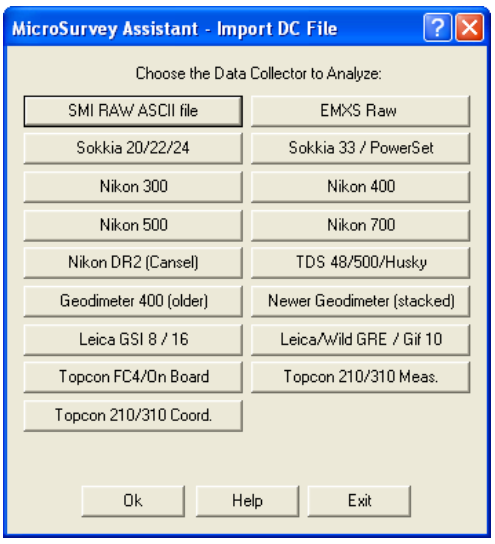
Step 3) Importing a Data Collector File

From here we are going to go through the steps to read our data collector file from the hard drive into our program and save it into a traverse file.

Pick on the button labeled **Import ASCII File or Data Collector File**. You will see this next dialog box.

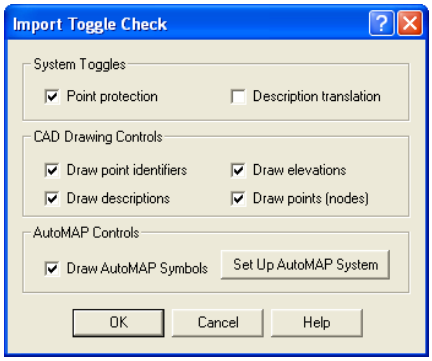


We are going to import a data collector raw file so pick the button labeled **Import Data Collector ASCII File**. This will bring up a dialog box with all the different collector types that we support.



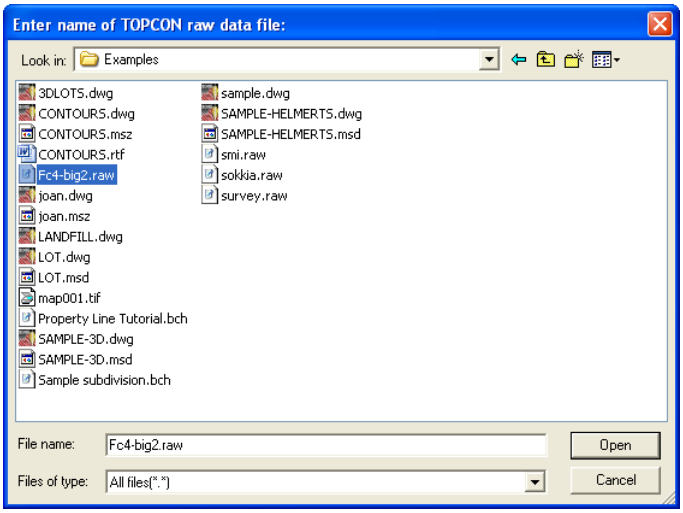
As you can see, the list of supported collector files is very large and includes all the major brands on the market. For this tutorial we will use a file collected in the Topcon format. (This is not saying that Topcon is the collector of choice, only that the file used in this tutorial was of this format. All of the other collector formats would give equally suitable data in this type of job.)

Pick the button labeled **Topcon FC4/On Board (bottom left corner of the dialog)**. As soon as you do you will be presented with the following dialog box;



This allows you to quickly check or change your toggles before proceeding. Pick the **OK** button to continue.

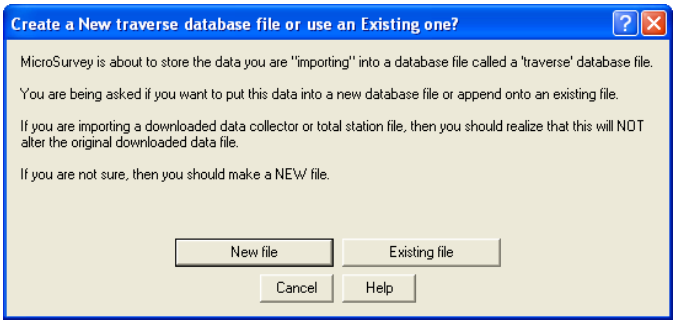
You will then be asked to give the file name of the collector file. Go to the **C:\Documents and Settings\USER\My Documents\MicroSurvey\MSCAD\2010\JOBS2010\Examples** directory and pick on the file **Fc4-big2.raw**. (where \USER\ is your user login folder)



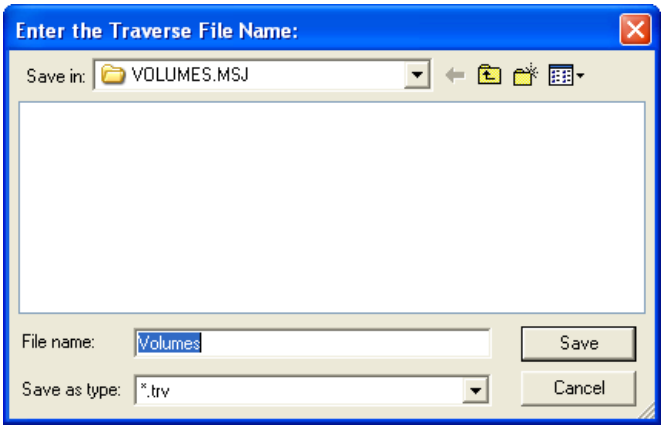
Once you have selected the correct file, press the **OPEN** button to continue.

Step 4) Creating the Traverse File

You will then be presented with the dialog box asking if this is a New or Existing Traverse.

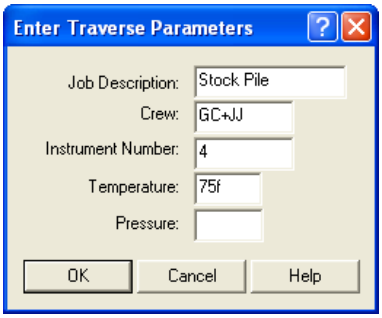


This is a **New Traverse** so pick the New Traverse button. Now you will be asked to name your traverse file. This allows you to have several traverses in one job and keep them all organized so you can work on them separately.



You can name your traverse file anything that makes sense to you. I have chosen the name **VOLUMES** for the traverse. The program will use the project name as the default. Once you have entered the name press the **Save** button.

Next you will be asked to enter some information about this traverse. You may leave this blank if you wish but a good practice is to fill in the information as it is used later in printouts.

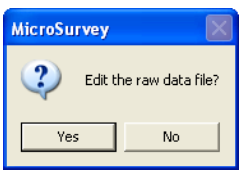


Then press the **OK** button to continue.

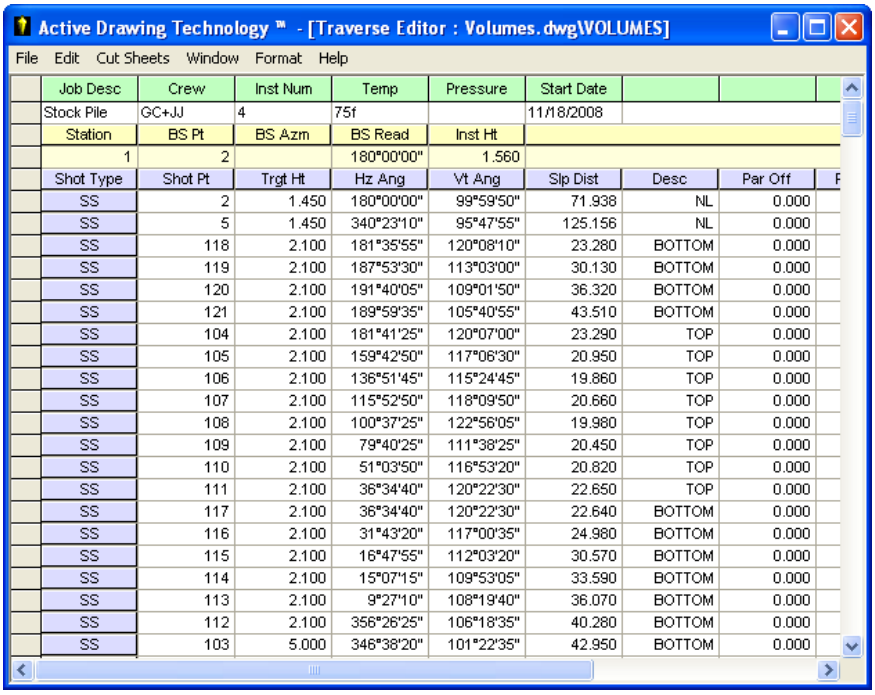
From this point, the program very quickly reads the raw data file from the hard drive and stores it into our traverse file. You will see the information scrolling very quickly at the top of the screen in the prompt area. You should see 4 points on the main screen. These were points entered as coordinates in the raw collector file. The rest of the shots have been recorded as raw data and have not been coordinated. We will do that next...

Step 5) Processing and Editing the Traverse File

You will see this dialog box in the middle of the screen.



Pick on **YES** so we can see the raw data in the traverse file and confirm that it is correct and complete. If the Assistant is still open, close it down so you can work on the traverse file. You should see the following window with the raw data from the survey.

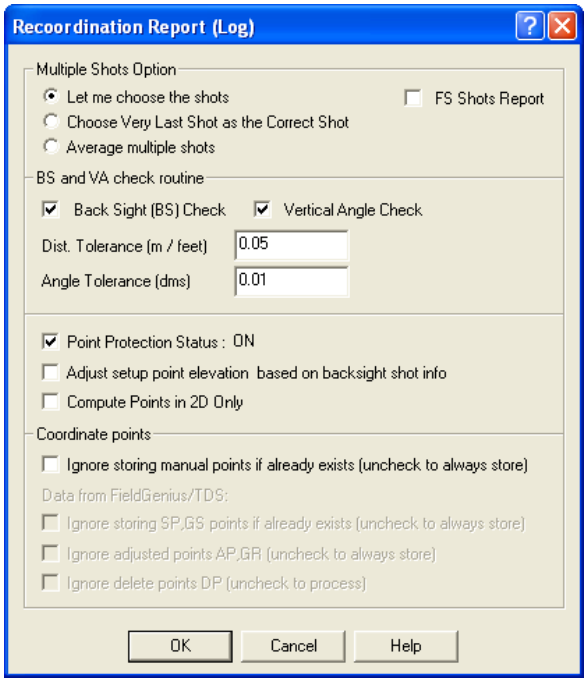


Job Desc	Crew	Inst Num	Temp	Pressure	Start Date		
Stock Pile	GC+JJ	4	75f		11/18/2008		
Station	BS Pt	BS Azm	BS Read	Inst Ht			
1	2		180°00'00"	1.560			
Shot Type	Shot Pt	Trgt Ht	Hz Ang	Vt Ang	Slp Dist	Desc	Par Off
SS	2	1.450	180°00'00"	99°59'50"	71.938	NL	0.000
SS	5	1.450	340°23'10"	95°47'55"	125.156	NL	0.000
SS	118	2.100	181°35'55"	120°08'10"	23.280	BOTTOM	0.000
SS	119	2.100	187°53'30"	113°03'00"	30.130	BOTTOM	0.000
SS	120	2.100	191°40'05"	109°01'50"	36.320	BOTTOM	0.000
SS	121	2.100	189°59'35"	105°40'55"	43.510	BOTTOM	0.000
SS	104	2.100	181°41'25"	120°07'00"	23.290	TOP	0.000
SS	105	2.100	159°42'50"	117°06'30"	20.950	TOP	0.000
SS	106	2.100	136°51'45"	115°24'45"	19.860	TOP	0.000
SS	107	2.100	115°52'50"	118°09'50"	20.660	TOP	0.000
SS	108	2.100	100°37'25"	122°56'05"	19.980	TOP	0.000
SS	109	2.100	79°40'25"	111°38'25"	20.450	TOP	0.000
SS	110	2.100	51°03'50"	116°53'20"	20.820	TOP	0.000
SS	111	2.100	36°34'40"	120°22'30"	22.650	TOP	0.000
SS	117	2.100	36°34'40"	120°22'30"	22.640	BOTTOM	0.000
SS	116	2.100	31°43'20"	117°00'35"	24.980	BOTTOM	0.000
SS	115	2.100	16°47'55"	112°03'20"	30.570	BOTTOM	0.000
SS	114	2.100	15°07'15"	109°53'05"	33.590	BOTTOM	0.000
SS	113	2.100	9°27'10"	108°19'40"	36.070	BOTTOM	0.000
SS	112	2.100	356°26'25"	106°18'35"	40.280	BOTTOM	0.000
SS	103	5.000	346°38'20"	101°22'35"	42.950	BOTTOM	0.000

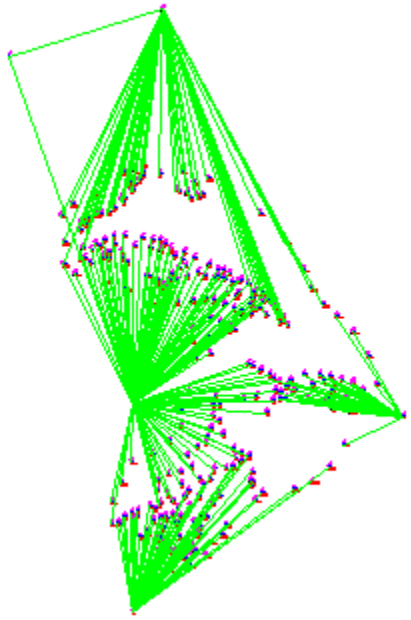
Step 6) Coordinate the Traverse

Select Re-coordinate Traverse from the Edit Menu on the Active Drawing Editor. Or you can type Ctrl-R if the editor window is current.

You will be given the option of creating a Re-coordination Report or Log. Accept the defaults as shown:



Now you will see the coordinates being calculated in the prompt area on top of the screen as well as the information being drawn into the graphics window. The entire job will be imported and displayed on screen.



The linework you see is only temporary and will be erased as soon as you do a zoom command or a redraw command. You will be left with nothing but the points at that time. To be able to do a zoom or redraw command we have to exit out of the MicroSurvey Assistant menus. Press the **OK** button and then the **EXIT** button to get out of the assistant. Then do a **Zoom Fit** (zoom extents) by picking this button on the left of the screen.

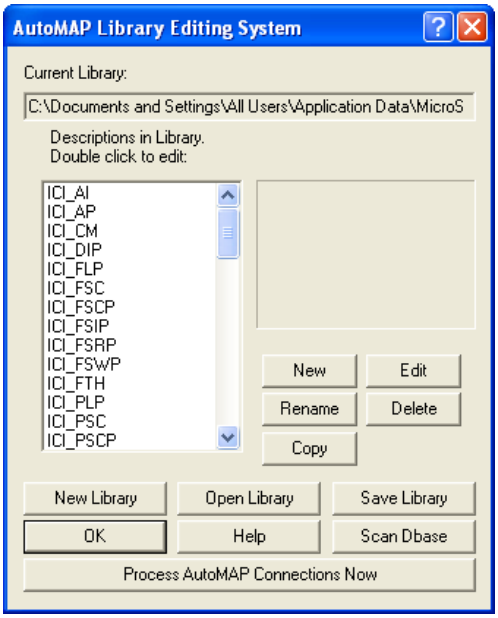
You will now see the points as shown below.

Step 7) Working with AutoMAP

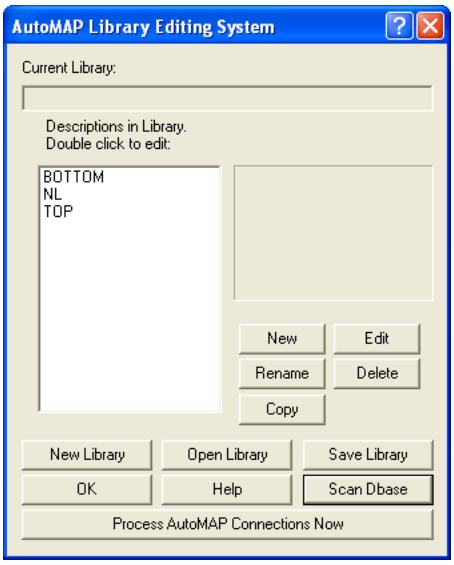
Our objective is to calculate the volume of this pile of earth. To do this we need to layer separate the data to help us build the two surfaces. In other words we want all the points with descriptions of TOP to be on one layer and the points with descriptions of BOTTOM on a different layer. This will make it easier to select the correct points to create surfaces to generate volumes.

To do this we are going to use the AutoMap program. You can find this in the **MsTraverse pulldown | Automap System**. This command is available in other locations as well.

This will display the dialog box below.



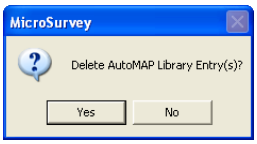
This is a powerful command but we will just use a portion of it's power in this tutorial. First thing you need to do is pick the **New Library** button. This will remove the current listing of descriptions (which do not match our current job) and allow us to then pick the **Scan Dbase** button which will go to our job and look up every description we used and display them, ready for editing.



This job has 3 different descriptions. BOTTOM, TOP and NL. We do not need the NL description as it only defined the control points and is not related to the surfaces we are creating, so we are going to delete this description from our list. This will not erase the points for the job. It only means that the points will not be relocated to another layer or have linework connecting them, so

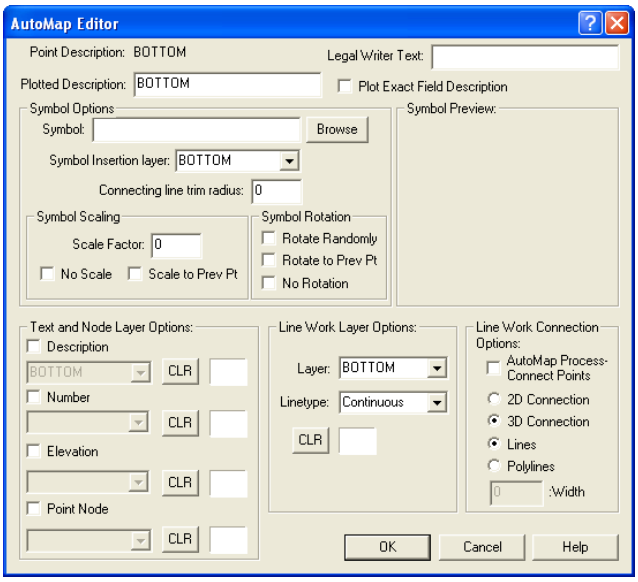
do not worry. Pick the description **NL** from the left side of the dialog and then pick the **Delete** button.

You will be asked if you are sure that you wish to delete this description.

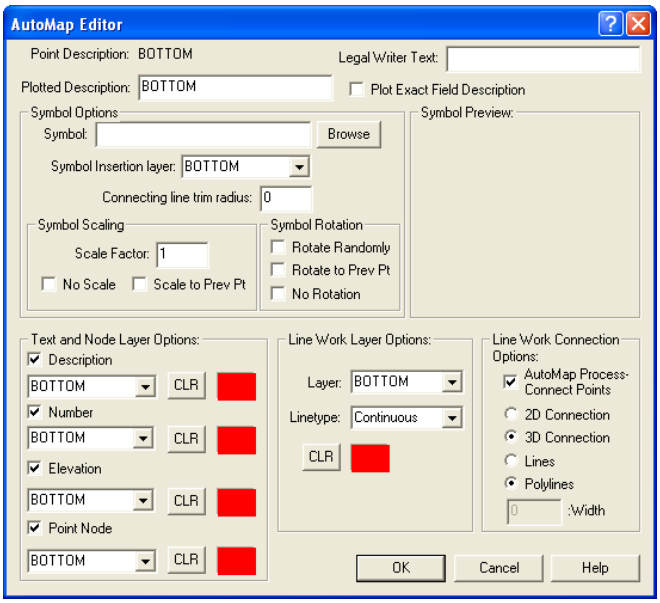


Pick the **YES** button to continue.

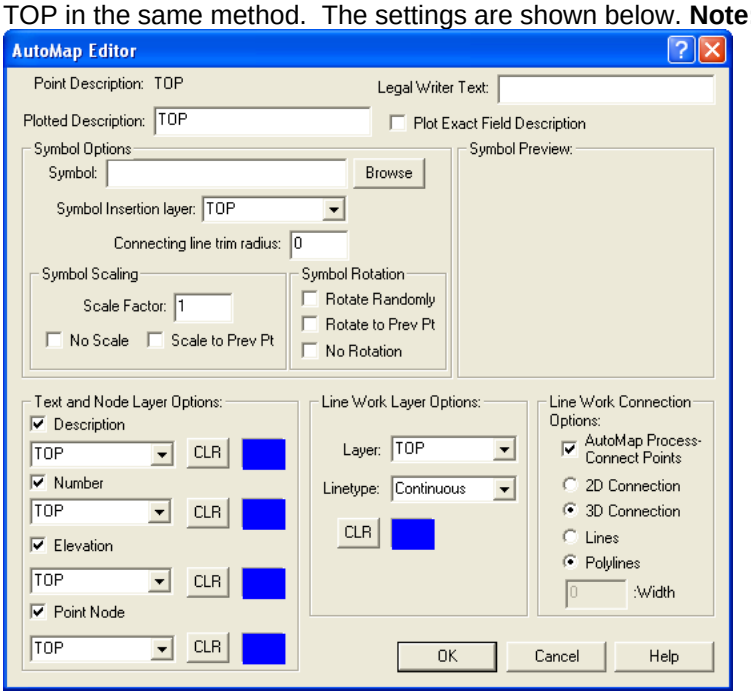
This will leave you with only the BOTTOM and TOP descriptions to be edited. Now pick on the description BOTTOM and pick the **Edit** button. You will now see this dialog box.



This dialog box has many options on it. The ones we are concerned with are in the bottom half. Set your program to match the dialog here. We are not applying any symbols, but we are going to draw a 3D polyline connecting all the points with the description Bottom, in increasing point number order. We are also moving the nodes, elevations and point numbers to the same layer as the description and polyline.
Note: Set all the layer colors to Red.

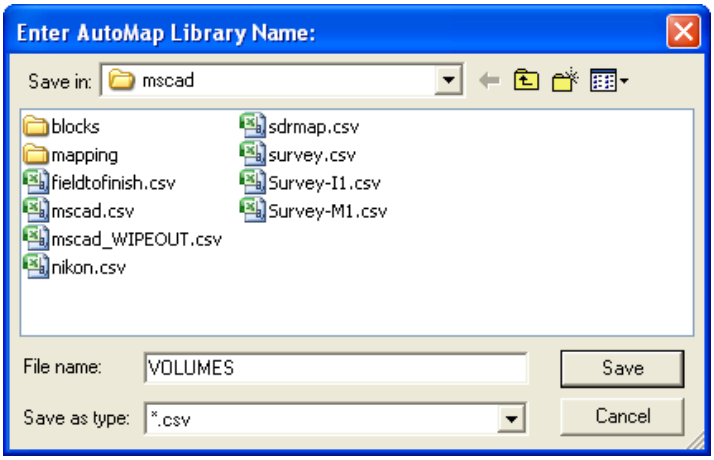


When you have set all the options as above then press the **OK** button and edit the description TOP in the same method. The settings are shown below. **Note: Set all the layer colors to Blue.**



Pick the **OK** button after setting the above dialog.

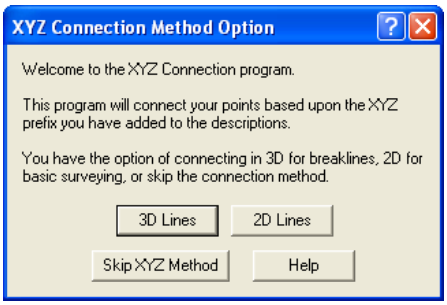
Lets save this library for future use. Pick on the **Save Library** button.



Give the library a unique name of VOLUMES, as shown above. Pick the **SAVE** button to continue.

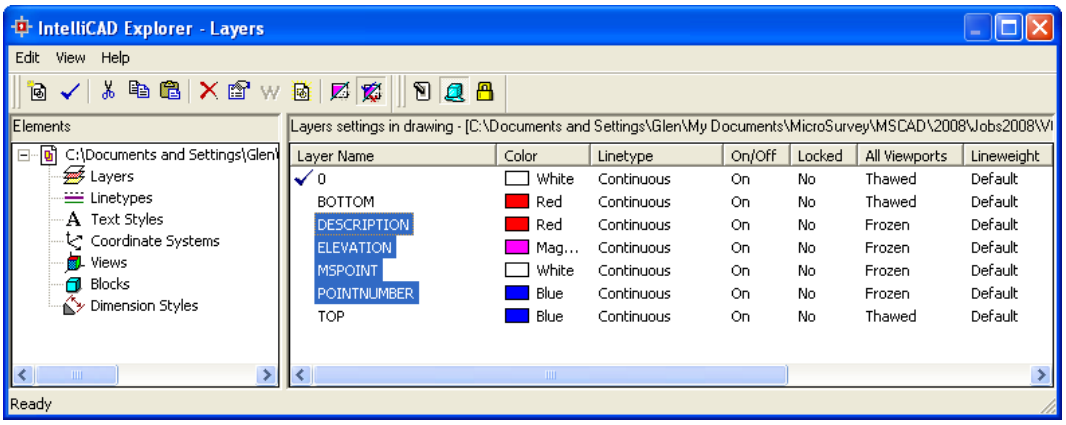
Now all that is left is to process the settings for the descriptions. Press the **Process AutoMAP Connections Now** button.

Now you will see the following dialog box;

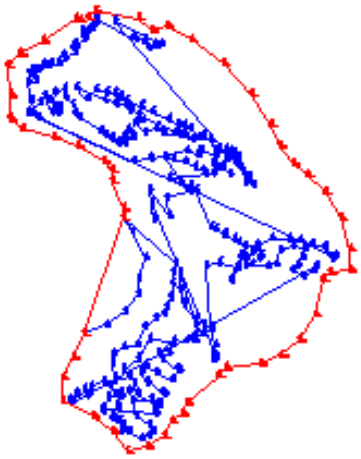


Because we are not using the Z-Coding option in this example, simply pick on the **Skip XYZ Method** button to continue.

Using the Explorer (pick this button ) we will freeze the layers shown below by picking on the **layer names** to highlight them. Pick the **"Thawed" word as shown below to toggle the value to "Frozen"** to freeze the layers – lastly, exit the Explorer.



Now your job should look like this.



The Bottom points have all been placed on the BOTTOM layer and connected by a 3D Polyline and the Top points have all been placed on the TOP layer and connected separately by another 3D Polyline.

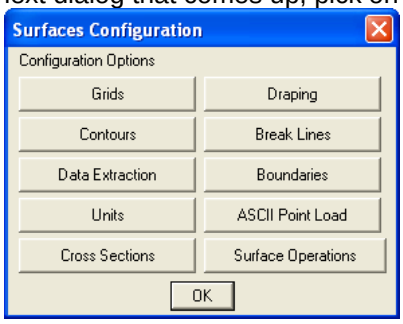
Step 8) Start the First Surface

Now we are ready to generate 2 surfaces to calculate volumes from. The first surface will have all of the Top and Bottom points to define the upper surface of the pile.

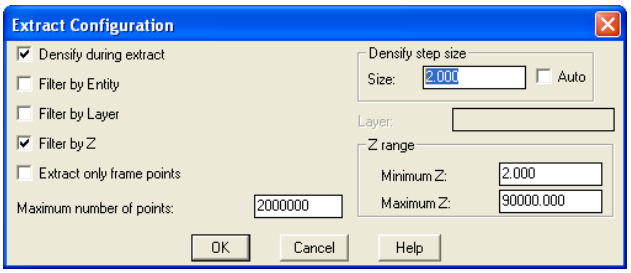
To do this we will load the toolbar from the MsModeling pulldown menu by picking on the option **Modeling Toolbar…**. The following toolbar will appear on screen. Move it to a convenient location on the right of the screen.

Next we need to set a setting to use the polylines consistently during extraction.
Pick on this toolbar button (or go to the MsModeling menu | Configuration Settings)

On the next dialog that comes up, pick on the button for Data Extraction.



On the following dialog, we are going to make a single change. Turn the Auto option off and set the size to a value of 2. This will interpolate extra vertices along the polylines at this interval.

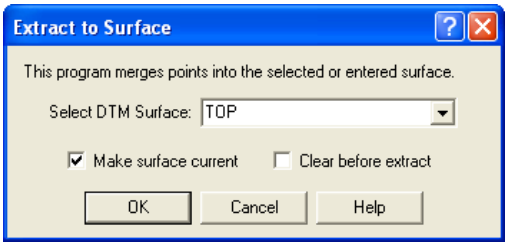


Pick OK twice to get out of the dialogs.

Next:

To extract points to a surface, **pick this button**. 

The following dialog box will appear. Please fill it out as shown below and then pick the **OK** button to continue.



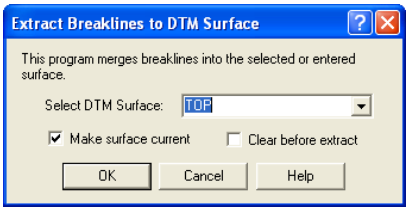
After picking the OK button you will be asked to select all the points to be used in this surface. We need all of the points on screen to form the top surface so **simply press the ENTER button to select them all**.

It should report in the command prompt area;

Points extracted from 1350 entities.
1432 points total in surface.

We have now defined the surface by extracting the points, but we now also need the breaklines to add more detail and make the surface accurately reflect the surface edges of the pile.

To extract the breaklines to the same surface, **pick this button**. 
The following dialog box will appear. Please fill it out as shown below and then pick the **OK** button to continue. **Note: remove the Clear before extract checkbox (if it is on)!**



After picking the OK button you will be asked to select all the breaklines to be used in this surface. We need all of the linework on screen to help form the top surface so **simply press the ENTER button** to grab them all. You should see something like this on the text screen:

956 additional points added to current surface

Step 9) Make the First TIN

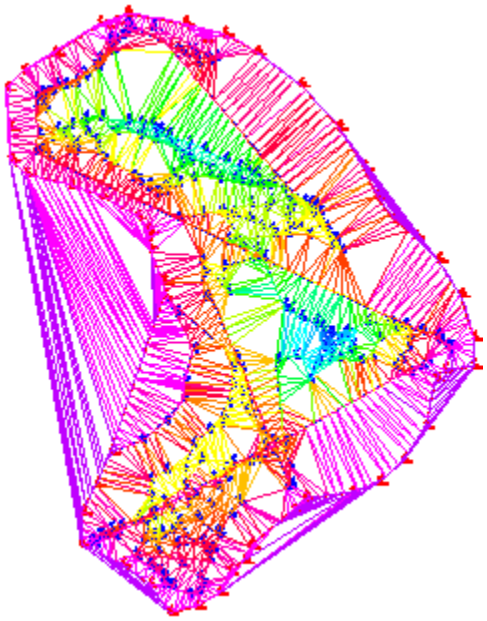
Next we need to create a TIN for this surface. **Pick this button**.  from the toolbar.

The TIN command will ask you several questions. Answer them as follows;

Surface name <TOP>: **<Enter>**

None/Show/Draw/Redraw <Show>? **<Enter>**

This will temporarily display the TIN so we can confirm that the TIN has been generated correctly.



A redraw or zoom command will remove the TIN from the screen.

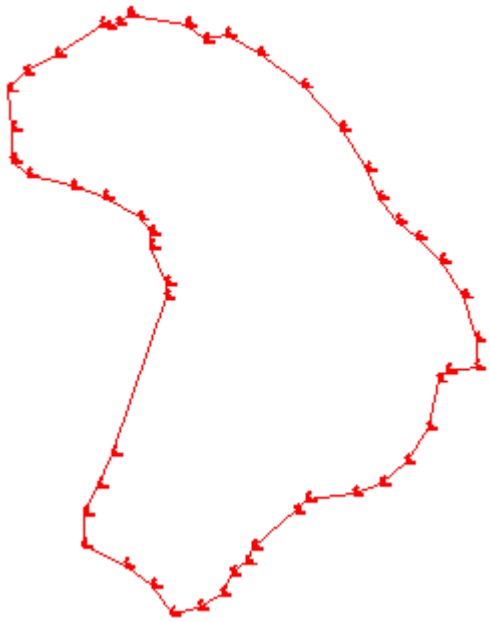
Step 10) Start the Second Surface

Now we need to create the Bottom surface. It is difficult to pick the points around the outside edge of the pile without accidentally picking other points as well, so we will isolate the bottom layer on screen. This command can be found on the **MsTools | Layer Control Tools** then pick the **ISOLATE** option. Or you can pick this button  from the MS Layer toolbar.

After the command loads you will be asked to:

Select item on layer to isolate: **Pick on one of the red lines, then press <ENTER>**

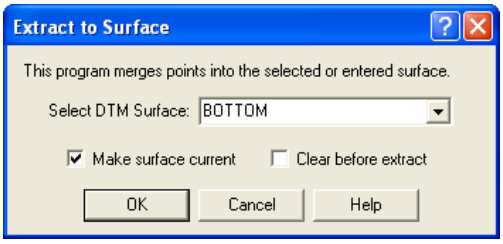
Now the job should look like this:



Step 11) Extract the Second Surface

To extract the points to a new surface, **pick this button**. 

The following dialog box will appear. Please fill it out as shown below and then pick the **OK** button to continue.



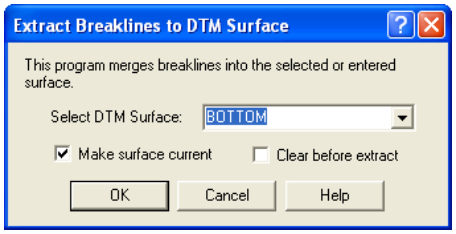
After picking the OK button you will be asked to select all the points to be used in this surface. We need all of the points on screen to form the bottom surface so **simply press the ENTER button** to grab them all.

It should report in the command prompt area;

Points extracted from 213 entities.
284 points total in surface.

So far we have the points that help define the surface but we now also need the breaklines.

To extract the breaklines to the same surface, **pick this button**. 
The following dialog box will appear. Please fill it out as shown below and then pick the **OK** button to continue. **NOTE: Remove the Clear before extract check box(if it is on)!**



After picking the OK button you will be asked to select all the breaklines to be used in this surface. We need all of the linework on screen to help form the bottom surface so simply press the **ENTER** button to select them all.

200 additional points added to current surface

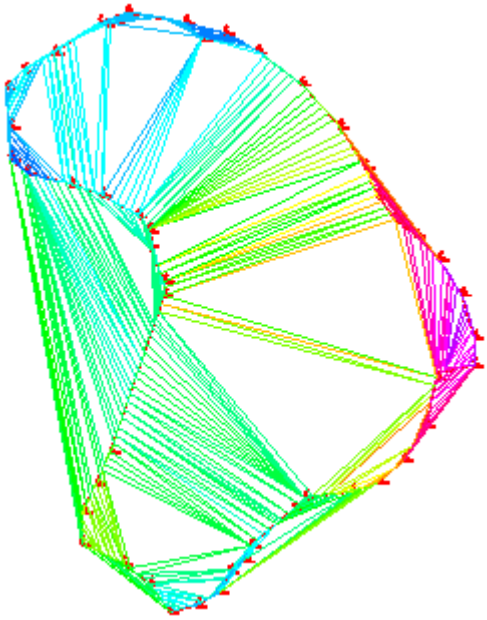
Step 12) Make the Second TIN

Next we need to create a TIN for this second surface. **Pick this button**. from the toolbar.

The TIN command will ask you several questions. Answer them as follows;
Surface name <BOTTOM>: **<Enter>**

None/Show/Draw/Redraw <Show>? **<Enter>**

This will temporarily display the TIN so we can confirm that the TIN has been generated correctly.



A redraw or zoom command will remove the TIN from the screen.

Step 13) Calculate Surface Volumes between the 2 Surfaces

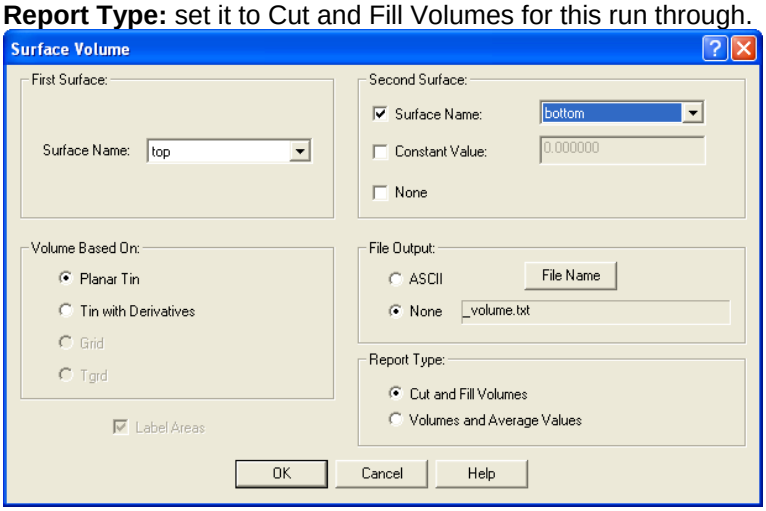
Now we can finally calculate the volume between the surfaces called TOP and BOTTOM.

We can calculate the Surface volume and report it in two different ways.

First we will run the **Surface Volume** command from the **MsModeling pulldown menu | Volumetrics**.

Fill out the two surface names as shown with the **TOP** surface on the left and the **BOTTOM** surface on the right. Be sure to pick the check box beside Surface Name to be able to enter the BOTTOM surface

Report Type: set it to Cut and Fill Volumes for this run through.



Now pick the **OK** button and volumes will be calculated and displayed in the command prompt area on screen. Flip to the command prompt window by pressing the **F2 function key** (a second time to return to the normal screen)

The volume will be displayed like this.

Using conversion factor of 1.

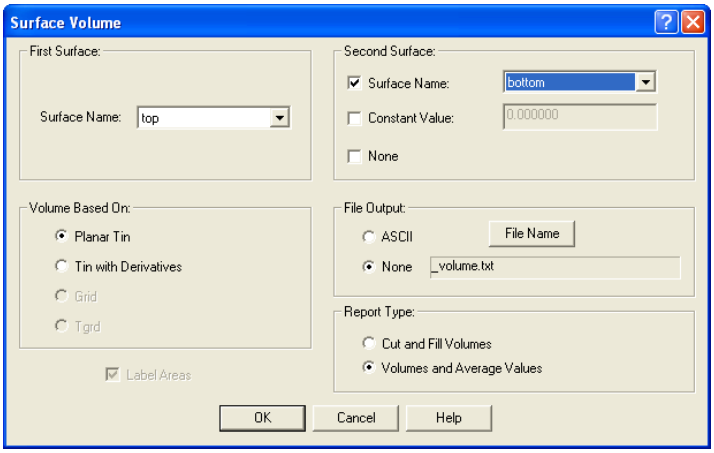
Volume of TOP-BOTTOM based on a planar tin.

Positive Volume	Negative Volume	Net Volume
46499.552	-1.938e-005	46499.552

The negative volume shown here is so small that it does not affect the job in any way and was due to minor deviations in the way the two TINs were generated. Your final volume is 46,499.552 m^3 (because our job was in metric – if it had been feet then the units would have been cubic feet by default)

Report Type: Set it to Volumes and Average Values for this run through.

Everything else remains the same.



The volume will be displayed like this.

Using conversion factor of 1.

Volume of TOP-BOTTOM based on a planar tin.

Net Volume	plan area	average Z
46499.552	8111.108	5.733

Step 14) Rendering the Top Surface

To be able to render a surface, the TIN needs to be drawn into the drawing. To do this, run the TIN command again from this button  .

This time when asked, set the surface to TOP and DRAW the surface.

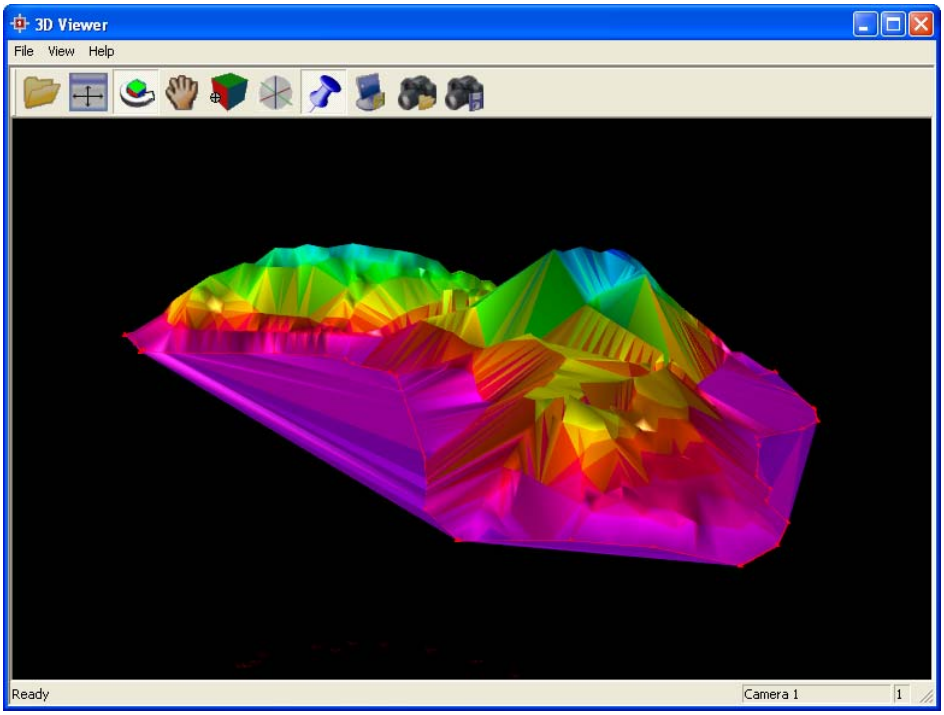
Surface name <BOTTOM>: **TOP <Enter>**

None/Show/Draw/Redraw <Show>? **D <Enter>**

The triangles are now part of the drawing and can be viewed in full 3D by going to the View menu | Rendering | Render.

Double click on the center of the surface then use your mouse to pick and rotate the surface as you desire. Experiment and have fun!

Your surface should look like this.



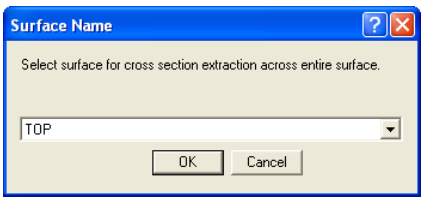
Close the Render window, and delete the tin from the screen. It is no longer needed.

Step 15) Cross Sections across the Job

For those who wish to confirm the volume by seeing cross sections to prove the answer, we have just the feature to do this.

Under the **MsDesign pulldown menu** | **AutoRoute** options there is a command **Across Full Surface**.

You will be asked which surface you wish to plot. Select **TOP** and press **OK**.

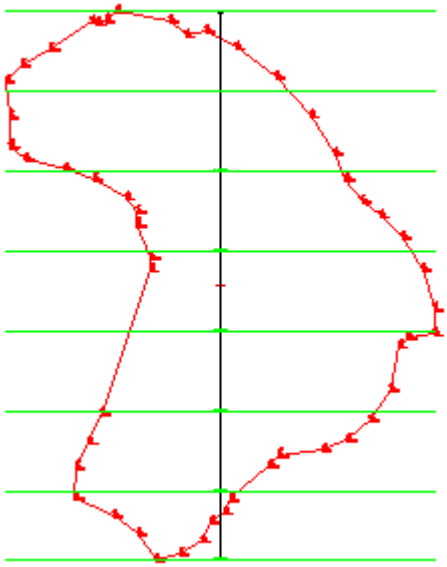


Next you will be asked which way do you wish to run the center line for all the cross sections to be related to. Then you will be asked for the Interval for the cross sections.

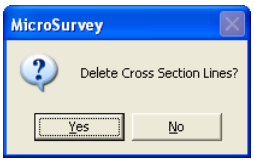
Begin on which side of surface North/South/East/<West>: **N <Enter>**

Enter cross section interval: **20**

A center line and cross section lines will be drawn over the job as reference.

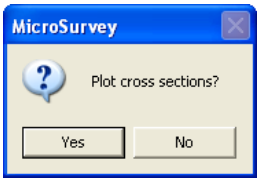


If you wish, you can erase these lines, or leave them for later reference. Your choice!

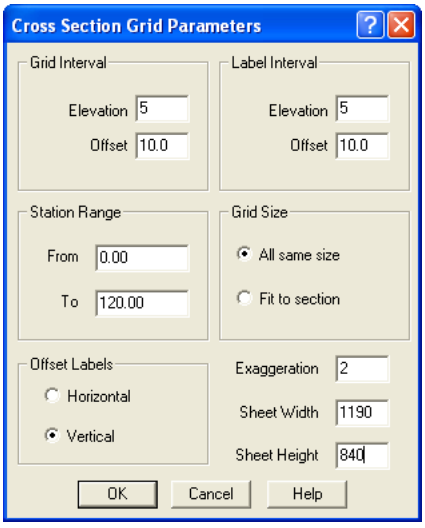


I left them on in my example by answering NO.

Next you will be asked if you wish to plot the cross sections.



Answer **Yes** to this and you will get the following dialog box that controls the grid on the cross sections.

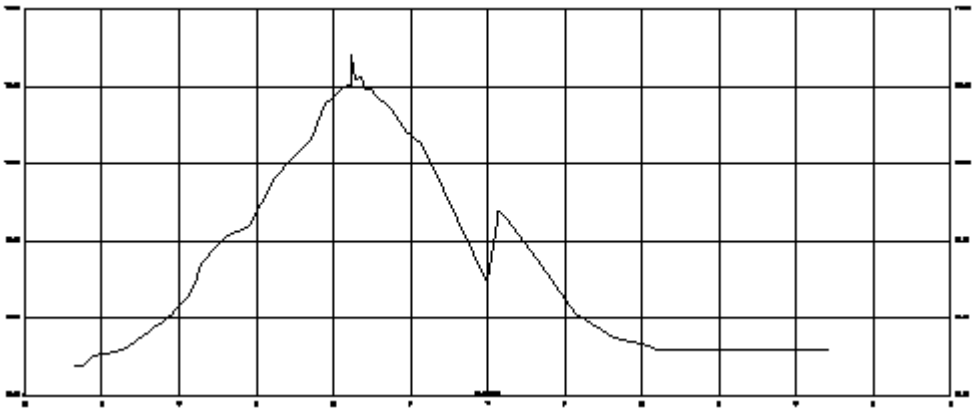


Fill your dialog box out as shown above and when completed press the **OK** button. Note: This job is a Metric job, so the width and height of the sheet are in mm. If you were working in feet, you would put in the inch size of the paper you were using, like 24 x 36

. When you pick the Ok button, You will be prompted with:

Pick lower left corner: This is the insertion point for the cross sections so select a starting point over to the right of the diagram so they do not overlap each other.

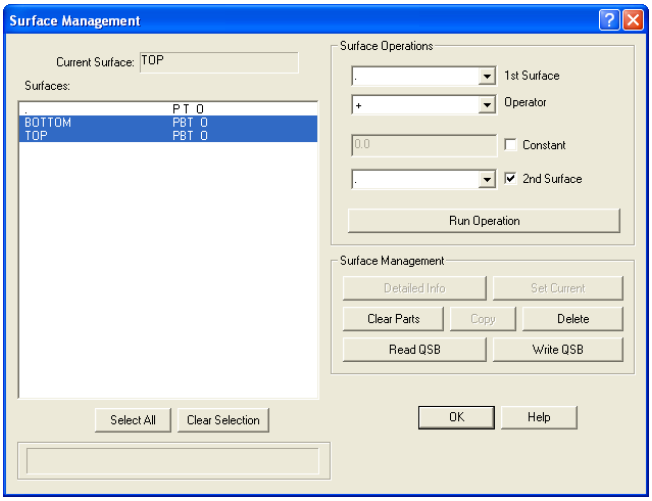
Below is one of the cross sections enlarged.



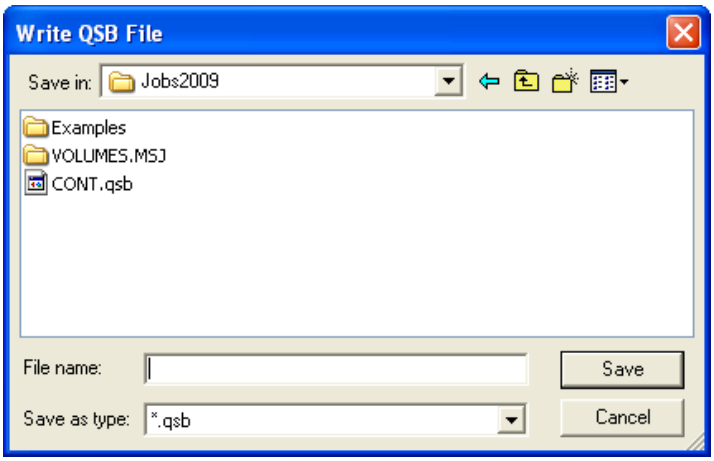
You can change the color of the layers to get better visual results or for setting pen widths for plotting.

As a double check you can calculate the volume under the cross sections, to work out the volume the old hand method.

Save your job by picking the **SAVE** command from the File pulldown menu. Then be sure to save your surfaces. Go to the MsModeling menu | Surface Operations, to bring this dialog up.



Highlight both surface names, then pick the Write QSB button.



Name the QSB file VOLUMES, then pick Save to finish the command. Pick OK to exit the previous dialog.

(End of tutorial)

Road Design Tutorial

Because of the size and complexity of this tutorial we have broken it down into 11 smaller steps to make it easier for you to follow.

Step 1) Opening the Job

Step 2) Create the Ground Surface

Step 3) Rendering the Surface

Step 4) Inputting the Horizontal Alignment

Step 5) Stationing and Saving the Horizontal Alignment

Step 6) Create Profile

Step 7) Design New Profile

Step 8) Create Cross Section Template

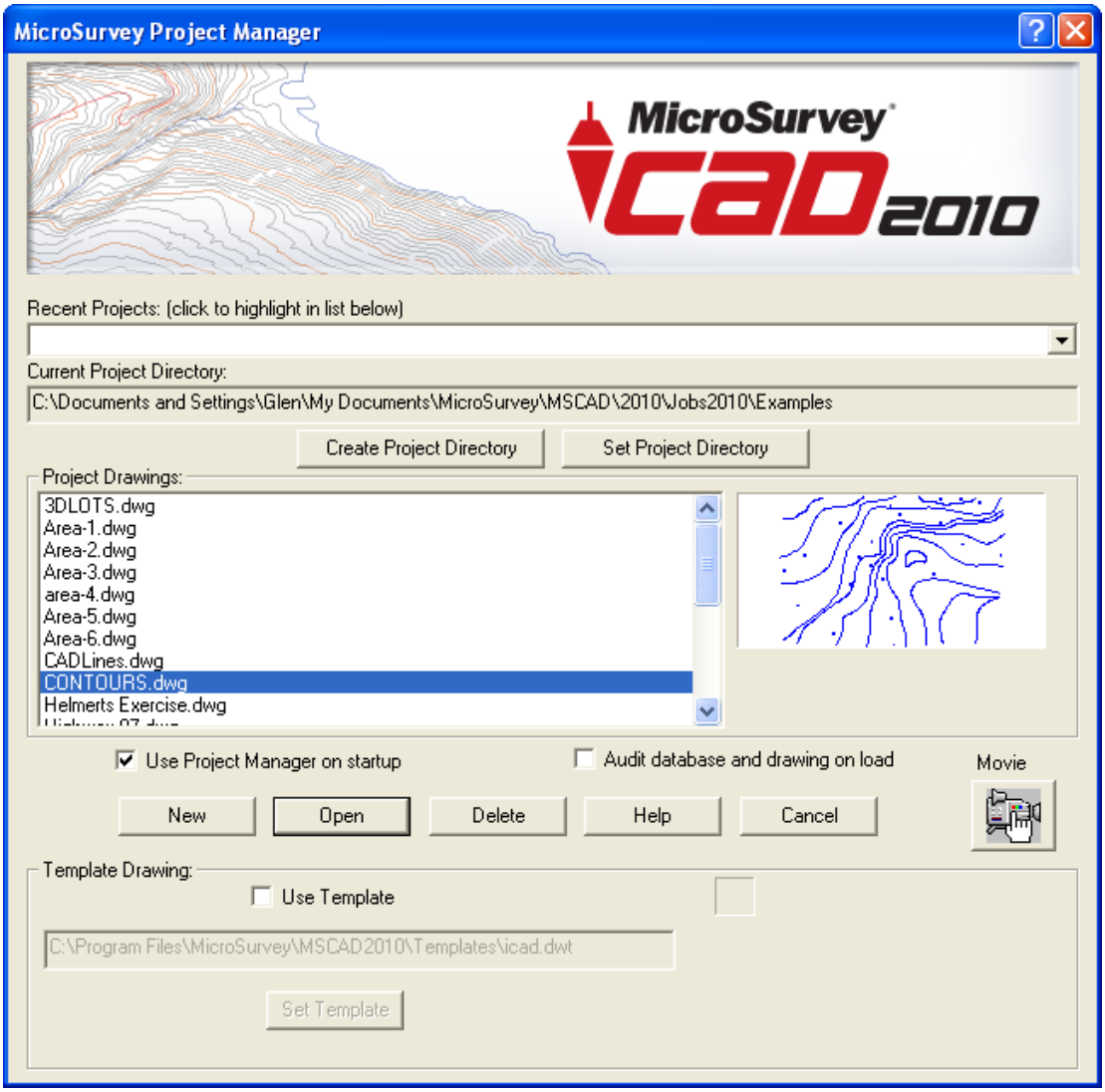
Step 9) Create New Road Surface

Step 10) Output Cross Sections

Step 11) Saving the Drawing and Surfaces

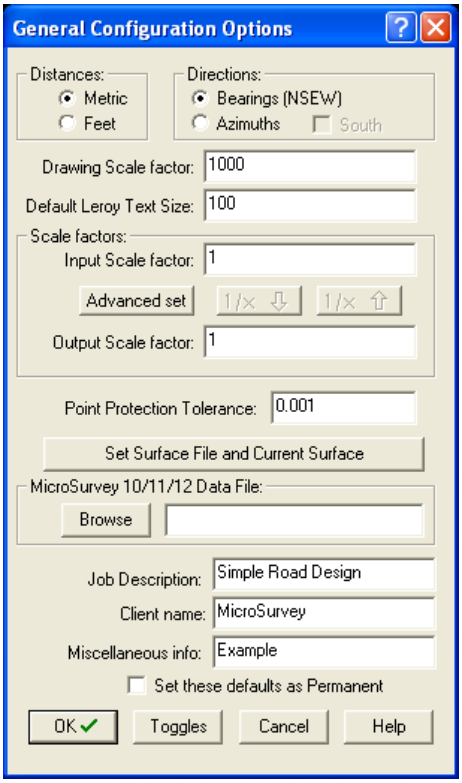
Step 1) Opening the Job

Start by opening the CONTOURS.DWG file from the Project Manager. The CONTOURS.DWG file should reside in your C:\Documents and Settings\UserName\My Documents\MicroSurvey\MSCAD\2010\Jobs2010\Examples directory by default. (where UserName is the user logged into that computer)

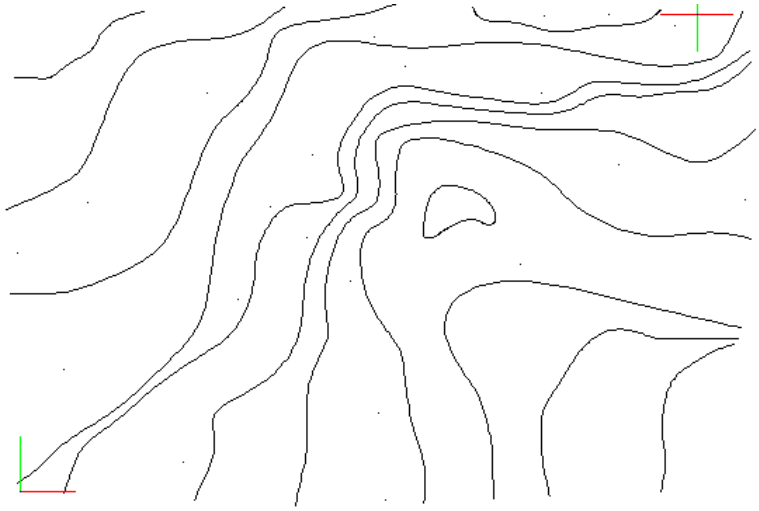


Pick on the job name and then pick the **Open** button.

The system General Configuration Options should be set to match the following for this job to work cleanly. Press the **OK** button once they are confirmed to be correctly set.

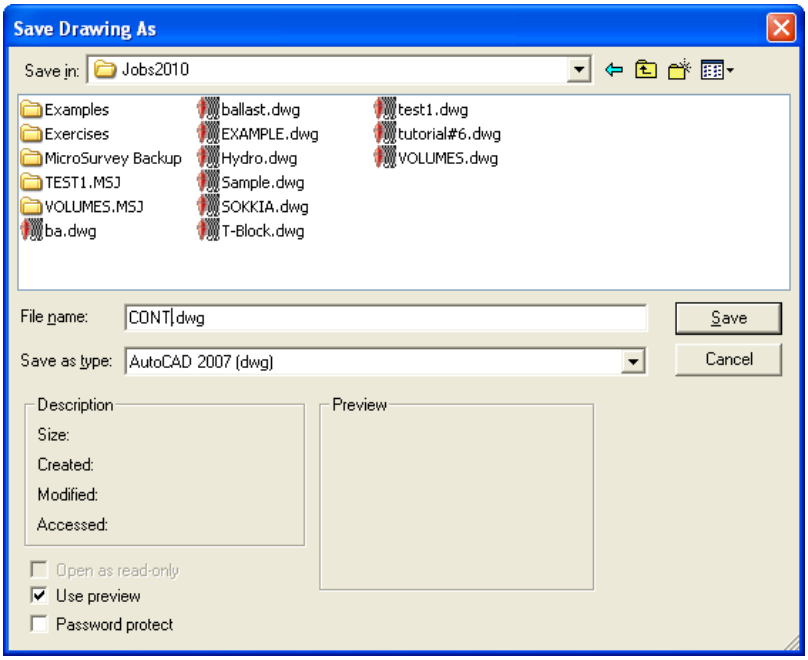


You will see a series of contours and a few points. They will be used to define your existing surface.



Do the SAVEAS command to create a new drawing using the contours as a starting point. This will protect the original data so you can execute the exercise again if you wish.

Type **SAVEAS** and press **enter**, or go to the File pulldown menu and pick on the **SAVEAS** command..

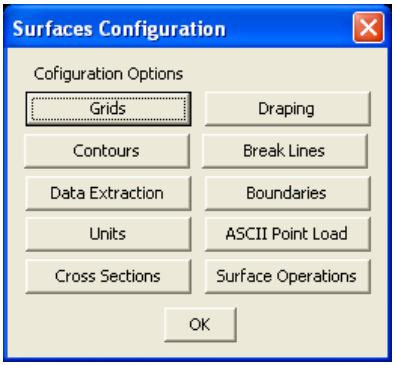


Change the default folder to save in **C:\Documents and Settings\UserName\My Documents\MicroSurvey\MSCAD\2010\Jobs2010** (where UserName is the user logged into that computer) and change the file name to **CONT.DWG** then pick the **SAVE** button to continue.

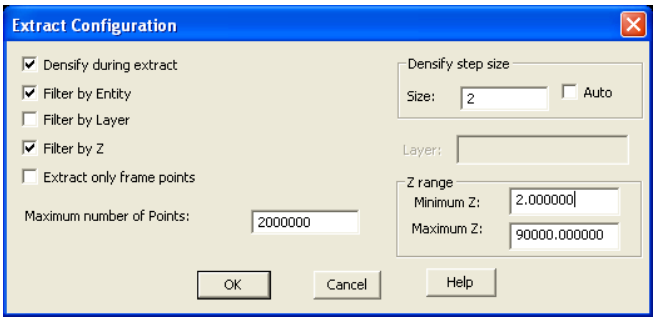
Step 2) Create the Ground Surface

Next, we need to extract all of the 3D point data and 3D breaklines (contours) to create the existing surface.

To set the program up so we can select only the data required to extract to a surface, we need to go to the MsModeling menu | Configuration Settings.



Pick on the Data Extraction button
Turn on the toggle for Filter by Entity and set your Density Step Size to 2 by turning the Auto option off.

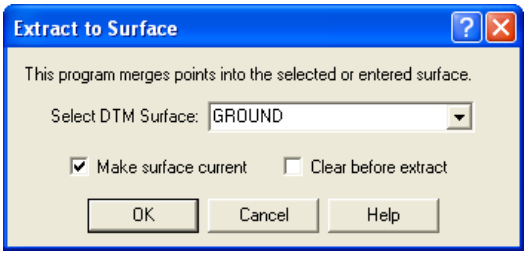


Pick OK to return to the previous dialog and OK again to exit the dialog.

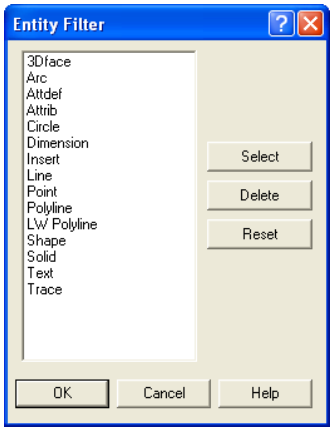
Next we will load the Modeling toolbar from the **MsModeling pulldown** menu by picking on the option **Modeling Toolbar**. The following toolbar will appear on screen. Move it to a convenient location on your screen (can be docked anywhere you wish).

To extract points to a surface, **pick this button**. 

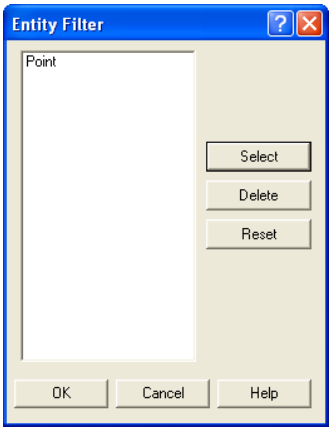
The following dialog box will appear. Please fill it out as shown below and then pick the **OK** button to continue.



After picking the OK button you will be asked to Pick the correct items from a filter list, to extract entities from the drawing. You will then see the following dialog:



Pick on POINT and then pick the Select button.



Points will now be the only entity that can be selected.

Pick OK to continue:

The command line will now display:

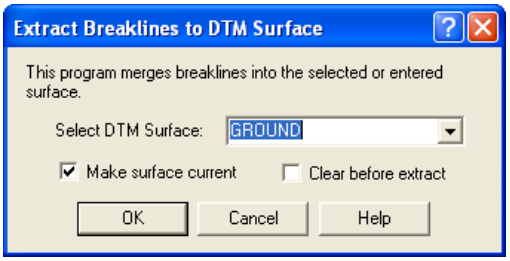
Return to select all visible or
Select entities:

We need all of the points on screen to form the top surface so simply press the ENTER button to grab them all.

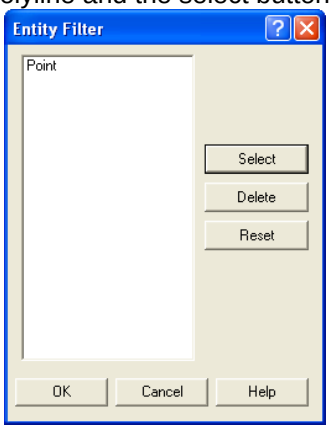
It should report in the command prompt area;
21 points total in surface.

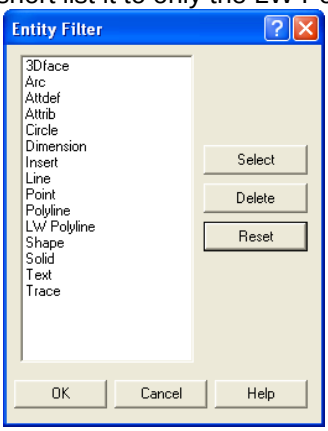
So far we have the points that help define the surface but we now also need the breaklines.

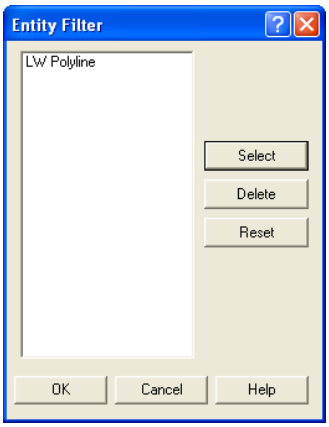
To extract the breaklines to the same surface, **pick this button**. 
The following dialog box will appear. Please fill it out as shown below and then pick the **OK** button to continue.



After picking the OK button the Entity Filter dialog will come up again.
It will default to only points being the list. Pick Reset to see the complete list. Then pick on LW Polyline and the select button to short list it to only the LW Polyline.







Pick OK to continue:

The command line will now display:

Return to select all visible or
Select entities:

We need all of the linework on screen to help form the top surface so simply press the ENTER button to grab them all.

The command line will now display:

1916 additional points added to current surface

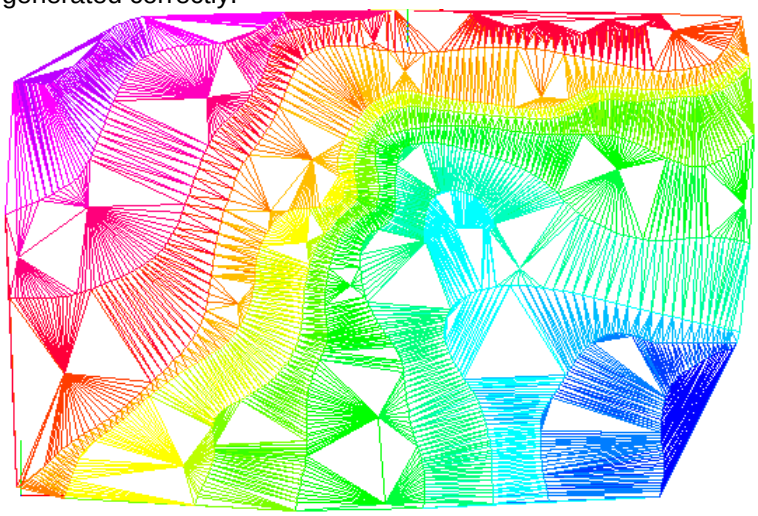
Next we need to create a TIN for this surface. **Pick this button**.  from the palette.

The TIN command will ask you several questions. Answer them as follows;

current surface <GROUND>:(or Select): <**Enter**>

None/Show/Draw/Redraw <Show>? <**Enter**>

This will temporarily display the TIN on screen, so we can confirm that the TIN has been generated correctly.

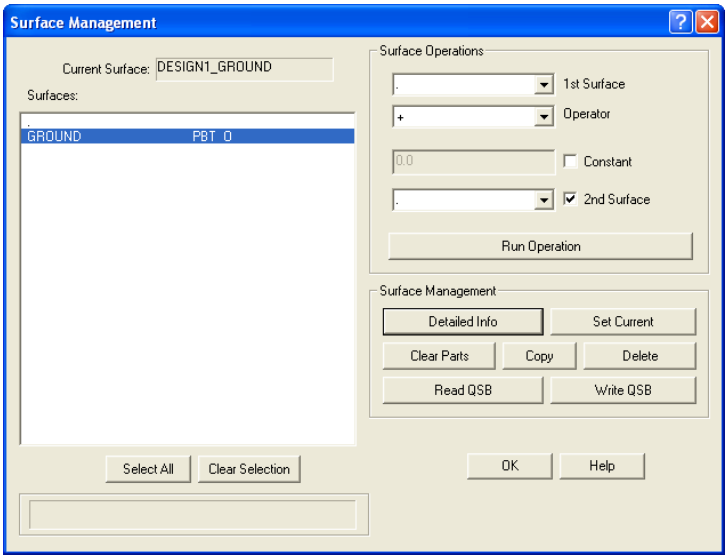


A redraw or zoom command will remove the TIN from the screen. The Tin will remain in memory.

Step 3) Rendering the Surface

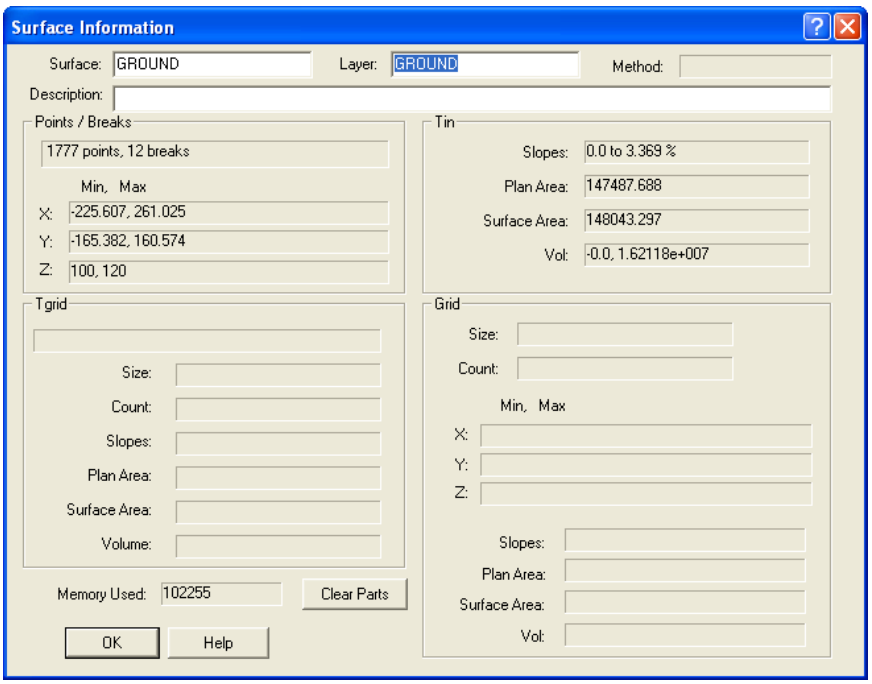
To look at the surface from any 3D angle, we would first need to Draw the surface to our screen, rather than just using the Show option.

To control what layer the TIN is drawn on, go to the MsModeling menu | Surface Operations (or pick on this toolbar button ) to bring up this dialog.



Highlight the Ground surface and then pick the Detailed Info button to bring up the next dialog.

At the top in the middle of this dialog, you can control what layer the TIN will be drawn on.



Set it to GROUND and pick OK to return to the previous dialog. Then pick OK again to exit the dialog.

Now we can draw the TIN into our drawing. **Pick this button**.  from the toolbar.

The TIN command will ask you several questions. Answer them as follows;

Surface name <GROUND>: <**Enter**>

None/Show/Draw/Redraw <Show>? D <**Enter**>
Lines/3dFaces/Polyface <Polyface>: <**Enter**>
Select Invisiblity... All/Interior/Between breaks/None <None>: <**Enter**>

Now the TIN will be part of the drawing and drawn on layer Ground.

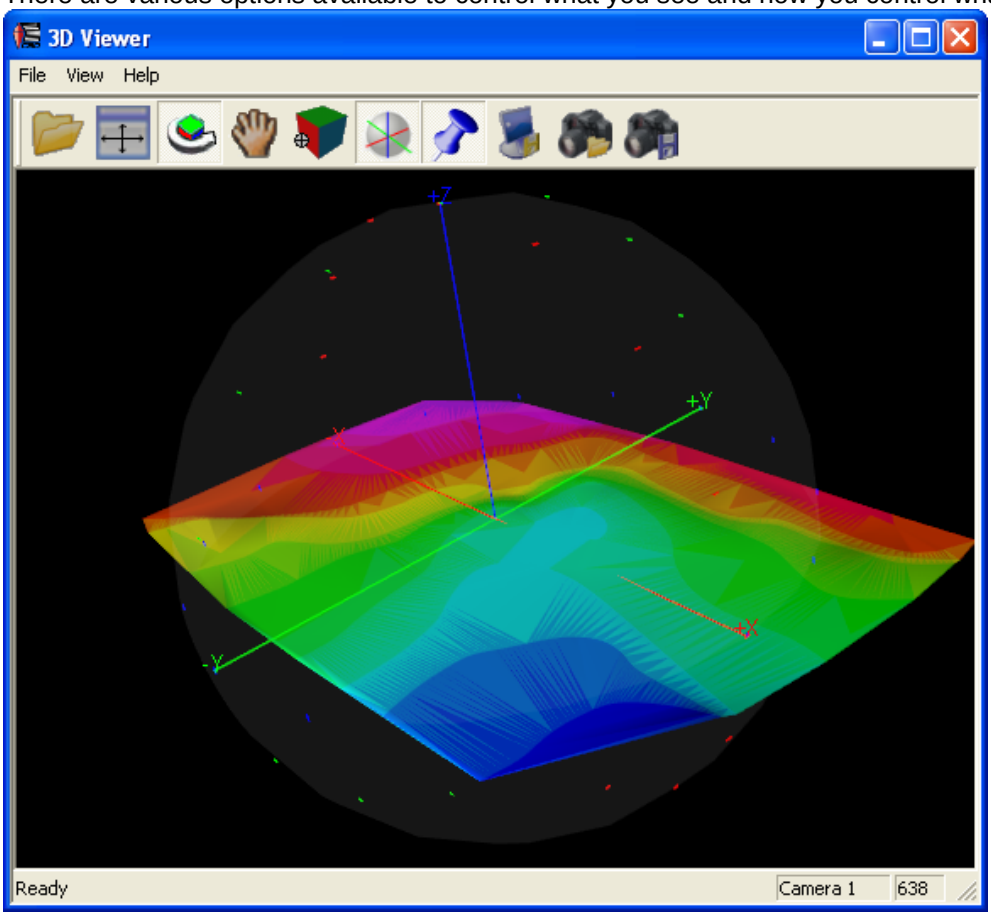
To make it easier to view, we will isolate the ground layer, so nothing else is on screen.

You can do this by going to the MsTools menu | Layer Control | Isolate

Select entities: ← pick the TIN you just drew
Entities in set: 1 <enter>
Select entities: <enter>

Now all you have on screen is the TIN layer.

Go to the View menu | Rendering | Render and you will see the following Render Window:
There are various options available to control what you see and how you control what you view.



You can spin the surface around in real time by use of the mouse. The Rendering chapter covers all of the different options you have available.

You can now exit the window and return to the normal drawing.

To bring the rest of the layers back to the screen go to the MsTools menu | Layer Control | UnIsolate .

The TIN does not need to remain in the drawing for the rest of the exercise, and can be deleted by going to the Edit menu | Delete, and picking the tin to select it, and press enter to complete the command.

Step 4) Inputting the Horizontal Alignment

Now that we have our surface we can create our alignment.

Start by going to the **MsDesign pulldown menu | AutoRoute** and picking the Design Alignment command.

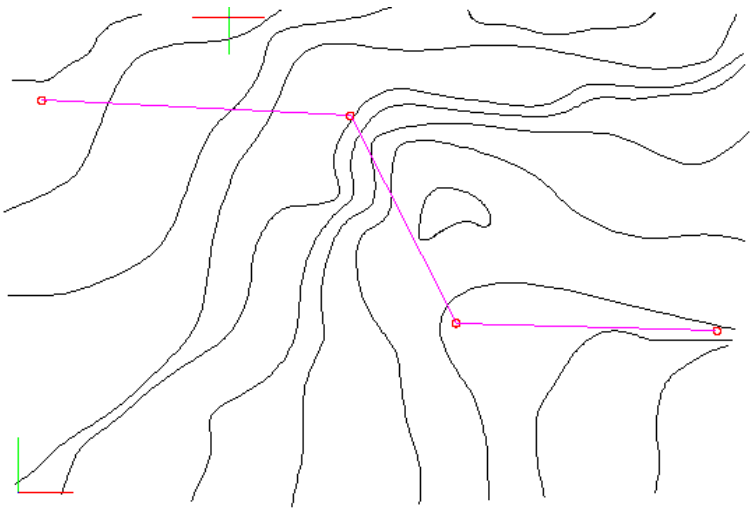
In the Command prompt area, it will ask you the following, please enter the information shown:
Enter name for horizontal alignment: <>: **MAPLE**

* NOTE *
When naming a horizontal alignment, be sure to use only a single word, with no spaces, as the name, such as:
ROAD1, Orange_Side_Road, Maple_Street, Pine-Street, Maple

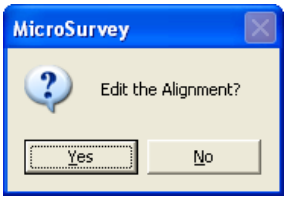
From point: **-200,100**
To point: **1,90**
To point: **70,-45**
To point: **240,-50**
To point: <**Enter**>

Note: It is not necessary to enter exact coordinates to create an alignment. You can also "pick" the points on screen using Object Snaps, as appropriate.

The center line of the road is now drawn.



Next you will be asked if you wish to edit the alignment:

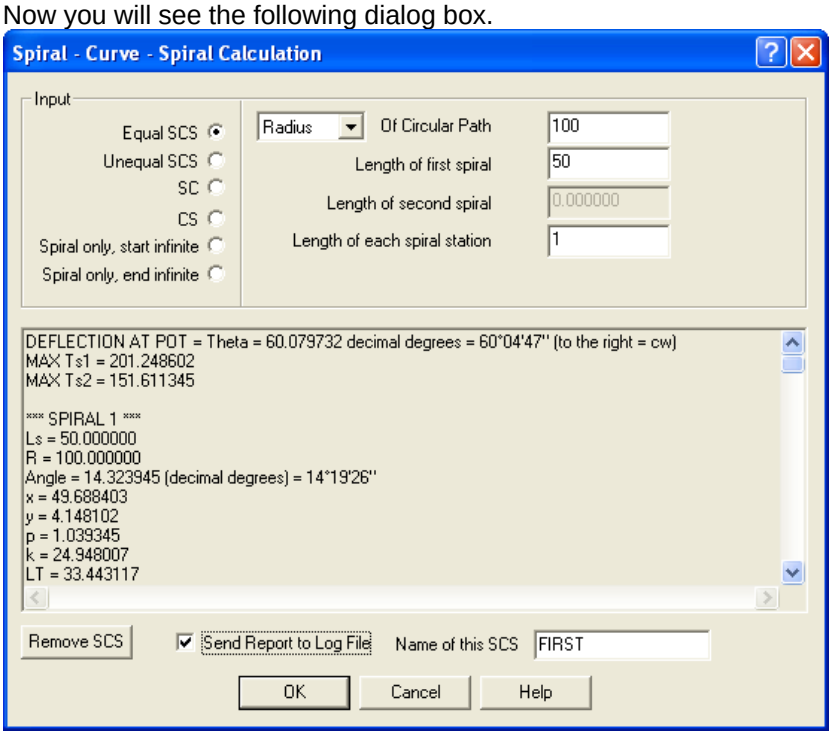


Answer **Yes** so we can insert new curves and spirals.

Edit alignment. Add/Delete/Move/sHift/Curve/Scs/Tangent: **SCS**

Select POT (or linework) to add/edit scs: <**pick the red circle at the FIRST bend in the road**> (zoom in if you can not pick it easily. Don't miss it!)

Now you will see the following dialog box.

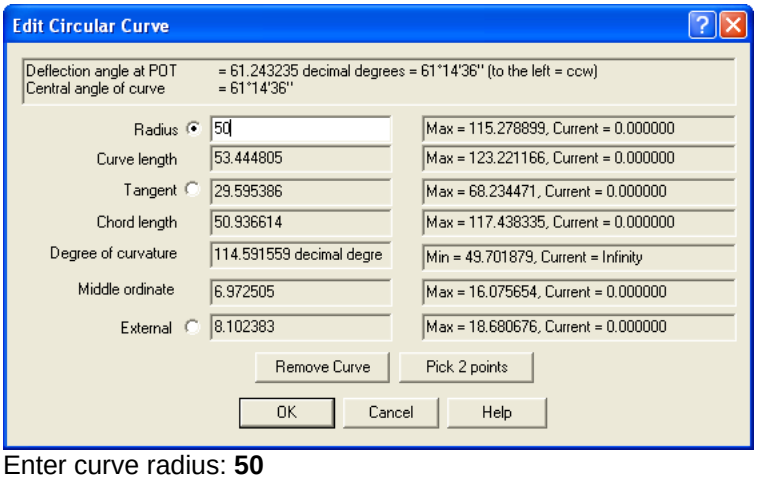


Fill in the values shown on the dialog above, and the calculations are automatically updated.You can name the spiral-curve-spiral and export the report to the View Log file.
Pick the **OK** button to place the spirals and curve on the screen.

Select POT (or linework) to add/edit scs: <**Enter**>

Edit alignment. Add/Delete/Move/sHift/Curve/Scs/Tangent: **Curve**

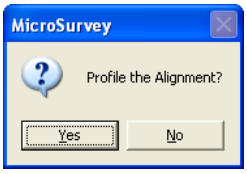
Select POT (or linework) to add/edit curve: <**pick the red circle at the SECOND bend in the road**> (zoom in if you can not pick it easily. Don't miss it!)



Enter curve radius: **50**
The rest of the curve data it automatically calculated and displayed in the dialog.
Pick OK to draw the curve to the screen.
Select POT (or linework) to add/edit curve:<**Enter**>

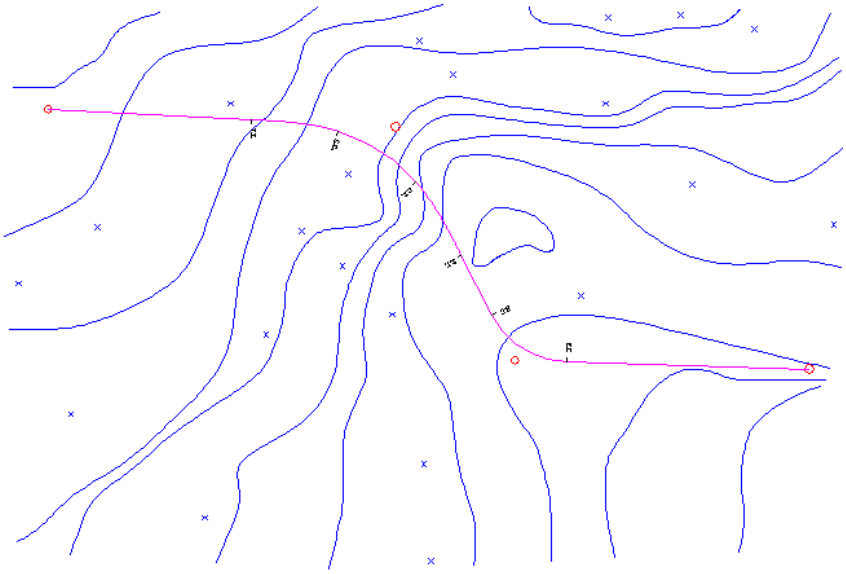
Edit alignment. Add/Delete/Move/sHift/Curve/Scs/Tangent: <**Enter**>

Now you will be asked if you wish to continue and profile the existing ground surface?



Pick **NO** for now.

At this point your job should look like this (your colors may be different):

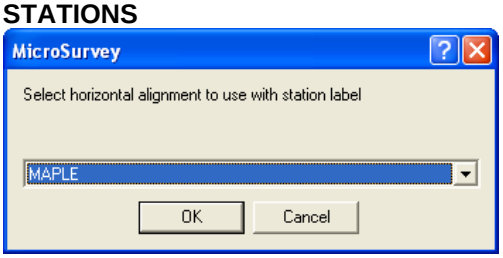


Step 5) Stationing and Saving the Horizontal Alignment

Before we continue with the profile lets label the stationing along the alignment.
Go to the **MsDesign pulldown menu | AutoRoute** pick on the Label Alignment option

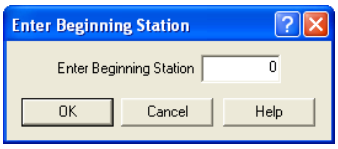
Label alignment. Stations/Offsets/Newpt/Existingpts/Report: **S**

STATIONS



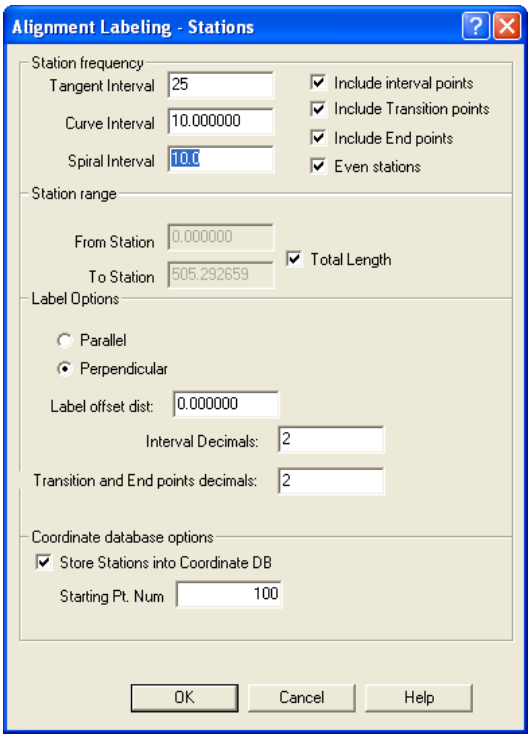
There are many options to label and create points along the alignment and on offsets, as well as reports.

We are going to simply label points along the centerline in this example.



Pick **OK** to continue

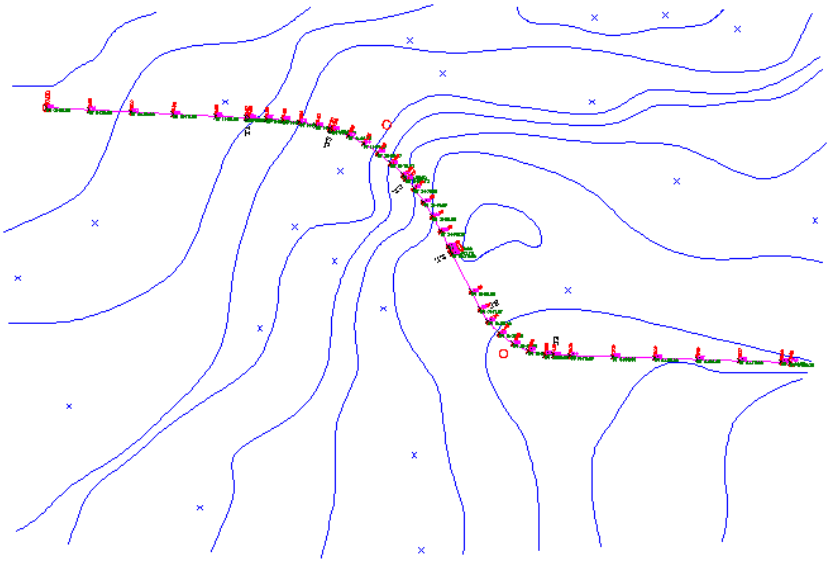
After picking the Alignment name and beginning station, you will have the following dialog box appear:



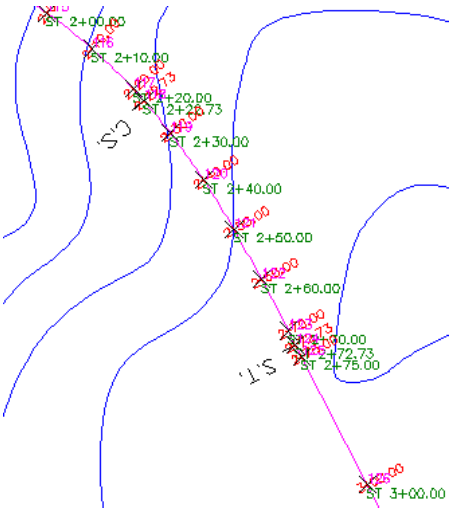
Fill in the table as shown and pick **OK** to continue.

Label alignment. Stations/Offsets/Newpt/Existingpts/Report:<**ENTER**>

Here is what you will see on screen,



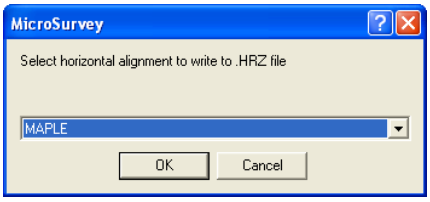
and a close up showing a portion of the labeling,



You can see that the tangent, curve and spiral have had the stationing labeled, as well as the beginning of Curve and Spiral. New points have been created along the centerline with the description set as the station. Some text overlap is apparent and a simple move command can clean this up.

Now we should save this alignment to a file to protect us and allow us to retrieve it without having to recreate it from scratch.

Under the **MsDesign pulldown menu | AutoRoute** pick on the **Write .HRZ** File option.



confirm the alignment name and pick OK to continue. On the command prompt window you will see the message that tells you where and what the file is called.

Alignment saved in C:\Documents and Settings\Glen\My Documents\MicroSurvey\MSCAD\2010\Jobs2010\MAPLE.HRZ.

Here is the contents of this file:

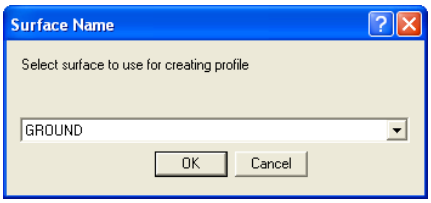
HRZVERSION=3::MAPLE
100.00000000,-200.00000000,0.00000000
90.00000000,1.00000000,0.00000000,50.00000000,50.00000000,1.00000000,1,100.00000000,0
-45.00000000,70.00000000,50.00000000,0,0,0,0,0,0
-50.00000000,240.00000000,0,0,0,0,0,0,0

Step 6) Create Profile

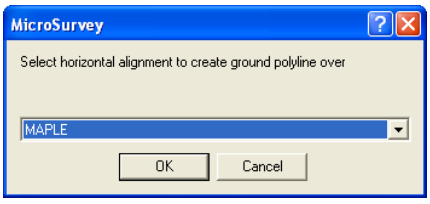
Now that we are finished labeling and saving the horizontal alignment – lets continue with the vertical profile.

Go to the **MsDesign pulldown menu | AutoRoute** and pick the **Extract Existing Ground Profile** option.

You will be asked to pick from a list of surfaces – we want **GROUND** as our surface.



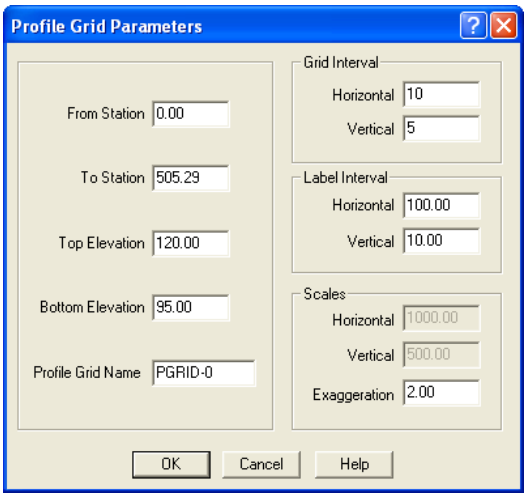
Pick on the word **GROUND** and pick the **OK** button.



Confirm the alignment you are working with and pick **OK** to continue.

Next you will be shown a dialog box that will control how the profile will be drawn.

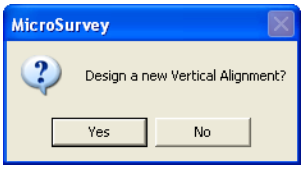
Change the settings to match this dialog:



The only value you need to change is the Grid Interval Horizontal from **100 to 10**. Press the **OK** button to continue.

Pick lower starting corner of grid: <**Pick Somewhere Appropriate – maybe Above the Alignment**>

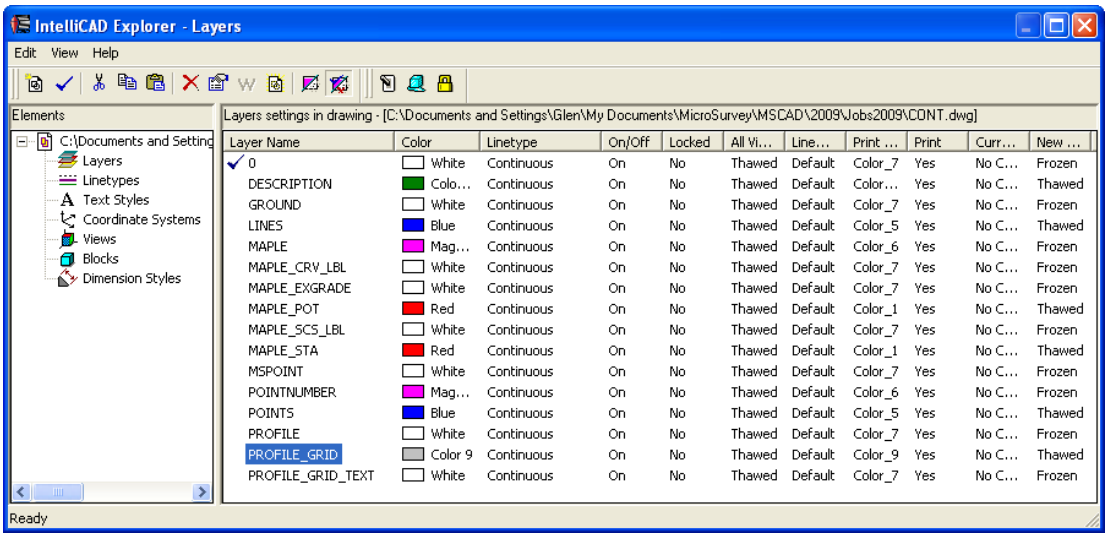
You will be asked if you wish to create the design profile?



Answer **NO** for now.

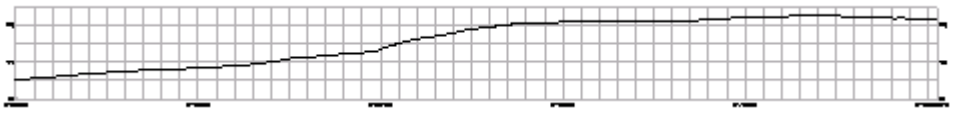
Now lets set the Profile_Grid layer to gray (color 9) for easier visibility, Go to the **Explore Layer** button  and pick on it.

Then pick on the layer name above, and change the color to gray(9).



The close the dialog to continue.

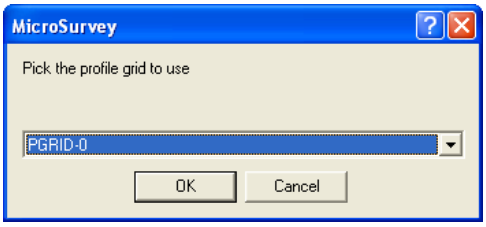
Now the profile will look like this:



Step 7) Design New Profile

Now that we have had a chance to look over our existing profile, we now need to create a design alignment.

Go to the **MsDesign pulldown menu | AutoRoute** and pick on the **Design Vertical Alignment** option.
Draw new profile grid or use existing New/<Existing>: <**Enter**>



Confirm the grid to work on and pick **OK** to continue:

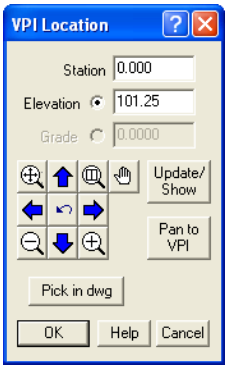
Enter name for vertical alignment: <>: **MAPLE**

NOTE:
When naming a Vertical alignment, be sure to use only a single word, with no spaces, as the name, such as: ROAD1, Orange_Side_Road, Maple_Street, Pine-Street, Maple

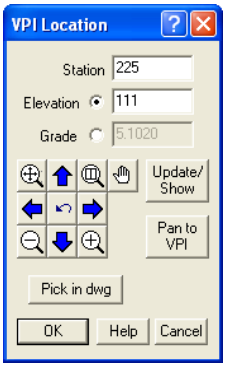
At this point, the program will draw a rubber band line from the bottom left corner of the graph. This helps you to find the starting end of the profile. Pick on the graph where you wish to start the new profile line.

Pick first VPI location: <**pick near the left edge around the existing profile**>

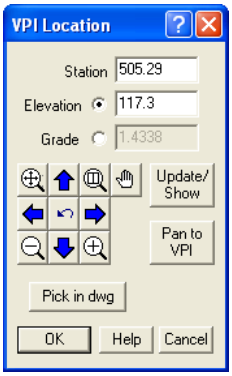
Change the dialog box that comes up, so the station and elevation look like the following;



Pick the **OK** button.
Next pick somewhere around the middle of the profile and change the dialog box so the station and elevation match the following;

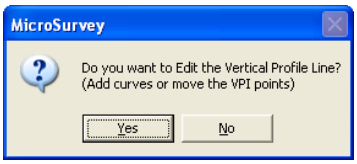


Pick the **OK** button.
and lastly pick over near the top right and change the settings so the station and elevation match the following.



Pick the **OK** button.
Press **ENTER** to continue.

Next you will be asked:



Pick **YES** to continue.

Now you will be prompted,

Add/Curve/Delete/Move/Freezethawgrid:**CURVE**

Select VPI (or linework) to add/edit curve: <Pick **the Red Circle at the FIRST bend in the vertical alignment**> (zoom in if you need to, to be able to pick the red circle cleanly – don't miss it)

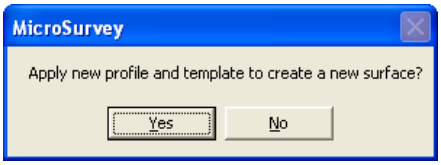
Current curve length (in stations) = **0.000000**
Select method to define curve length: Pick/Type: **TYPE**

Enter curve distance: **150** <**Enter**>

Select VPI (or linework) to add/edit curve: <**ENTER**>

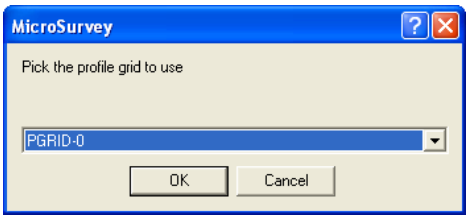
Add/Curve/Delete/Move/Freezethawgrid: <**ENTER**>

Next you will be asked if you wish to pass our cross section template along the design alignment and create a new surface.



Answer **NO** for now because we need to create the template first.

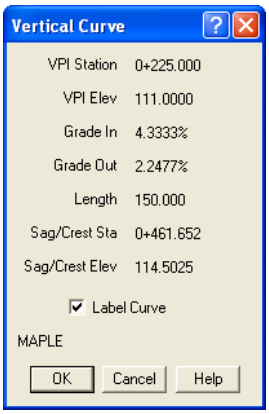
Before we create the Cross Section Template, lets label the vertical curve.
Go to the **MsDesign pulldown menu | AutoRoute** and pick on the **Query/Label VPI** option.



Confirm the vertical alignment grid to use, pick **OK** to continue:

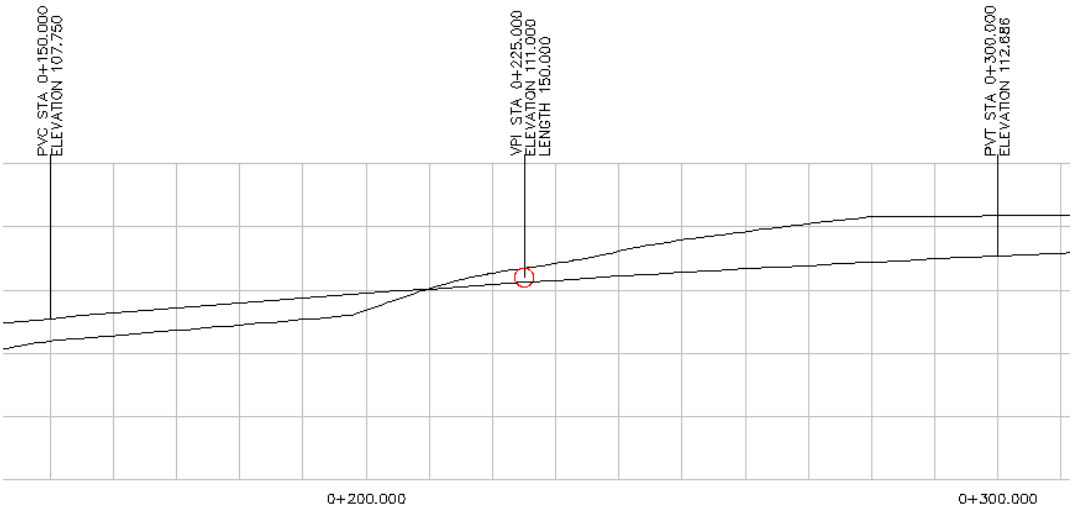
Select existing VPI: <**Pick the Red Circle at the FIRST bend in the vertical alignment**> (zoom in if you need to, to be able to pick the red circle cleanly – don't miss it)

You will see the following dialog box.



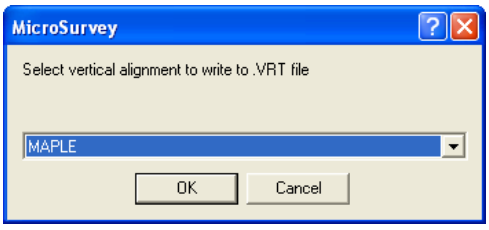
Be sure to pick the **Label Curve** box to turn it on. Then pick the **OK** button to continue.

The curve will be label as shown below:



Select existing VPI:<**enter**>
Now to give us a copy of the vertical profile in a file,

Go to the **MsDesign pulldown menu | AutoRoute** and pick on the **Write .VRT File** option.



Confirm the vertical alignment and pick **OK** to continue.

The command prompt will display the following to confirm it was saved.
C:\Documents and Settings\Glen\My Documents\MicroSurvey\MSCAD\2010\Jobs2010\PGRID-0.VRT saved.

Here is the contents of this file:

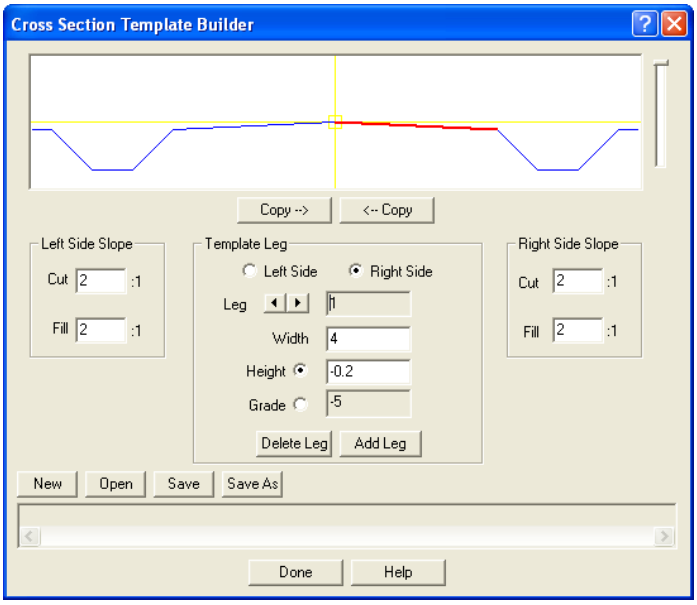
```
VPI 1     STA 0.000          Z 101.250
VPI       STA 225.000        Z 111.000  L 150.000
VPI       STA 505.290        Z 117.300  L 0.000
END
```

Step 8) Create Cross Section Template

Now you will create a template for our road cross section.

Go to the **MsDesign pulldown menu | AutoRoute** and pick on the **Create Cross Section Template** option.

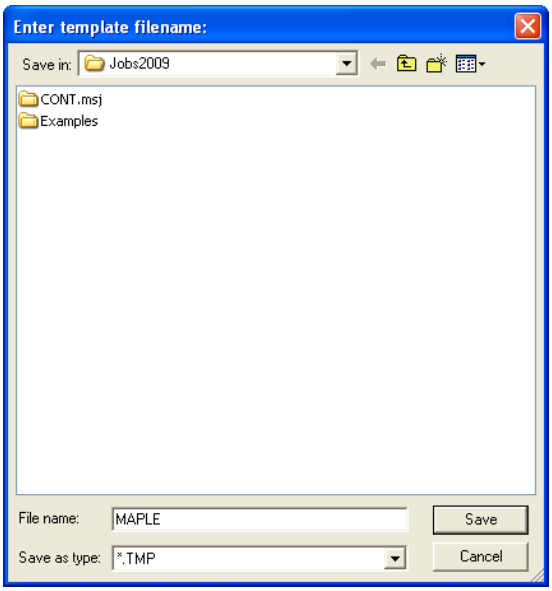
You will see a template editor on screen. This editor has many options that need to be filled out.



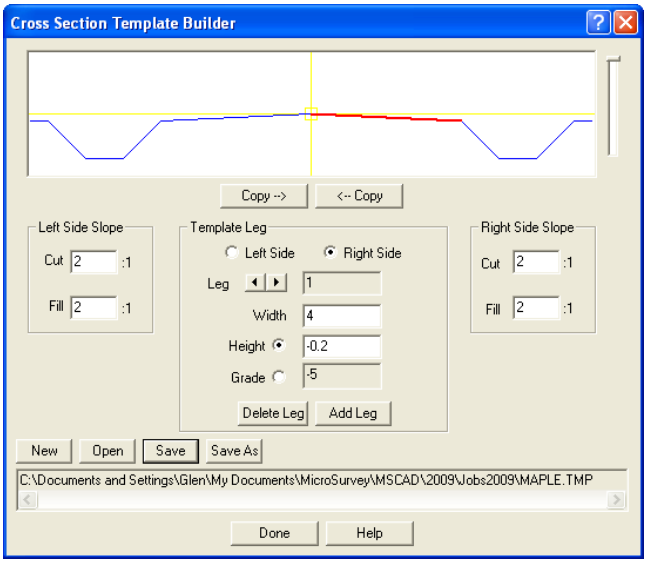
We will use the default supplied, but make note of all of the options you have available.

Pick the **SAVE** button. This will allow you to save the template for future use in this and any other project.

Give the template the name of **MAPLE**, as shown.



Pick the **SAVE** button to continue.



The file name and location will now be displayed in the dialog.
Pick DONE to continue.

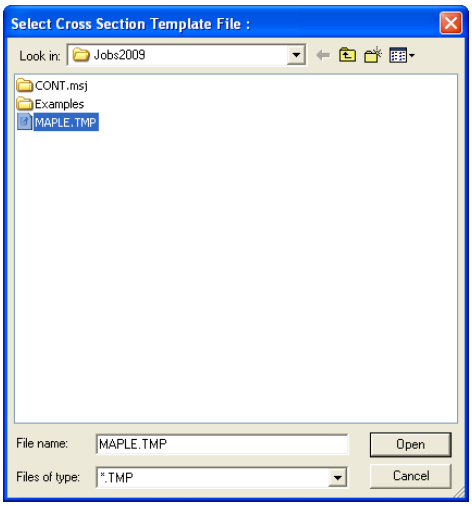
The following message is also placed in the command prompt window.

Cross section template file saved as C:\Documents and Settings\Glen\My Documents\MicroSurvey\MSCAD\2010\Jobs2010\MAPLE.TMP.

Step 9) Create New Road Surface

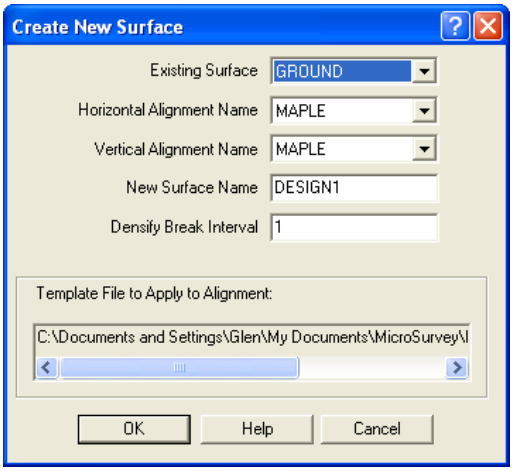
Now that the cross section template is complete, we can now apply it to the design alignment. Go to the **MsDesign pulldown menu | AutoRoute** and pick on the **Create New Design Surface** option.

You will then see the following dialog box:



Pick on our **MAPLE** template then pick the **OPEN** button to continue.

The following dialog comes up next,

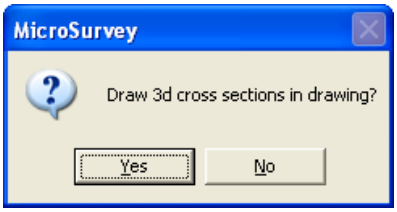


You need to confirm the surface and alignment names match the box shown above. Press the **OK** button.

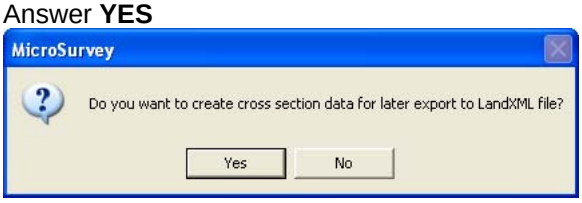
After a short period of time (a few seconds or so), the following prompt appears in the command window.

Draw or Show new TIN? Draw/Noshow/<Show>:

Press enter to default to Show

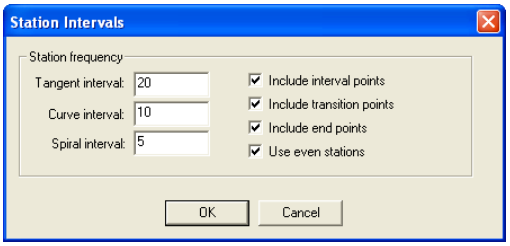


Answer **YES**



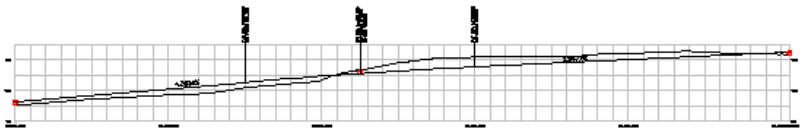
Answer **YES**

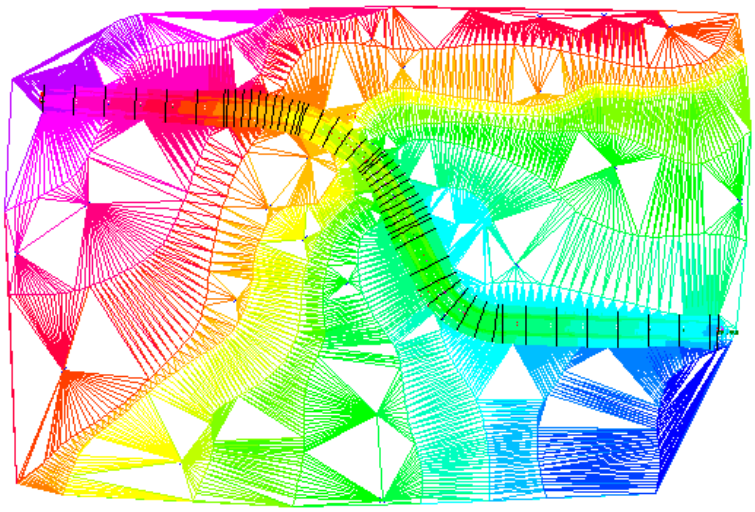
This will export a LandXML file that will be able to be uploaded to our FieldGenius data collector, for use in the field, or to many other programs that can read this file format.



Set the intervals as show. Pick **OK** to continue.

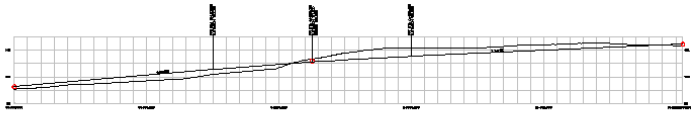
Your drawing should now look something like this:

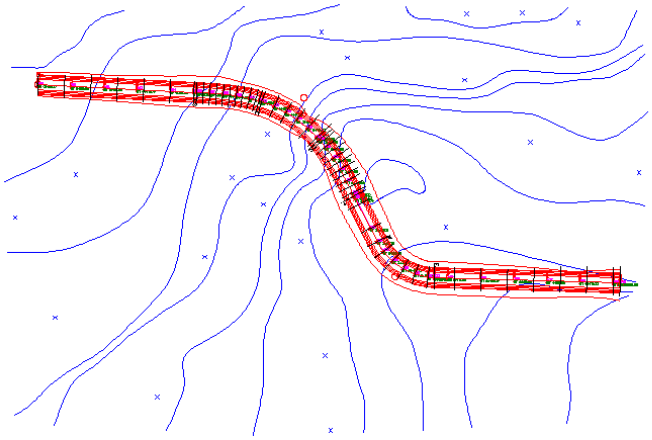




After seeing the TIN you can hit the **redraw** button to clear the TIN. The Surface does stay in memory for future use.

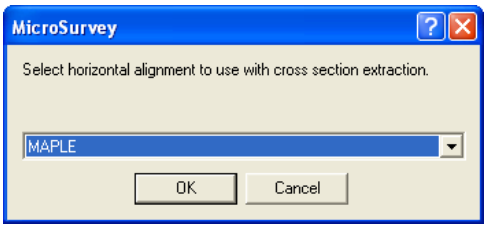
What you will now see on screen is the road with the template applied, showing the outer edge where the template intersects with the original surface.





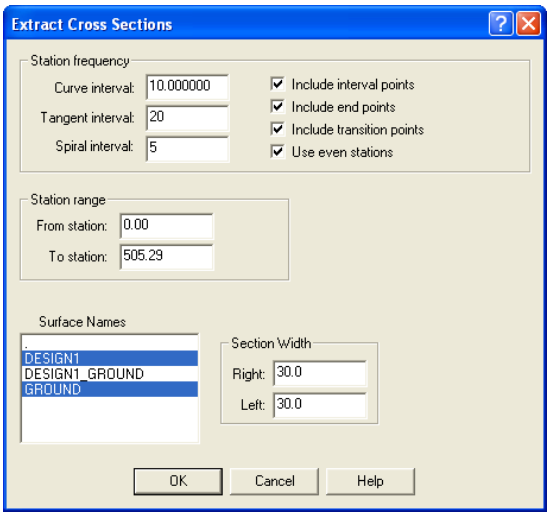
Step 10) Output Cross Sections

Now lets get some cross sections along the alignment.
Go to the **MsDesign pulldown menu | AutoRoute** and pick on the **Extract Cross Sections from Alignment** option.

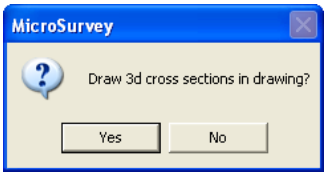


Confirm the Alignment and pick **OK** to continue.

Be sure to set the next dialog box exactly as shown below to ensure you get the correct results. Special attention to ensure you select **BOTH** surfaces as shown.

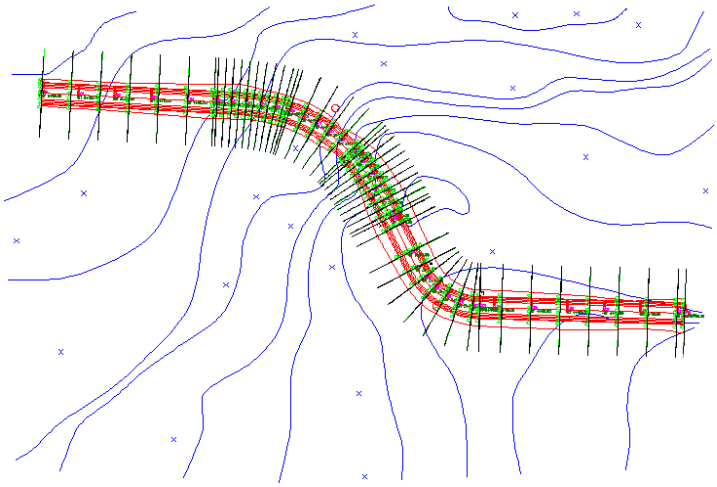


Pick the **OK** button to continue.

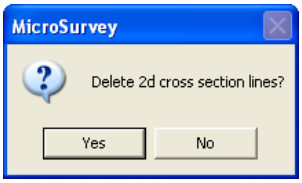


Answer **YES**.

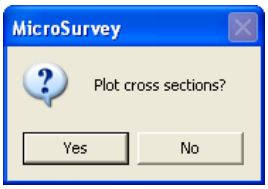
This will draw lines on the plan view of the alignment to show where the cross sections will be extracted from.



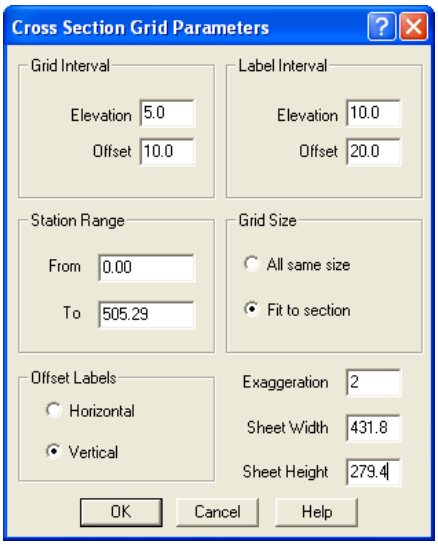
Then:



Answer **YES** then you will have only the 3D section lines left.



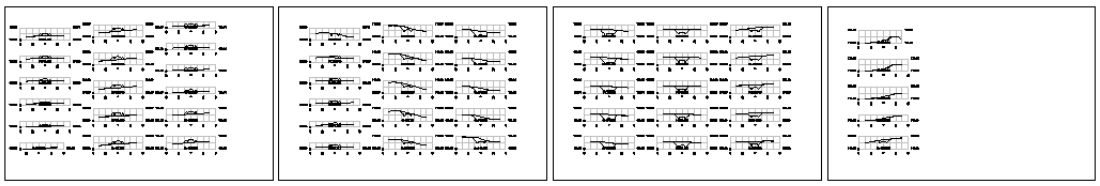
When you answer **YES** you will be shown another dialog box that controls the output of the sections. Please fill it out exactly as shown:



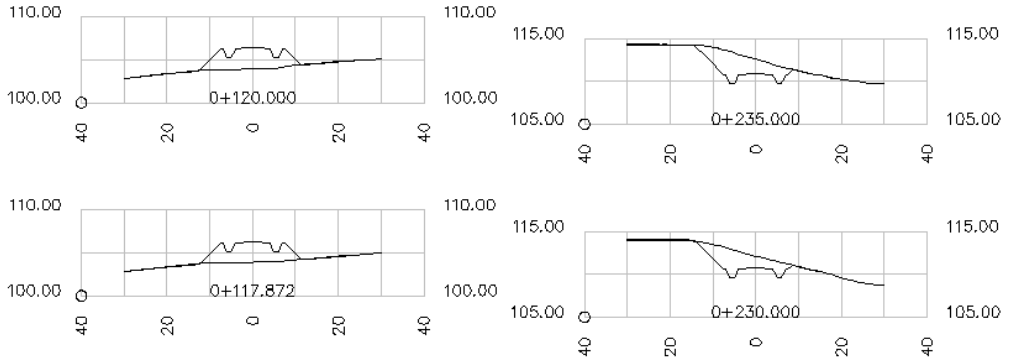
Pick the **OK** button to continue.

Pick lower left corner: <**this is the starting location for the sections to be drawn**> (go to the right of the drawing so they do not overlap on screen)

You will see the sheet size outlined and the sections draw within the sheet.



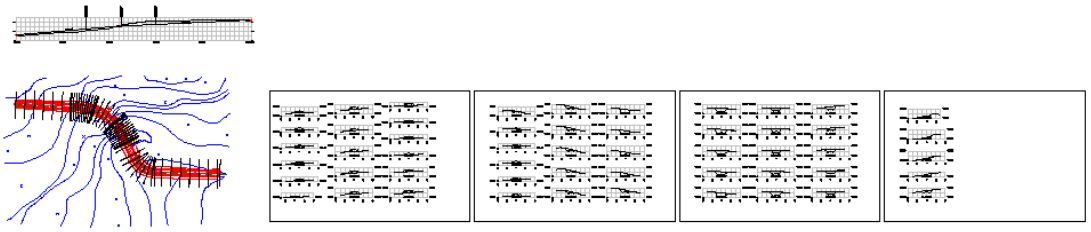
Changed the color of Layer **GRID** to gray (**9**) as we did for the profile, above. Here is a close up of a few of the sections:



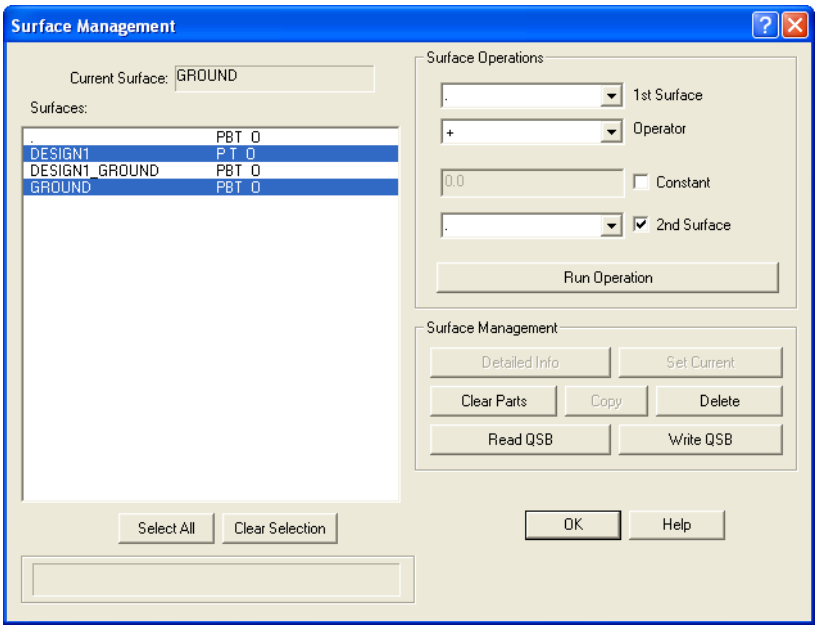
Step 11) Saving the Drawing and Surfaces

Be sure to save the drawing and the surfaces.

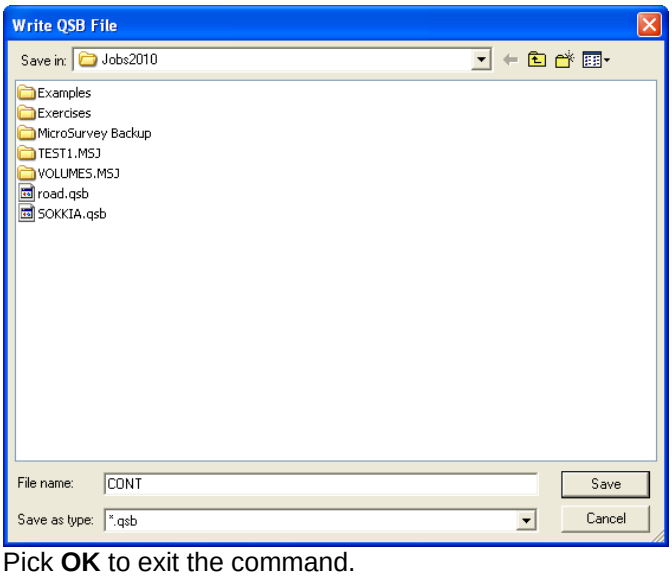
To Save the Drawing, Simply pick on the Save button or go to the File menu and pick on the Save command. Your finished drawing should look something like this:



To save the surfaces you need to go to the MsModeling menu | Surface Operations and this dialog will come up:



Pick on the 2 surfaces as shown above and pick the Write QSB button.
Enter in the file name **CONT** and pick **Save**.



Pick **OK** to exit the command.

Now the surfaces and the drawing are both safe! You can now exit the program with the ability to reopen the drawing and reload the surface file, if you need to do further work in it.

House Placement Tutorial

Because of the size and complexity of this tutorial we have broken it down into 9 smaller steps to make it easier for you to follow.

Step 1) Open the Job

Step 2) Working with the Toolbox

Step 3) Entering a Lot

Step 4) Defining the Lot Sides

Step 5) Entering a House

Step 6) Defining a House

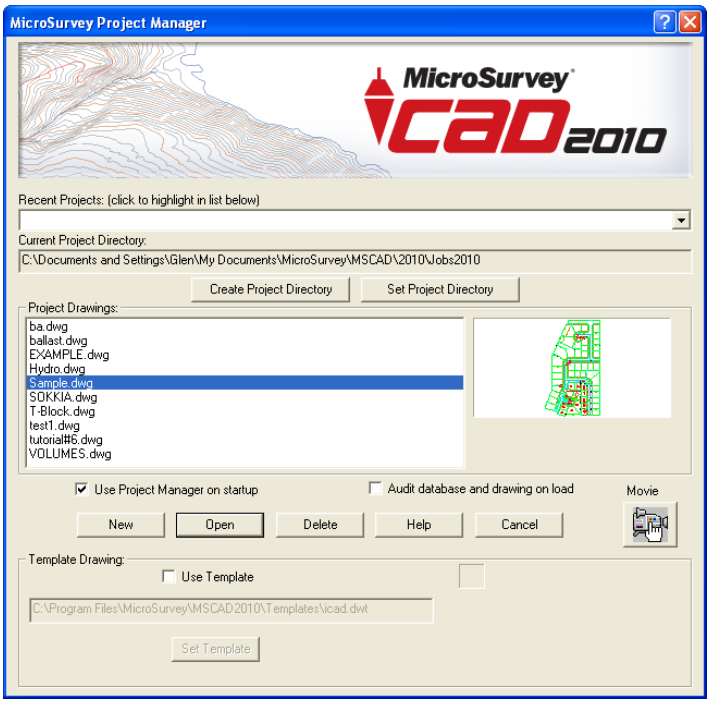
Step 7) Placing a House on the Lot

Step 8) Computing Stakes

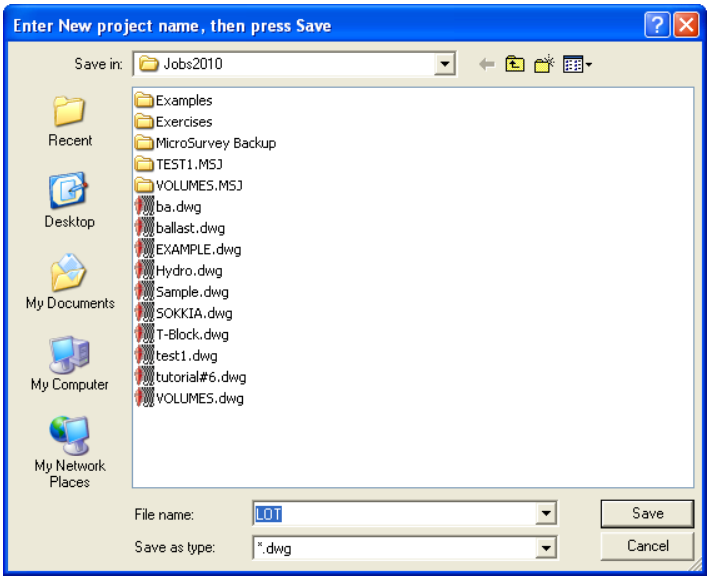
Step 9) Staking Reports

Step 1) Open the Job

To begin, start a new drawing by running the MicroSurvey Project Manager… command, found under the **File drop-down menu**.

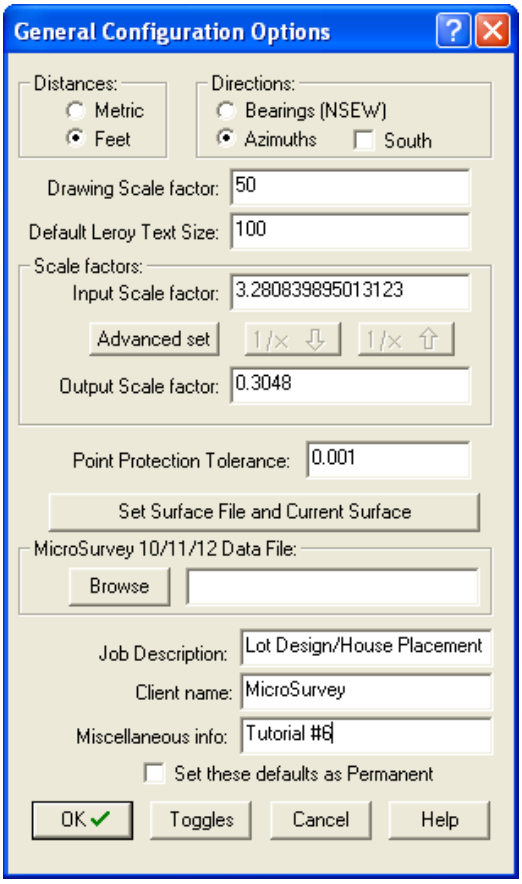


Pick the New button on the Project Manager, and name the job **LOT**.

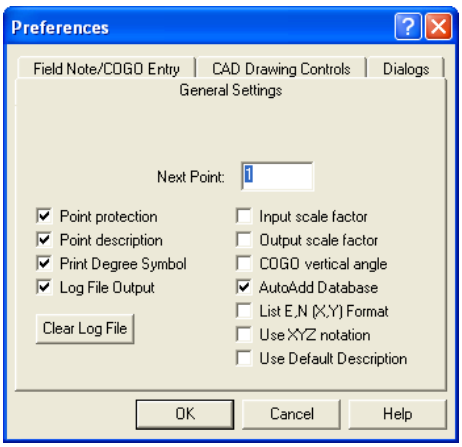


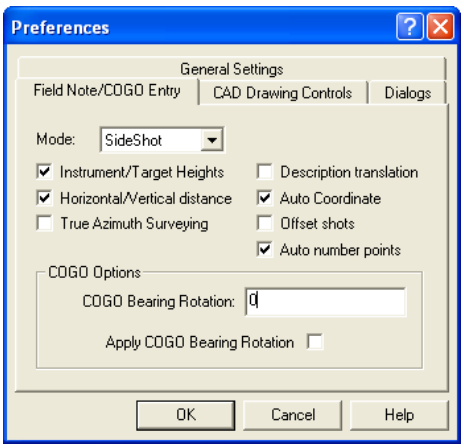
Pick **Save** to continue.

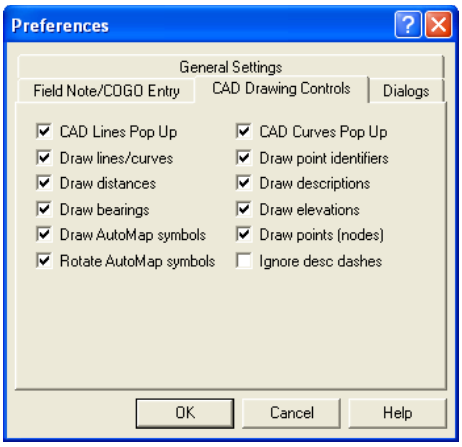
Next you will see the following dialog box.
Set the defaults as shown here

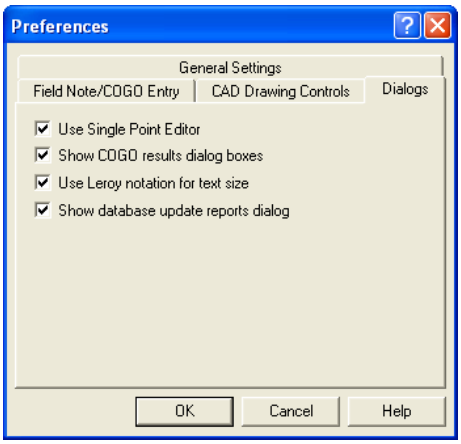


At the bottom of the above dialog box, pick on the **Toggles** button. This brings up the following dialog boxes.
Set the Toggles as shown here.









Now pick the **OK** button to return to the previous dialog and pick **OK** again to exit and save the settings in that dialog box.

Step 2) Working with the Toolbox

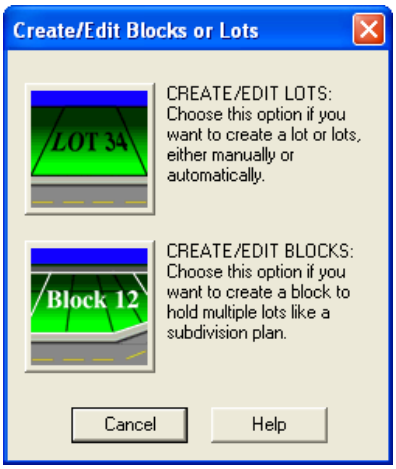
Go to the **MsTools pulldown menu -| Subdivision Toolbar…** option.

The toolbox and can be dragged to any location on screen (by picking in the top bar in the Toolbox and while holding the mouse button down, drag it to the desired location) to make it easy to access but not cover the drawing.

Step 3) Entering a Lot

Pick on this button: 

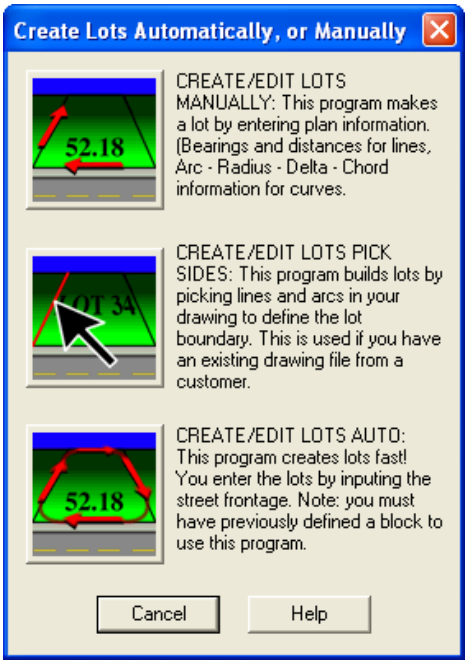
You will now be asked if you are entering a lot or block.



In this example we will pick on the **top button** to enter a Lot.

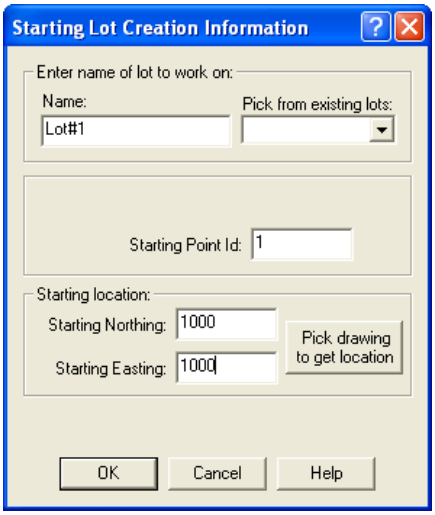
(Create/Edit Lots)

Now you will be asked which of the 3 different ways you wish to enter the lot information.



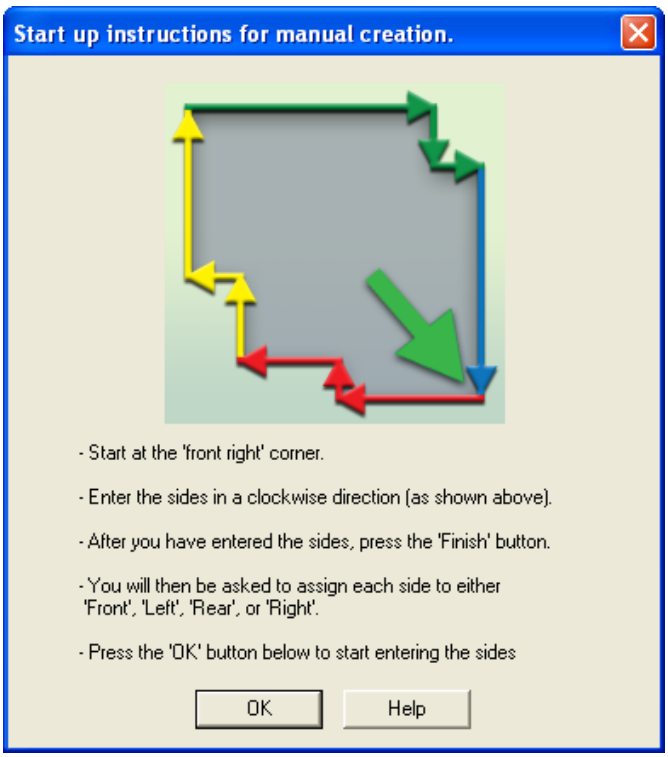
Pick on the first button: (Create/Edit Lots Manually)

Now fill out the next dialog as show, with the lot number.



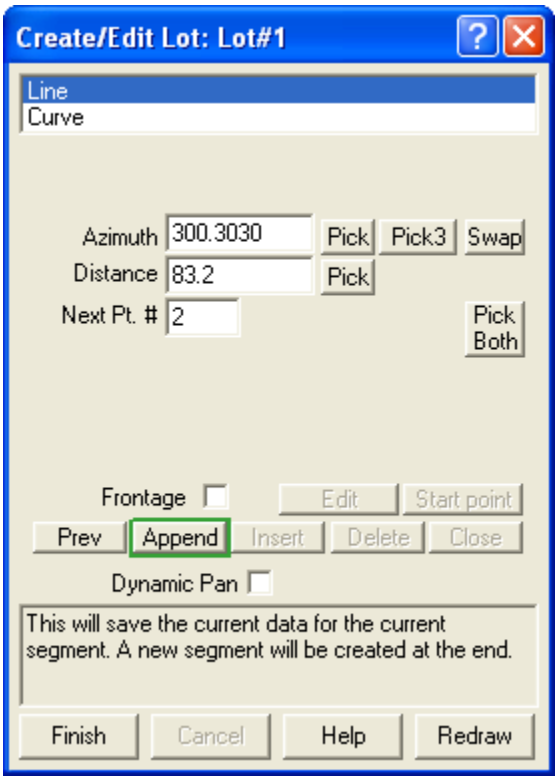
Pick on the **OK** button to continue.

You will then be given some reminders on how to enter your lot.



Pick on the **OK** button to continue.

Now you will see the following dialog:

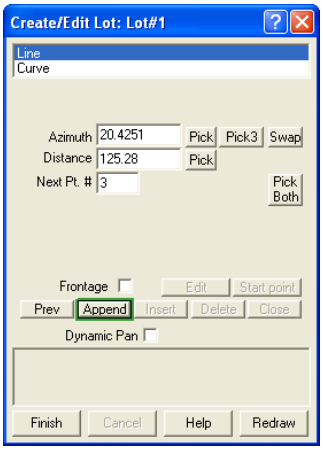


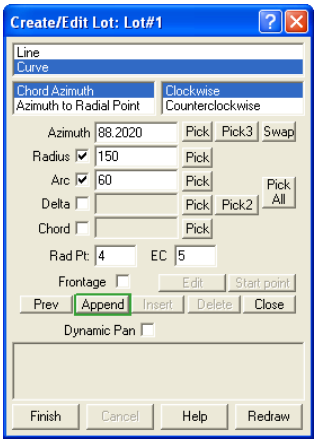
There will be many things to enter on this dialog. To start with you need to tell the routine if you are entering a **line** or **curve** – then press **enter** to continue.

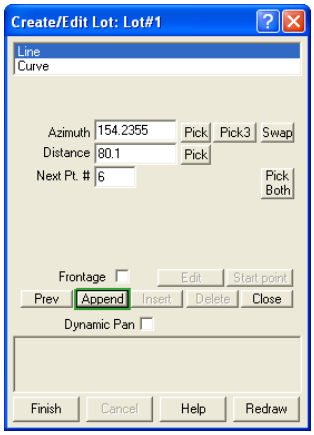
Then you will be asked to fill in each piece of information on that line or curve. Press enter after each piece of info has been entered.

After entering this info – press Append and you will be given the previous dialog again, ready for new numbers. You will also see the lot taking shape in the drawing after each side is entered.

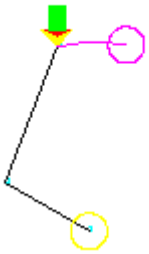
Here are the remain pieces of information for you to enter:

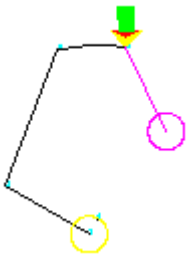


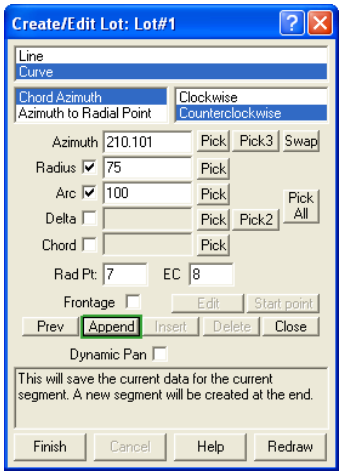


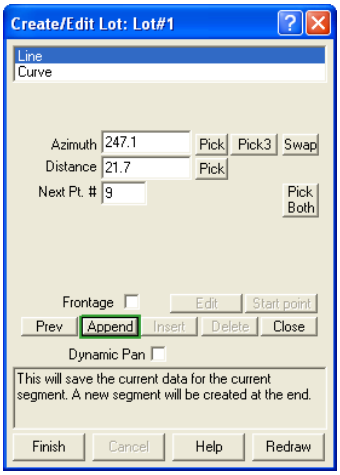


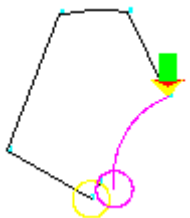
As you continue to enter in the individual line and curve data, you will see the preview of the drawing on screen. It will show the segment you are currently entering so you can confirm it looks correct. If it is incorrect, you can make changes before Appending it to the lot.

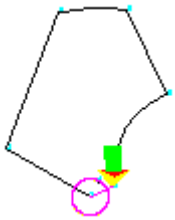






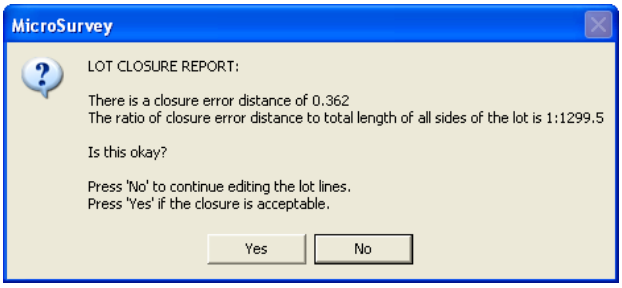






After you enter in all of the info on the last dialog – pick the **FINISH** button to continue.

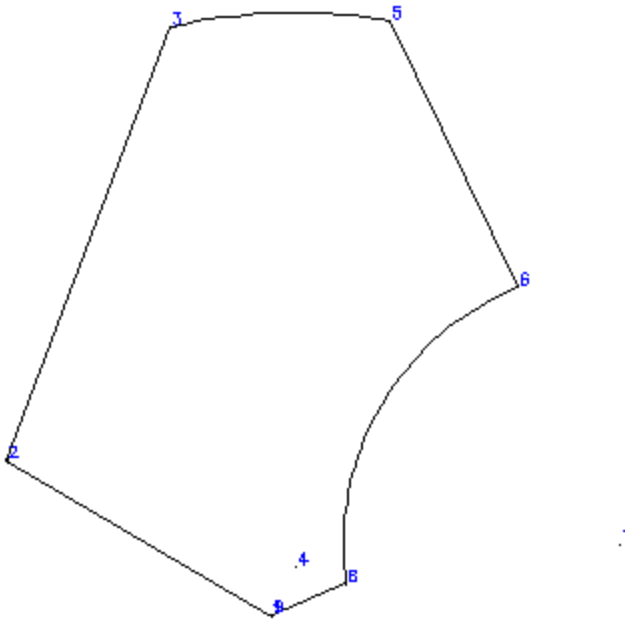
You will be presented with the following:



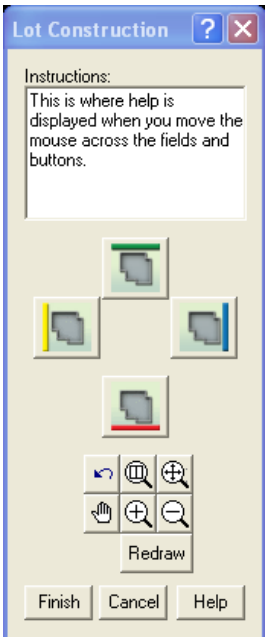
Pick the **YES** button to continue.

Step 4) Defining the Lot Sides

At this point you have the following lot drawn.



The following dialog is on screen:



You need to pick on each of the 4 buttons labeled Front, Left, Rear and Right, one at a time and then pick the linework related to the button.

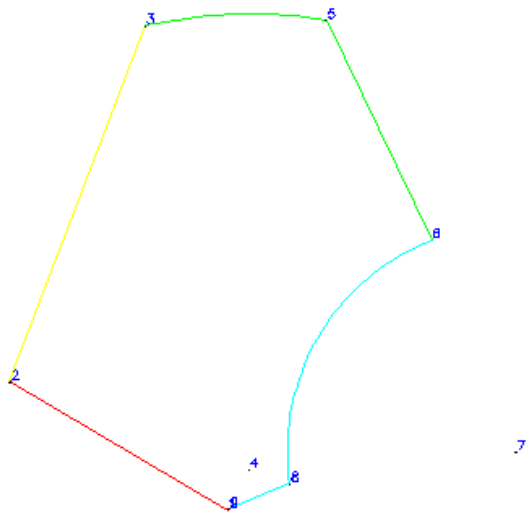
To start, pick the **FRONT** button and then pick the **first line** we drew. Then press **enter** to continue.

Then pick the **LEFT** button and pick the **second line** we drew. Then press **enter** to continue.

Then pick the **REAR** button and pick the **first curve** and the **next line** we drew. Then press **enter** to continue.

Finally pick the **RIGHT** button and pick the **second curve** and **last line** we drew. Then press **enter** to continue.

The lot sides should have changed color to match the buttons on the dialog, as shown below:



Pick the **FINISH** button to continue. Next a window will appear showing you the lot report.

lotreport.rtf - WordPad

File Edit View Insert Format Help

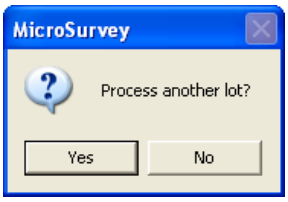
```
C:\Documents and Settings\Glen\My Documents\MicroSurvey\MSCAD\2010\Jobs2010\Lot
Job Description:
11:15:06 05/20/09
--------------------------------------------------------------------------------
Lot  : Lot#1

From PNT Bearing     Distance     Northing     Easting       To Pnt
  1     300°30'30"    83.20     1000.000    1000.000         2
  2      20°42'51"   125.28     1042.238     928.319         3
  3      88°20'20"    59.60     1159.419     972.631         5
    ARC=   60.00  RAD=  150.00 DELTA= 22.5506        + Area  RadNum=4
  5     154°23'55"    80.10     1161.147    1032.207         6
  6     210°10'10"    92.76     1088.911    1066.818         8
    ARC=  100.00  RAD=   75.00 DELTA= 76.2340        - Area  RadNum=7
  8     247°10'00"    21.70     1008.720    1020.203         9
    Square Feet  :   13567.4    Acres        :     0.311
    Square Metres:   1260.46    Hectares     :     0.126
        TOTAL Traverse Distance :     462.64
        TOTAL Traverse Perimeter:     470.28
        TOTAL Traverse Stations :      7
        CLOSURE Direction       : 214°16'54"
        CLOSURE Distance        :       0.36
        ERROR of Closure        :  1:1278.35
    Frontage: 83.200000.
```

You may print it by going to the **File pulldown menu** in this window and picking the **Print** command.

You may close the window by picking the **X** in the top right corner of the window.

Now you will be asked (and it may have been on screen already)

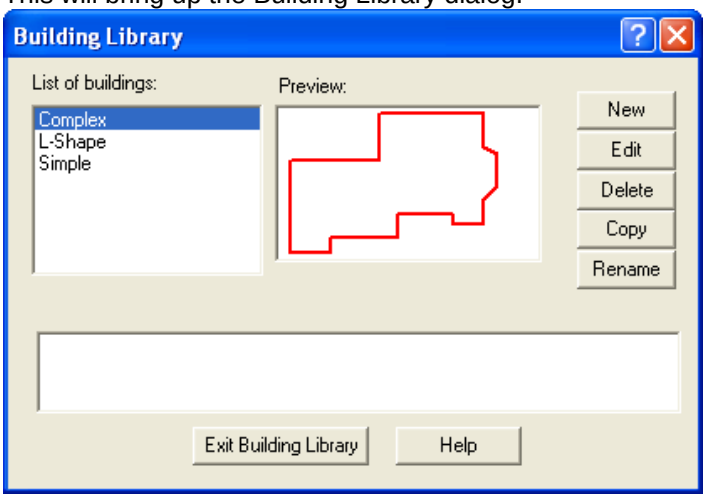


Pick on **NO** to finish the lot entry.

Step 5) Entering a House

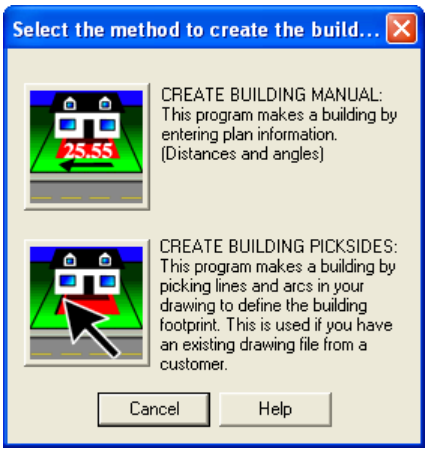
Pick on this button: 

This will bring up the Building Library dialog.



This dialog will display any structures already saved in the library and if you pick on one the preview will show up as well.
Pick on the **NEW** button to add one.

You will be given 2 different ways of entering house data.



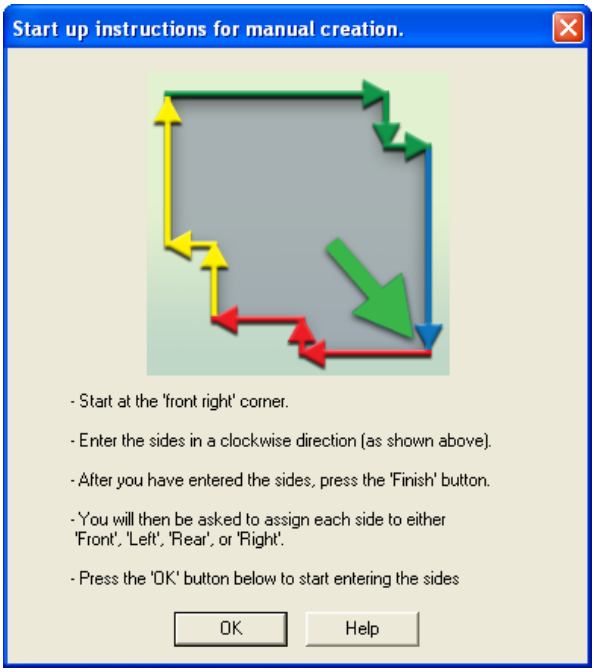
We will pick on the first button to continue.

(Create Building Manual)

Next give the house a name of **Tutorial** and pick the **OK** button to continue.

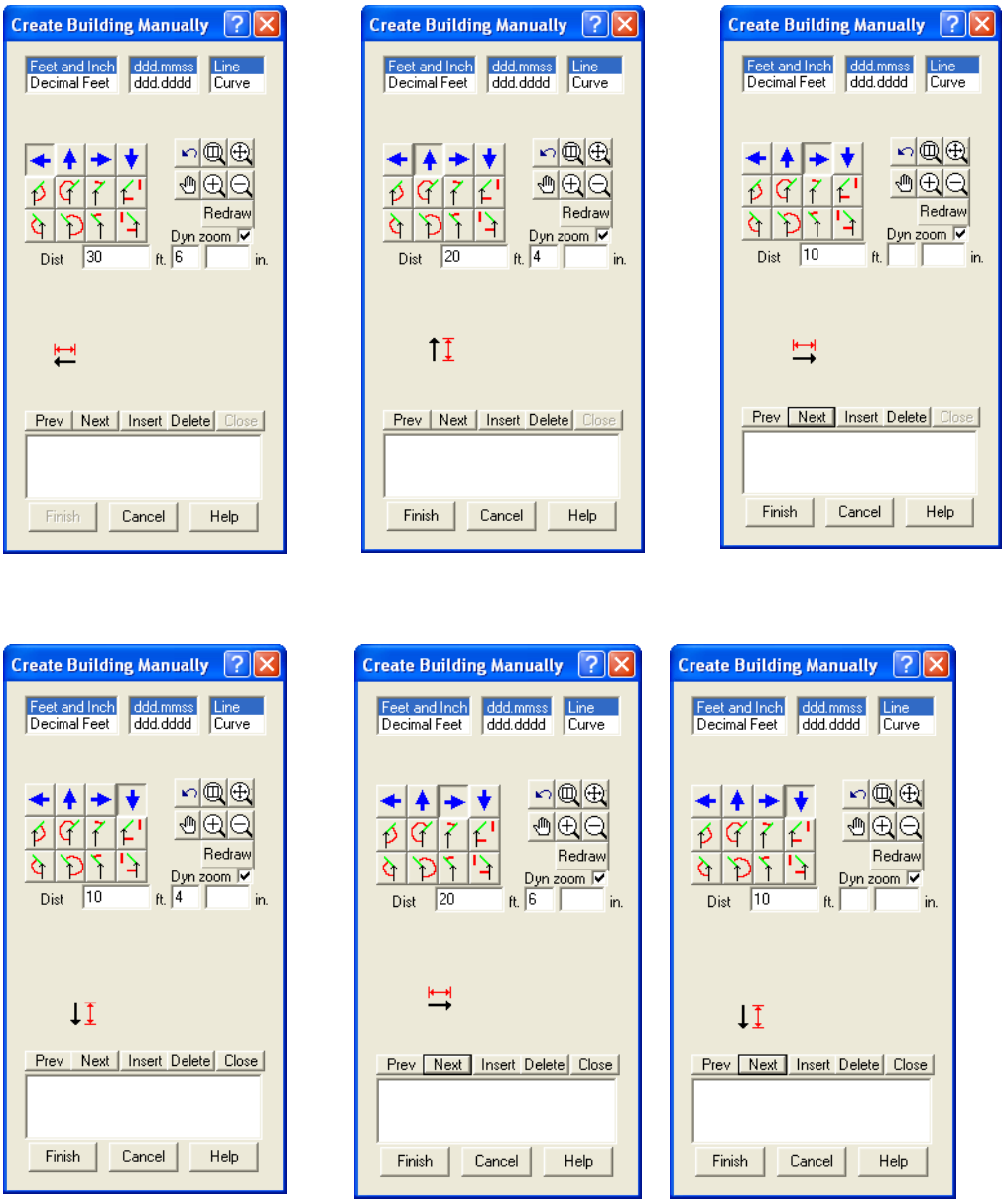
A new drawing is started automatically, using the name of the house.

Similar to the lot entry, the following dialog is displayed as a reminder of how to enter the information.



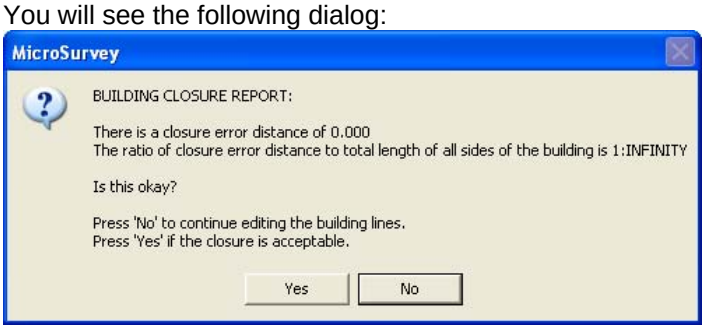
Pick the **OK** button to continue.

Pick each of the entries shown to define the units and direction the line is to be drawn in, and then press enter after each value is entered.



Pick the **FINISH** button to continue.

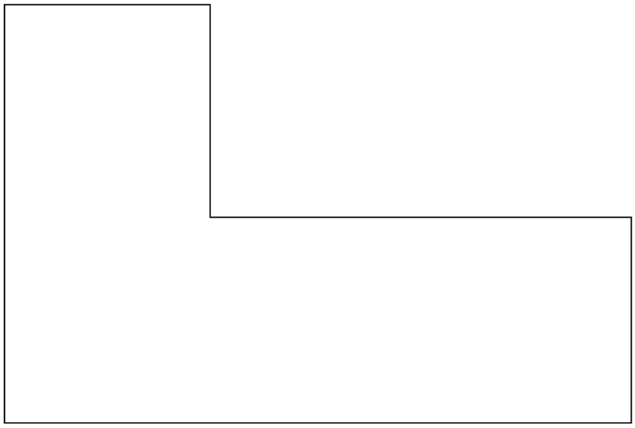
You will see the following dialog:



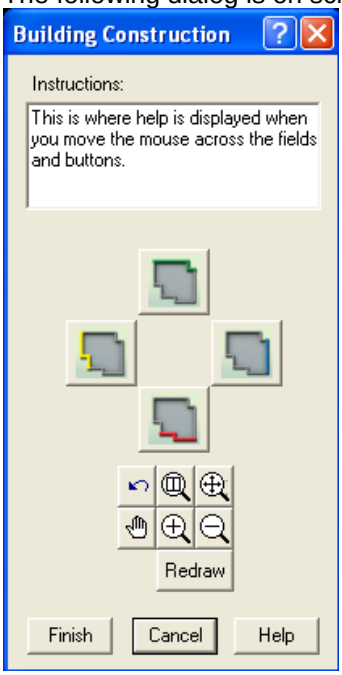
Pick **YES** to continue.

Step 6) Defining a House

At this point you have the following house drawn.



The following dialog is on screen:



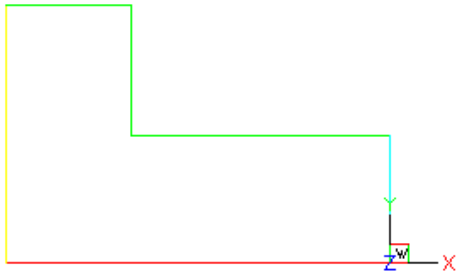
You need to pick on each of the 4 buttons labeled Front, Left, Rear and Right, one at a time and then pick the linework related to the button.

To start, pick the **FRONT** button and then pick the **first line** we drew. Then press **enter** to continue.

Then pick the **LEFT** button and pick the **second line** we drew. Then press **enter** to continue.

Then pick the **REAR** button and pick the **next 3 lines** we drew. Then press **enter** to continue.

Finally pick the **RIGHT** button and pick the **last line** we drew. Then press **enter** to continue.



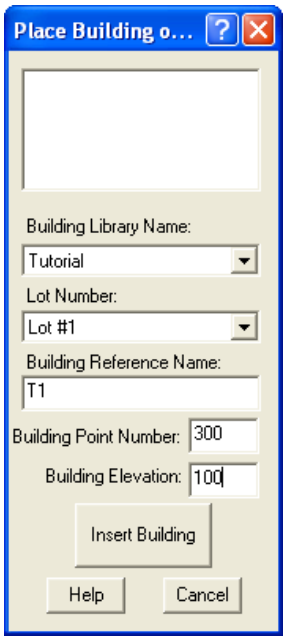
Pick the **FINISH** button to continue.

Your house has now been saved in the house library

Step 7) Placing a House on the Lot

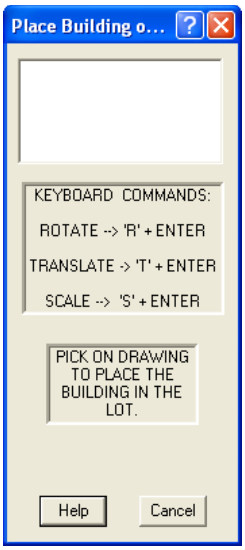
Now we need to place the House on the Lot. We do this by picking this button from the toolbox.

It will bring up the following dialog box. Fill it out as shown.



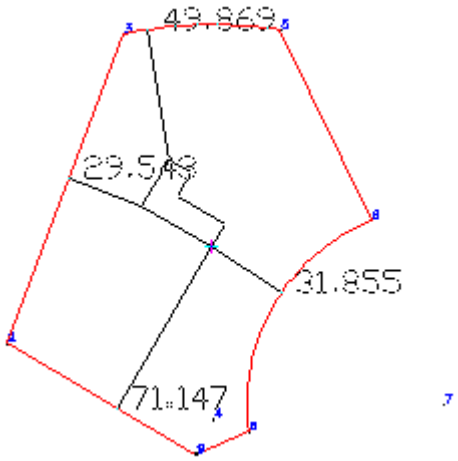
Once you pick the **Insert Building** button, the house we designed will now be attached to your crosshair and is ready for placement.

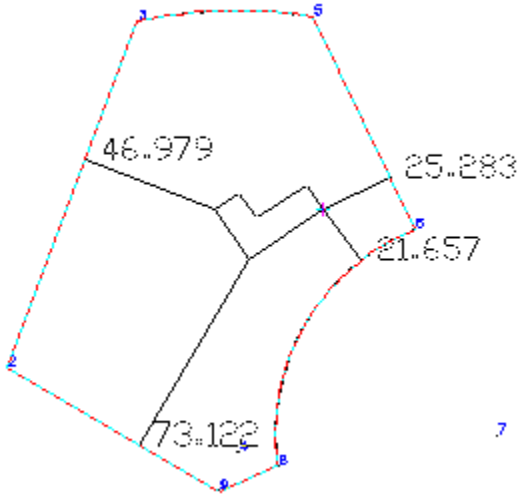
NOTE: As you move the house around you can see the side ties update dynamically. You can switch between rotating, translating and scaling the house by following the instructions on the dialog. You may move the dialog out of the way by picking the top bar and dragging it to the side.



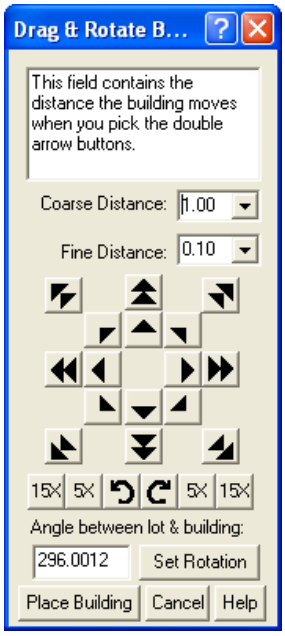
You will see the house ties update as the house is moved in any direction, giving you the closest tie to the property line, in each direction

Here are a couple of examples as we move the house around and rotate it to get what we desire.





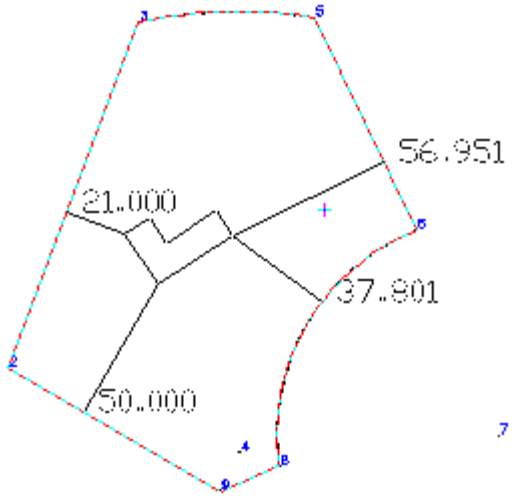
Now we need to pick the desired location with the mouse, to place the house roughly on the lot.



Once the house has been placed roughly on the lot, you will have the ability to fine-tune the exact location by using this **"Tuner"** dialog.

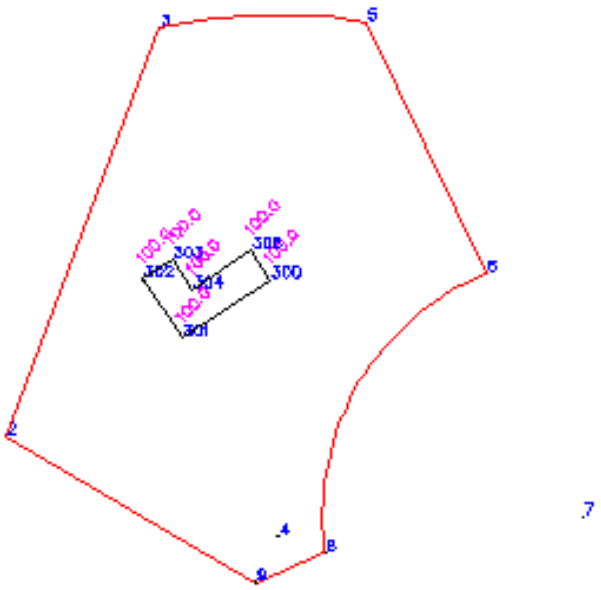
You have course and fine control with the outer and inner directional buttons. You can also specify the amount of movement for the two settings. You may also rotate the house by the rotation arrows and even set the rotation based upon the angle between the house and the lot.

You decide where you wish to place your house. Mine is set as shown.



When you are happy with the final placement then pick the **Place Building** button to continue.

Your house is now coordinated and points are placed on the house corners based upon the starting number and elevations set earlier.



Step 8) Computing Stakes

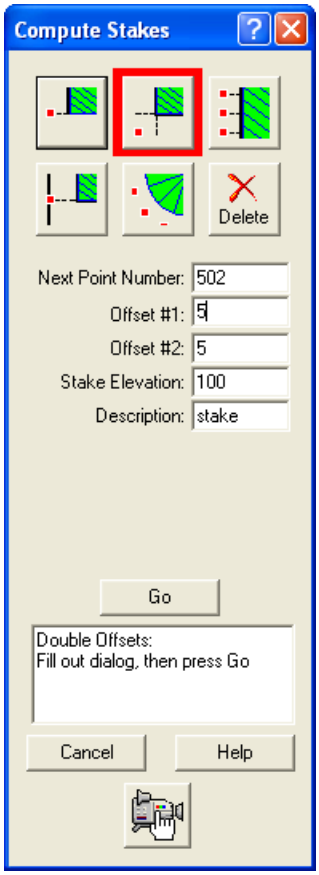
Now that you have the house on the lot, we need to add a few stakes to make it easier for the construction crew to layout the house in the field.

We will add a few stakes around the footprint of the house, offset back from the actual footprint. To do this we will go to the **MsPoints drop-down menu | Compute Points** and pick the **Compute Stakes…** option.

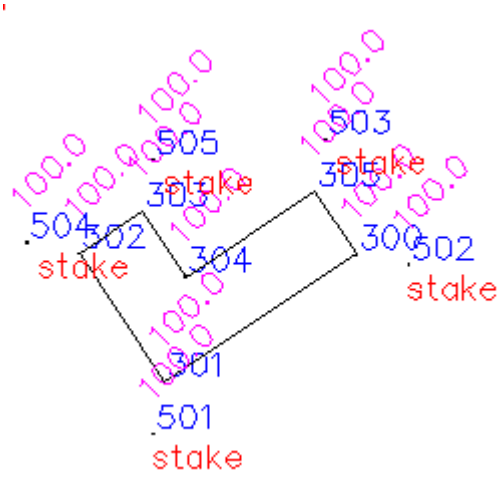
Pick the highlighted button shown here, to place stakes at the building corners, offset from each line.

Confirm the starting point number and offsets and elevation of the points you are about to place.

Once all values are entered as desired, pick the GO button, then on the drawing you will need to pick the appropriate lines and offset sides, to place the stakes required.



Then pick the house sides where you wish to place points. Pick the sides so that you get points as shown below: (The white window at the top of the dialog box will give you instructions to walk you through placing points)



Press the **ESC** button to end placing new points and return to the previous dialog. Set other points if you desire, by using some of the other routines.

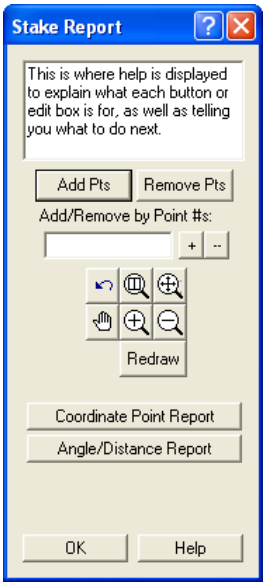
Pick the **OK** button to end the command.

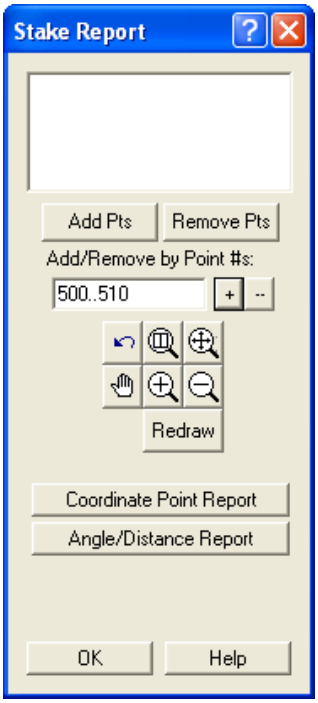
Step 9) Staking Reports

Now that we have some stakes set, we need to generate a staking report for the field crew.

Go to the **MsPoints drop-down menu |** and pick on the **Stake Out Points** option.

You will see the following dialog box:



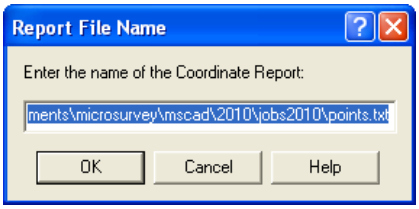


In the small white rectangle, enter in the point range for the stakes. In my example I typed **500..505**

Then pick the **+** sign to the right.

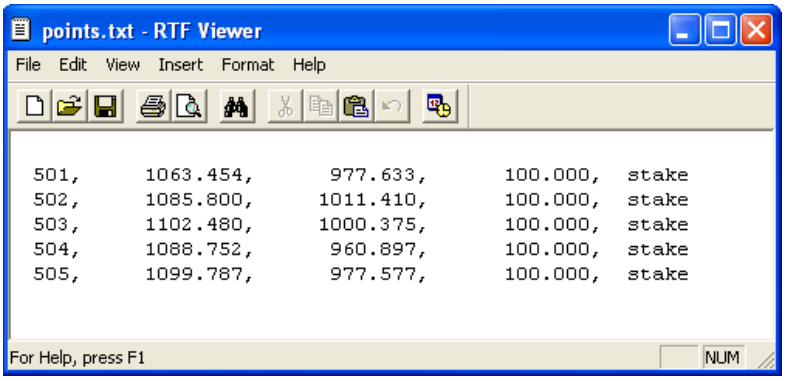
The points on screen should now have little yellow **X's** on them.

Now pick on the **Coordinate Point Report** button.
Then confirm the report file location and name:



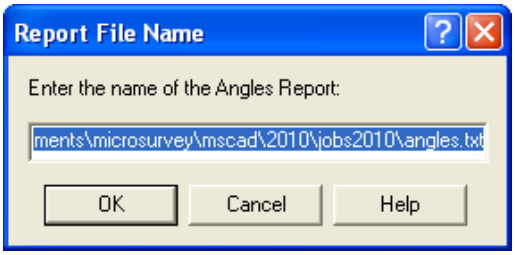
Pick the **OK** button to continue.

The coordinate report is created and displayed in our editor. You may print this report by going to the **File pulldown menu | Print**.

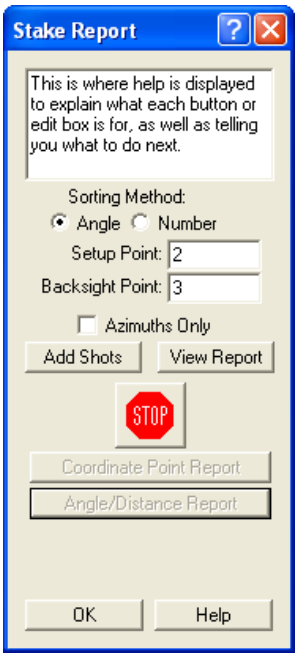


You may close the window by picking the **X** in the top corner of the window.

Now pick on the **Angle/Distance Report** button.
Then confirm the report file location and name:

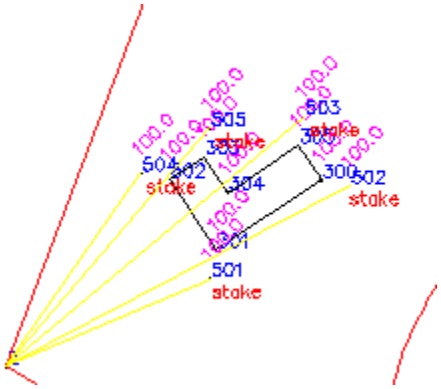


Pick the **OK** button to continue.

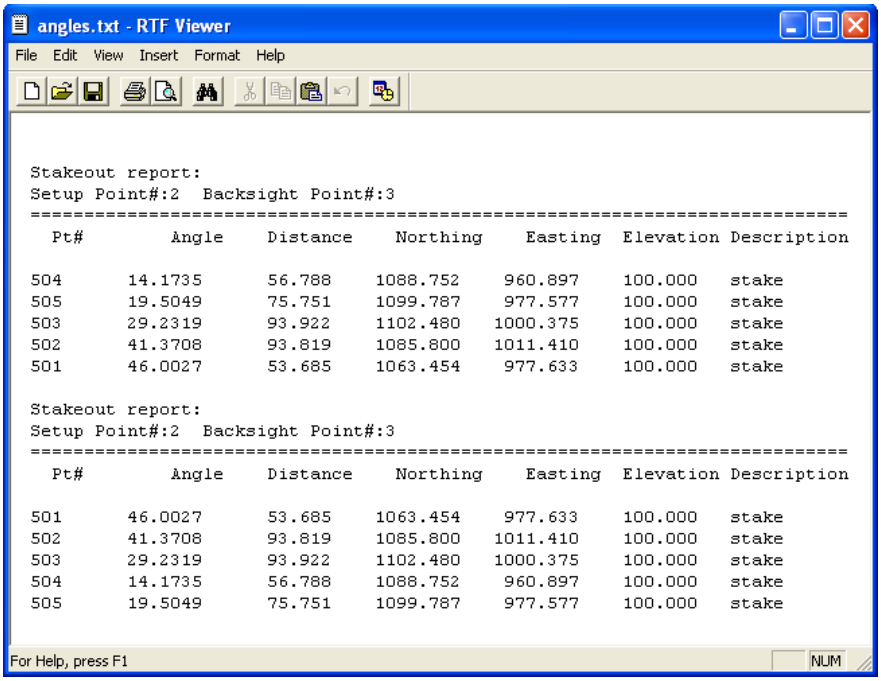


Enter in the **setup** and **backsight** point numbers as show, and pick on the **sorting method** (we will do **Angle** first then **Number**), then pick on the **Add Shots** button. (now do the **Number** option and pick **Add Shots** again)

The drawing will have yellow lines from the setup to each stake. They are temporary and will be removed with a **redraw** or **zoom command**.



Now pick the **View Report** button to see the two reports we generated.



The first was sorted by *Angles* the second by *Point Numbers*.

You may print this report by going to the **File pulldown menu** (in this window) and pick the **Print** option.

You may close the window by picking the **X** in the top corner of the window.

Pick the **OK** button to continue.

Save your job by going to the **File pulldown menu** and picking on the **SAVE** option.

(End of tutorial)

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