

A Practical Guide to Carlson Survey 2014 Level 1

Rick Ellis

A Cadapult Press Publication

Copyright

Copyright © Cadapult Press, Inc. 2014

All rights reserved. No part of this publication may be reproduced in any form, or by any means electronic, mechanical, recording, photocopying, or otherwise, without written permission from the publisher, except for brief quotations used in reviews, or for marketing purposes specific to the promotion of this work.

ISBN: 978-1-934865-16-3

Although Cadapult Press has made every attempt to ensure the accuracy of the contents of this book, the publisher and author make no representations or warranty with respect to accuracy or completeness of the contents in this book, including without limitation warranties of fitness for a particular purpose. The datasets included in this book are for training purposes only.

Carlson Survey is a registered trademark of Carlson Software. AutoCAD Civil 3D, AutoCAD Map 3D, and AutoCAD® are registered trademarks of Autodesk, Inc. All other trademarks are the property of their respective owners.

Published in the United States of America by:
Cadapult Press, Inc,
(503) 829-8929
books@cadapult-software.com

Printed and manufactured in the United States of America

About the Author

Rick Ellis has worked with and taught Civil/Survey CAD software since the mid-90s. He is the Author of several critically acclaimed books on AutoCAD Map 3D and other CAD packages. He continues to work on projects in a production environment, in addition to teaching classes to organizations both large and small.

This practical background and approach has made him a highly rated speaker at Autodesk University, a member of the national speaker team for the AUGI CAD Camps and a sought after instructor by organizations around the world.

Rick can be reached at: rick@cadapult-software.com

Acknowledgements

Thank you to Carlson Software for their cooperation. A special thanks to Gary Rosen and Lauren Lax from Carlson Software for their assistance and encouragement. Without it this book would not have been possible.

Exercise Data

I would like to thank the City of Springfield, Oregon for providing the data for this book. The dataset provided is for illustration purposes only. While it is based on real world information to add relevance to the exercises, it has been altered and modified to more effectively demonstrate certain features as well as to protect all parties involved. The data should not be used for any project work and may not represent actual places or things. It is prohibited to redistribute this data beyond your personal use as a component of training.

A Practical Guide to Carlson Survey 2014

Introduction

Congratulations on choosing this course to help you learn how to use Carlson Survey 2014. The term “practical” is used in the title because this course focuses on what you need to effectively use Carlson Survey 2014, and does not complicate your learning experience with unnecessary details of every feature in the product.

Each lesson contains the concepts and principles of each feature to provide you with the background and foundation of knowledge that you need to complete the lesson. You then work through real world exercises to reinforce your understanding and provide you with practice on common tasks that other professionals are performing with Carlson Survey in the workplace every day.

You can take the lessons in this course in whatever order is appropriate for your personal needs. If you want to concentrate on specific features, the lesson for those features does not require that you complete prior lessons. With this course organization, you can customize your own individual approach to learning Carlson Survey.

When you complete this course, you will have the background and knowledge to apply Carlson Survey to your job tasks, and become more effective and productive in your job.

Course Objectives

The objectives of this course are performance based. In other words, once you have completed the course, you will be able to perform each objective listed. If you are already familiar with Carlson Survey, you will be able to analyze your existing workflows, and make changes to improve your performance based on the tools and features that you learn and practice in this course.

After completing this course, you will be able to:

- Navigate the Pull-down Menus and Ribbon Menus.
- Set up Carlson Survey to use the Project approach.
- Work with Coordinate Files.
- Draw Points into the Drawing.
- Edit Points in the Drawing and External Point Database.
- Create Point Groups.
- Prepare Surface Data using Points and 3D Polylines.
- Create Surface Models.
- View and Edit Surfaces.
- Perform Surface Inquiries
- Generate and Label Contours.
- Utilize Field to Finish Coding and Drawing.
- Import and Export Land XML Data.
- Work with Centerlines.
- Generate Linework Labels.

Prerequisites

Before starting this course, you should have a basic working knowledge of AutoCAD®. A deep understanding of AutoCAD is not required, but you should be able to:

- Pan and Zoom in the AutoCAD drawing screen.
- Describe what layers are in AutoCAD, and change the current layer.
- Create basic CAD geometry, such as lines, polylines and circles.
- Use Object Snaps.
- Describe what blocks are, and how to insert them.
- Perform basic CAD editing functions such as Erase, Copy, and Move.

If you are not familiar with these functions, you can refer to the AutoCAD Help system throughout the course to gain the fundamental skills needed to complete the exercises.

Conventions

The course uses the following icons and formatting to draw your attention to guidelines that increase your effectiveness in Carlson Survey, or provide deeper insight into a subject.



The magnifying glass indicates that this text provides deeper insights into the subject.



The compass indicates that this text provides guidance that is based on the experience of other users of Carlson Survey. This guidance is often in the form of how to perform a task more efficiently.

Exercises

The exercises in this course have been designed to represent common tasks that are performed by civil engineers, surveyors, designers and drafters. The data included in the exercises are typical drawings, point files and other data used by professionals like you. Exercises provide higher level process information throughout the exercise tasks. You are given information about not only what to do, but why you are doing it. Many images are included to help guide you.

Installing the Datasets

The CD included with this book contains all of the datasets required for the exercises.

There are two ways to install the dataset:

- Use the Setup.exe.
- Unzip the files.

Use Setup.exe

Double click *Setup.exe* and follow the instructions for installation.

Unzip the Files

Unzip *Carlson Survey 2014 L1 Training.zip* directly to the C drive.

Whether you use the Setup file or the Zip file the results will be the same, the dataset will be copied to the folder:

C:\Carlson Projects

A folder called **APG 2014 Data** is created that contains several folders with source data for the exercises in this book.

There are also folders created called **APG 2014 Survey Lesson X_X** These folders contain project files and drawings where the lesson number of the folder corresponds to the lesson numbers in the book. This will allow you to jump in at the beginning of many of the lessons in the book, and do just the specific exercises that you want, if you do not have time to work through the book from cover to cover.

Table of Contents

Chapter 1	A First Look at Carlson Survey 2014	1
1.1	Lesson: A Guided Tour through the Pull-down Menus	2
1.2	Lesson: A Guided Tour through the Ribbon Menus	14
Chapter 2	Working with Data, Settings, and Start Ups	19
2.1	Lesson: Working with External Data	20
2.1.1	Setting up Carlson Survey to Work with External Data	24
2.2	Lesson: Setting Up General Settings	30
2.2.1	Working with General Settings	33
2.3	Lesson: Creating a New Drawing	35
2.3.1	Starting Up a New Drawing	38
Chapter 3	Working with Points	41
3.1	Lesson: Introduction to Point Data	42
3.2	Lesson: Importing a Text/ASCII File	44
3.2.1	Importing a Text/ASCII File	47
3.3	Lesson: Point Defaults	52
3.3.1	Setting Up Point Defaults	55
3.4	Lesson: Draw - Locate Points	57
3.4.1	Draw Points in a Drawing	60
3.4.2	Creating new Points with Draw – Locate Points	62
3.5	Lesson: Controlling Point Display	65
3.5.1	Scaling Attributes	68
3.5.2	Moving Attributes	69
3.5.3	Editing Specific Attributes	70
3.6	Lesson: Editing Point Data	72
3.6.1	Editing Point Data	73
3.7	Lesson: Erasing Points	75
3.7.1	Erasing Point Blocks from a Drawing	76
3.7.2	Deleting Point Data from the External Point Database	79
3.8	Lesson: Using Point Groups	81
3.8.1	Creating a Point Group	84
3.8.2	Drawing Points by Point Group	87

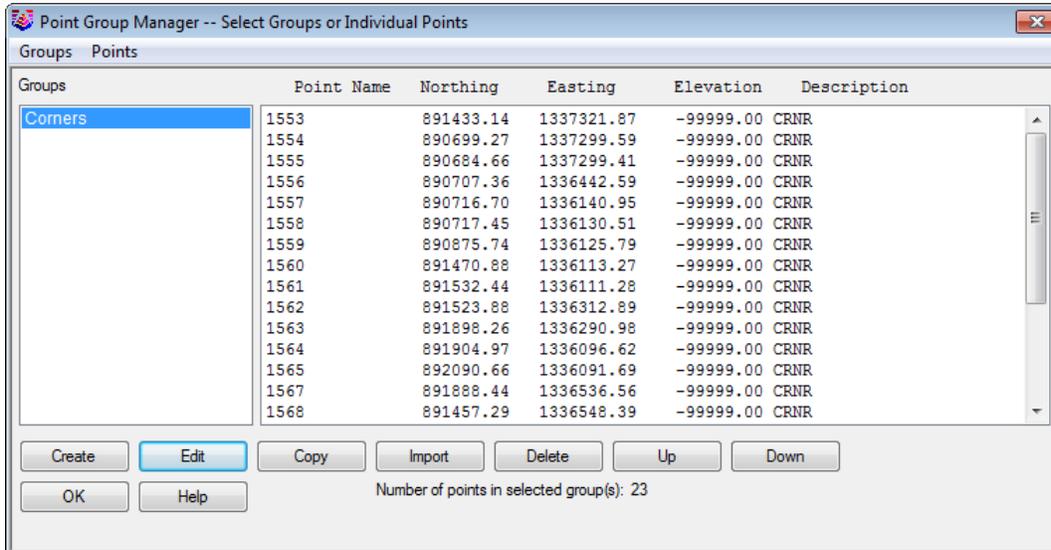
Chapter 4	Working with Surfaces	91
4.1	Introduction to Surfaces	92
4.2	Lesson: Preparing Surface Data	94
4.2.1	Creating a New Drawing for the Surface	97
4.2.2	Creating a Point Group to Be Used As Surface Data	100
4.2.3	Creating a Point Group to Connect with 3D Polylines	103
4.2.4	Drawing 3D Polylines by Point Number	104
4.2.5	Drawing 3D Polylines by Point Selection	108
4.3	Lesson: Using Triangulate and Contour	111
4.3.1	Using Triangulate and Contour	117
4.4	Working with Contour Labels	124
4.4.1	Adding Contour Labels	125
4.4.2	Moving Contour labels	126
4.4.3	Masking Contour Labels	127
4.5	Viewing Surfaces	129
4.5.1	Using the Surface 3D Viewer	131
4.6	Lesson: Editing Surfaces	133
4.6.1	Editing a Surface with the Surface Manager	136
4.7	Lesson: Surface Inquiries	141
4.7.1	Quick Profile	143
4.7.2	Spot Elevation by Surface Model	146
4.7.3	Slopes Zone Analysis	148
Chapter 5	Working with Field to Finish	153
5.1	Lesson: Introduction to Field to Finish	154
5.2	Lesson: Setting up Field to Finish Codes and Settings	157
5.2.1	Creating a New Drawing for Field to Finish	162
5.2.2	Creating a Field to Finish Code File (.FLD file)	164
5.2.3	Creating/Editing a Field to Finish Code	167
5.2.4	Setting the Special Codes	175
5.3	Lesson: Drawing with Field to Finish	179
5.3.1	Drawing Field to Finish Entities	182
5.4	Lesson: Using the Field to Finish Inspector	184
5.4.1	Using the Field to Finish Inspector	186
5.5	Lesson: An Example of What can be Done with Field to Finish	188
5.5.1	Putting it all Together	190

Chapter 6	Ten More Essential Tools	197
6.1	Lesson: Using Drawing Cleanup	198
6.1.1	Using Drawing Cleanup	200
6.2	Lesson: Inverse	202
6.2.1	Inverse Between Two Points	204
6.3	Lesson: Labeling Lines	207
6.3.1	Set Linework Label Linking	213
6.3.2	Annotate Defaults	214
6.3.3	Auto Annotate	216
6.4	Lesson: Working with Centerlines	218
6.4.1	Define a Centerline	221
6.4.2	Edit a Centerline	222
6.4.3	Station a Centerline	225
6.4.4	Export a Centerline	227
6.5	Lesson: Land XML Export/Import	228
6.5.1	LandXML Export	231
6.5.2	LandXML Import	234
6.6	Lesson: Google Earth Export/Import	237
6.6.1	Google Earth Export	239
6.6.2	Google Earth Import	242
6.7	Lesson: Working with Quick Keys	244
6.7.1	Creating Quick Keys	246
6.8	Lesson: Working with the Symbol Library	248
6.8.1	Editing the Symbol Library	250
6.9	Lesson: Importing Esri SHP Files	253
6.9.1	Configure GIS Settings	254
6.9.2	Import Esri SHP	257
6.9.3	Viewing the GIS Data	260
6.10	Lesson: Place Image by World File	263
6.10.1	Place Image by World File	266

3.8 Lesson: Using Point Groups

Introduction

In this lesson we look at the use of Point Groups to organize your point data, and some of the subsequent uses of those groups.



Key Concepts

Concepts and key terms covered in this lesson are:

- Point Groups
- Filters
- Applications of Point Groups

Objectives

After completing this lesson, you will be able to:

- Learn what Point Groups are
- Learn how to Create Point Groups
- Learn various applications of Point Groups

Advantages of using Point Groups

Point Groups are a powerful and versatile tool to organize your point data. Some uses of Point Groups include:

- Controlling Point Display
- Editing Points
- Drawing Points
- Field to Finish
- Selecting Points to build a Surface
- Exporting specific Points
- Creating Point Tables
- Generating Reports

Creating Point Groups

Point Groups are saved selection sets of points. They can be created by setting up a query (or filter) that sorts through all the points in the current .CRD and selects the ones that match the criteria. Point groups can be based on a variety of criteria including point numbers, point elevations, point descriptions and logical combinations thereof.

The *New Point Group* dialog box consists of an *Include* tab and an *Exclude* tab. First the filtering criteria specified on the *Include* tab is applied to the entire current coordinate file. The resulting list of points is created and held in memory. Note that on the *Include* tab, all specified filter criteria must be met for a point to be included.

Components of the Query can include any combination of:

- A Range of point numbers, selected from the Drawing or the .CRD, found in the Drawing or the .CRD that fall within a drawn Circle, or found within the Drawing or the .CRD within a drawn Polyline
- Elevation Range
- Descriptions
- All Points in the database

Next, the filtering criteria specified on the *Exclude* tab is applied to that temporary list. Any points in the list that match the exclude criteria are removed from the list to create the final Point Group.

On the *Exclude* tab, the user specifies whether the points to be excluded must match *All* of the filter criteria, or *Any* of the filtering criteria. Using all of these variables in different combinations can produce a very specific set of points.

Components of the Query can exclude any combination of:

- A range of point numbers, using the same methods as described for Include
- Elevation Range
- Descriptions

How Point Groups Work

The parameters that define Point Groups are stored in files with a .GRP file extension, and the same filename as the .CRD coordinate file they are to be applied to. Each Point Group file is associated with one and only one CRD file, as determined by the filename. For example, Test.grp will only refer to points in Test.crd in the same directory.

Each Point Group file contains a number of Point Groups. Each Point Group contains rules for selecting the points within the *.crd file. This file is not intended to be edited manually. The Point Group Manager in Carlson Survey is the correct tool to use to edit the Point Group rules and/or to add or remove Point Groups.



Point Groups are dynamic, inasmuch as the .CRD file is read in its current state whenever Point Groups are employed. So if Points that belong in a specific Point Group are added to or deleted from the .CRD, the next time Point Groups are used, they will be updated to the current state of the .CRD.

Exercises: Working with Point Groups

In these exercises you create a Point Groups, using filtering of descriptions, and then use the new Point Group with *Draw-Locate* to draw that specific set of Points in the Drawing.

You do the following:

- Create a Point Group
- Draw a Point Group

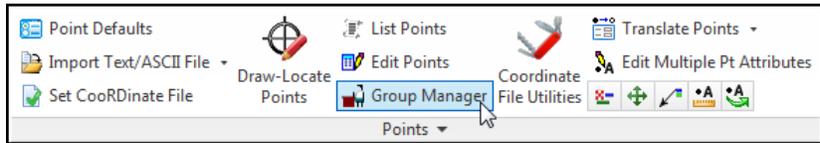
3.8.1 Creating a Point Group

1. Continue working in the drawing **Survey.dwg**.

If you have not completed the previous lessons:

Open *3_8.dwg* from the project folder *APG 2014 Survey Lesson 3_8*.

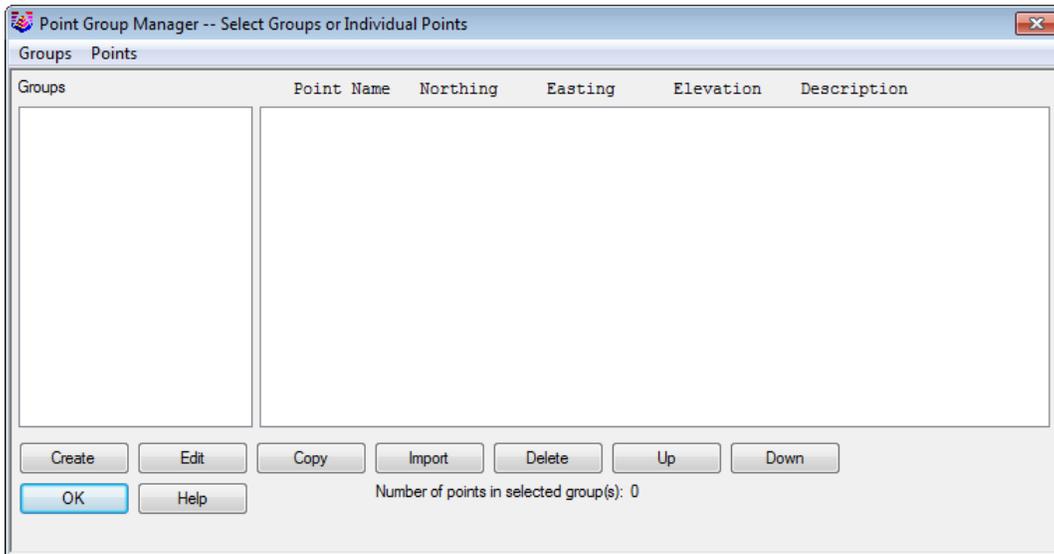
2. Select **Ribbon: Points**
⇒ **Points** ⇒ **Group Manager**.



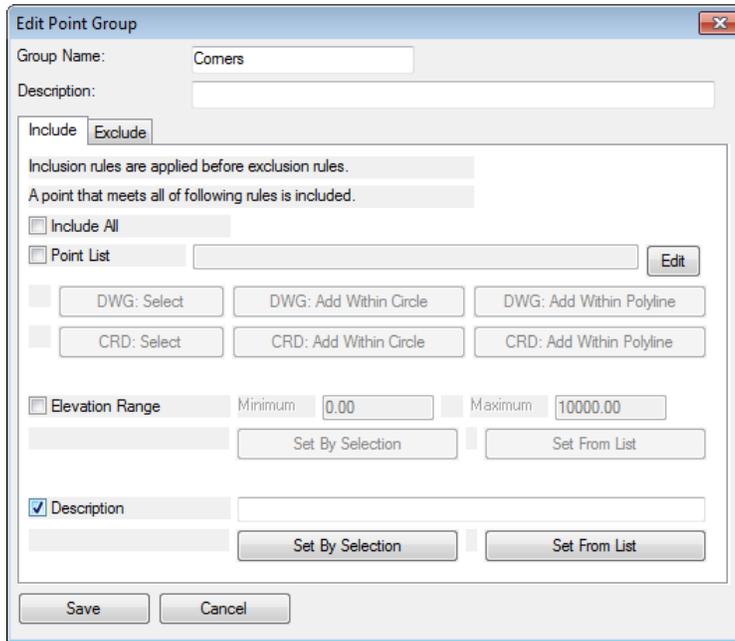
Alternatively from the pull-down menu:

Select **Points** ⇒ **Point Group Manager**.

The *Point Group Manger* opens.

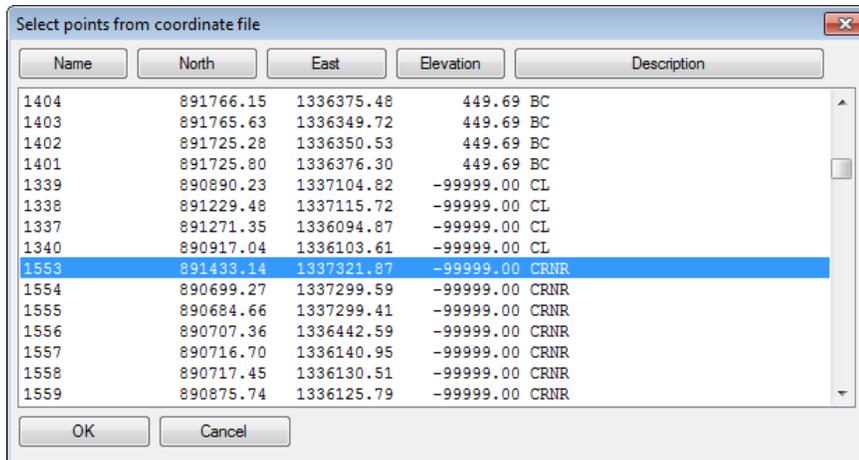


3. Click <<**Create**>>.

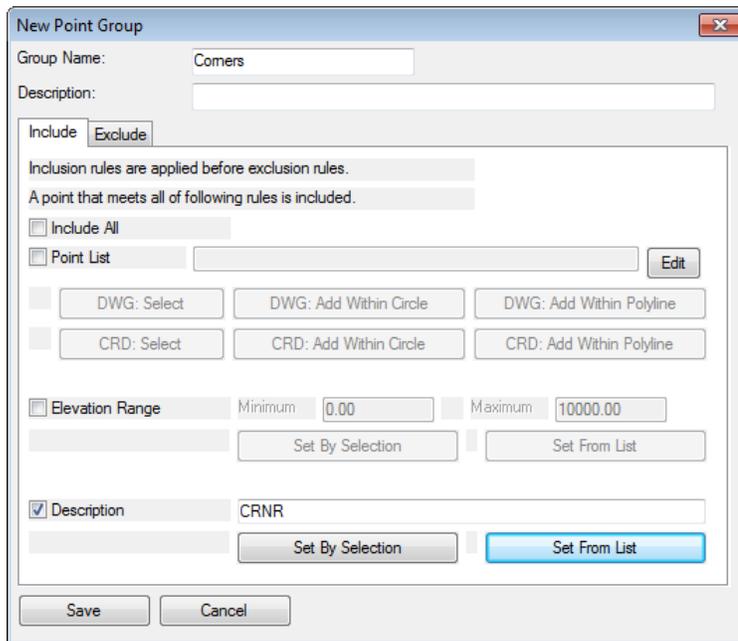


4. In the *New Point Group* dialog box for the **Group Name** enter **Corners**.
5. On the *Include* tab disable **Include All**.
6. Enable **Description**.
7. Click <<**Set From List**>>.

This opens the *Select points from coordinate file* dialog box. Here you can see all the points in the current .CRD file, sort them, and select the descriptions that you want to use to create the point group. It saves time and reduces errors by allowing you to see the description of points that are in the point database so you don't have to type them in from memory.

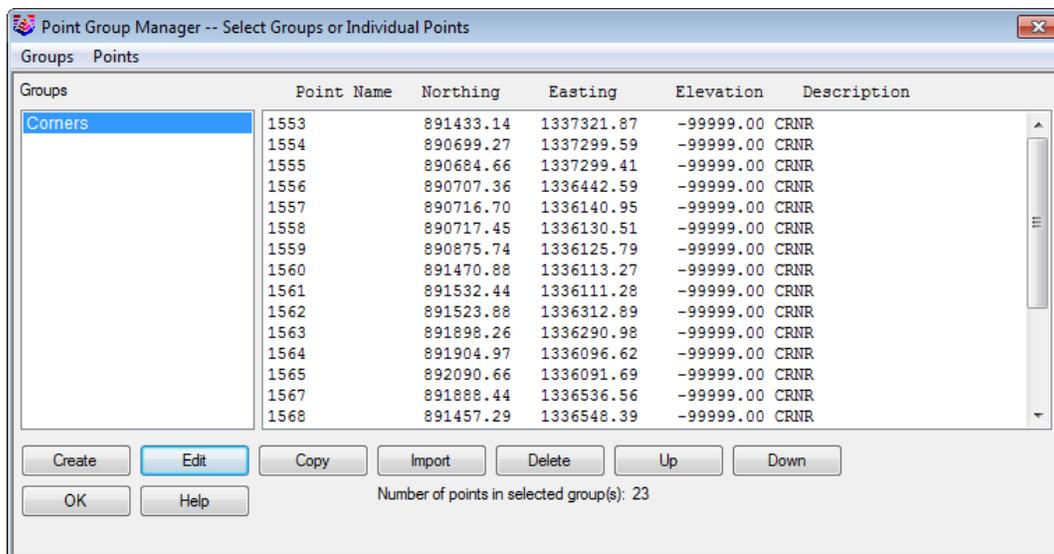


8. Click <<**Description**>> to sort the list by the description.
9. Find a point with a **CRNR** description and select it.
10. Click <<**OK**>>.



The 'New Point Group' dialog box is shown. The 'Group Name' field contains 'Corners'. The 'Description' field is empty. The 'Include' tab is selected. Below the tab, there is a note: 'Inclusion rules are applied before exclusion rules. A point that meets all of following rules is included.' There are several options: 'Include All' (unchecked), 'Point List' (unchecked), and buttons for 'DWG: Select', 'DWG: Add Within Circle', 'DWG: Add Within Polyline', 'CRD: Select', 'CRD: Add Within Circle', and 'CRD: Add Within Polyline'. There is also an 'Elevation Range' section with 'Minimum' set to 0.00 and 'Maximum' set to 10000.00, and buttons for 'Set By Selection' and 'Set From List'. The 'Description' section has a checked checkbox and the value 'CRNR', with buttons for 'Set By Selection' and 'Set From List'. At the bottom are 'Save' and 'Cancel' buttons.

11. Back in the *New Point Group* dialog box click <<Save>>.



The 'Point Group Manager -- Select Groups or Individual Points' dialog box is shown. The 'Groups' tab is selected. A table lists the points in the 'Corners' group. The table has columns for Point Name, Northing, Easting, Elevation, and Description. The 'Corners' group is selected in the left pane. Below the table are buttons for 'Create', 'Edit', 'Copy', 'Import', 'Delete', 'Up', and 'Down'. At the bottom are 'OK' and 'Help' buttons. A status bar at the bottom indicates 'Number of points in selected group(s): 23'.

Point Name	Northing	Easting	Elevation	Description
1553	891433.14	1337321.87	-99999.00	CRNR
1554	890699.27	1337299.59	-99999.00	CRNR
1555	890684.66	1337299.41	-99999.00	CRNR
1556	890707.36	1336442.59	-99999.00	CRNR
1557	890716.70	1336140.95	-99999.00	CRNR
1558	890717.45	1336130.51	-99999.00	CRNR
1559	890875.74	1336125.79	-99999.00	CRNR
1560	891470.88	1336113.27	-99999.00	CRNR
1561	891532.44	1336111.28	-99999.00	CRNR
1562	891523.88	1336312.89	-99999.00	CRNR
1563	891898.26	1336290.98	-99999.00	CRNR
1564	891904.97	1336096.62	-99999.00	CRNR
1565	892090.66	1336091.69	-99999.00	CRNR
1567	891888.44	1336536.56	-99999.00	CRNR
1568	891457.29	1336548.39	-99999.00	CRNR

12. In the *Point Group Manager* notice the new point group *Corners*. It contains 23 points and is limited to points with the description *CRNR*.

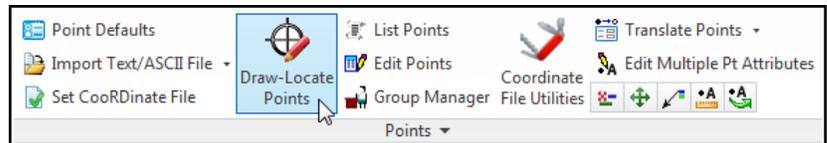
13. Click <<OK>>.

3.8.2 Drawing Points by Point Group

1. Continue working in the drawing from the previous exercise.
2. From the pull-down menu: Select **Points** ⇒ **Erase Point**.
3. At the command line respond to the prompts as follows:
4. Select points from screen, group or by point number [<Screen>/Group/Number]? **S**
5. Graphically select all the points in the drawing and press **Enter**.
6. Delete points from coordinate file [Yes/<No>]? **N**
7. Delete point symbols [<Yes>/No]? **Y**

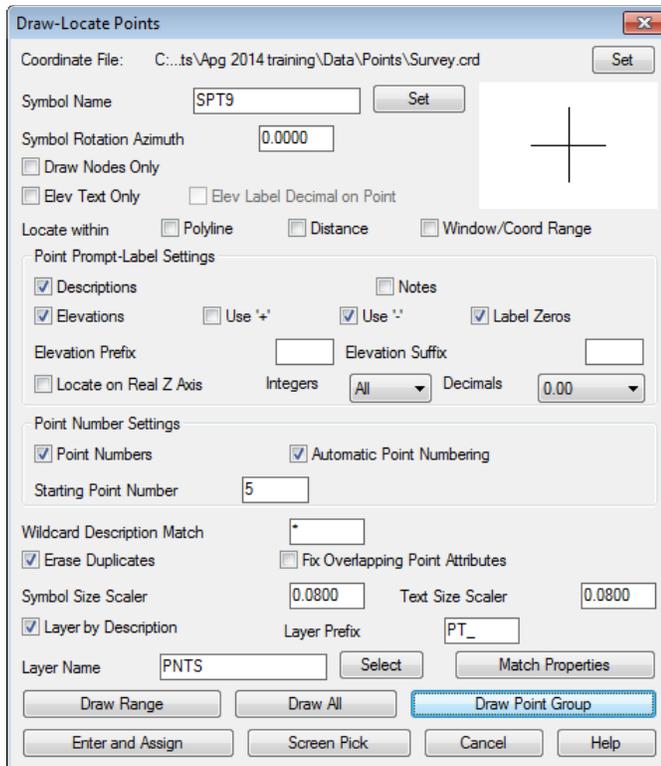
All the points are now removed from the drawing, however, they still exist in the point database.

8. Select **Ribbon: Points**
⇒ **Points** ⇒ **Draw – Locate Points**.



Alternatively from the pull-down menu:
Select **Points** ⇒ **Draw – Locate Points**.

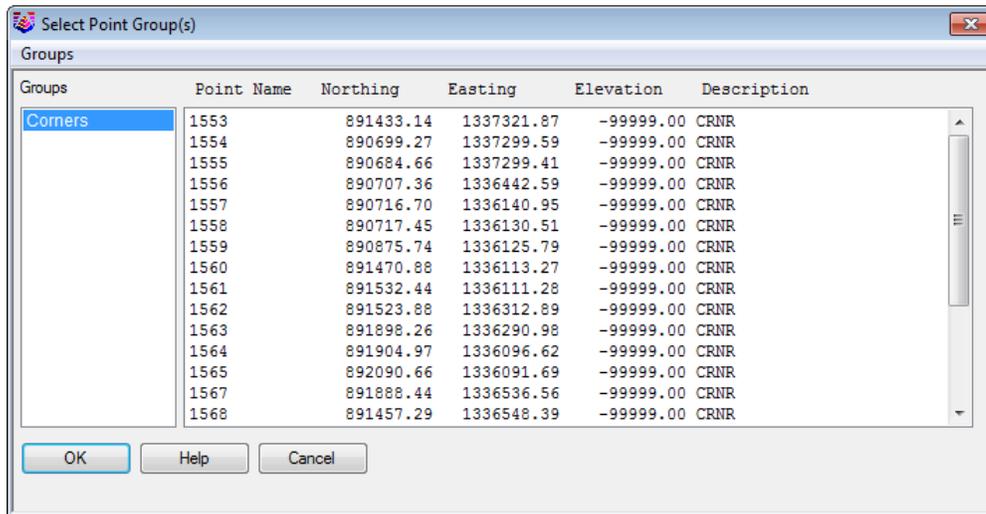
The *Draw-Locate Points* dialog box opens.



Many of the settings within the *Draw-Locate Points* dialog box are already set to the choices you made in the *Point Defaults* dialog. However, they can be changed here, and the changes will be used for this specific point creation.

9. Confirm **Layer by Description** is enabled.
10. Confirm the **Layer Prefix** is set to **PT_**.
11. Confirm the remaining settings are set like the graphic above.
12. Click **<<Draw Point Group>>**.

This opens the *Select Point Group(s)* dialog box. Here you can select one or more point groups to draw into the drawing.



13. Confirm the point group **Corners** is selected.
14. Click **<<OK>>**.

Only the points representing corners are created in the drawing and should look like the graphic below.



Lesson Review

In this lesson you learned about using *Points Groups* in *Carlson Survey*. First you created a *Point Group* by including all the points in the .CRD file with a certain description. Then you used that *Point Group* to draw the points into the drawing.

Chapter Review

In this chapter you learned about many aspects of working with points in *Carlson Survey 2014*. You looked at the use of the external point database, the coordinate file, known as the Carlson .CRD file. You also learned about several methods for the creation of point blocks in the drawing to represent the records in the external point database. You then learned how to edit the point blocks in the point data, how to erase point blocks and point data.

A solid understanding of the use of points in Carlson Survey is essential. Practice these exercises and try other commands on the points menu that we did not cover. You are on your way to becoming a Carlson Survey master and being a master of points is a solid step along the way.

Next we look at creating Surfaces using points and break lines.