



A Practical Guide to Carlson Survey 2023

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Exercise Data

We would like to thank the City of Springfield, Oregon and McKenzie Engineering Group from Norwell, Massachusetts for providing the data for parts of 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 2023

Introduction

Congratulations on choosing this course to help you learn how to use Carlson Survey 2023. The term “practical” is used in the title because this course focuses on what you need to effectively use Carlson Software, 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 Software, 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 Software to use the Project approach
- Utilize various COGO tools
- Enter Raw Survey Data at the Command Prompt
- Enter Raw Survey Data in the Carlson Raw Data Editor
- Adjust a Traverse with Compass and Angle Balance
- Adjust a Traverse with Carlson SurvNet
- Enter Deed Data to Create a Deed File
- Perform a Deed Correlation with Field Data
- Create and Edit Lots and Areas
- Utilize Carlson LotNet to Generate Lots and Setbacks
- Edit and Annotate LotNet Lots
- Setup Field to Finish Codes and Generate 2D and 3D Geometry
- Utilize Various Critical Coordinate File Utilities
- Utilize the Point History to Record all Edits to Coordinate Files
- Use Special Linetypes for Map Creation

Prerequisites

Before starting this course, you should have a basic working knowledge of CAD. While a deep understanding of all CAD functionality is not required, but you should be able to:

- Pan and Zoom in the drawing screen.
- Describe what layers are 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 Help system throughout the course to gain the fundamental skills needed to complete the exercises.

This text builds on the foundation of knowledge established in *A Practical Guide to Carlson Software Fundamentals 2023*. While a mastery of the material in that book is not mandatory to the successful completion of this text, it is highly recommended as a prerequisite to this courseware. Those topics include:

- Working with Points and Point Data
- Managing Point Groups
- Working with Surfaces
- Generating and Labeling Contours
- Performing Basic Drawing and Editing in CAD
- Importing and Exporting Land XML Data
- Working with Google Earth and World files
- Generating Linework Labels

Conventions

The course uses the following icons and formatting to draw your attention to guidelines that increase your effectiveness in Carlson Software, 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 Software. This guidance is often in the form of how to perform a task more efficiently.

Downloading and Installing the Datasets

In order to perform the exercises in this book, you must download a zip file and install the datasets.

Type the address below into your web browser to load the page where you can download the dataset.

www.cadapult-software.com/data

Unzip the Files

Unzip the file **APG_SURVEY2023.zip** directly to the C drive. The dataset will be copied to the folder:

C:\Carlson Projects

A folder called **APG Survey 2023 Data** is created that contains several folders with source data for the exercises in this book.

There are folders called **APG Survey 2023 Chapter X** These folders contain project files and drawings that are used to start the corresponding Chapters.

There are also folders created called **APG 2023 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.

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.

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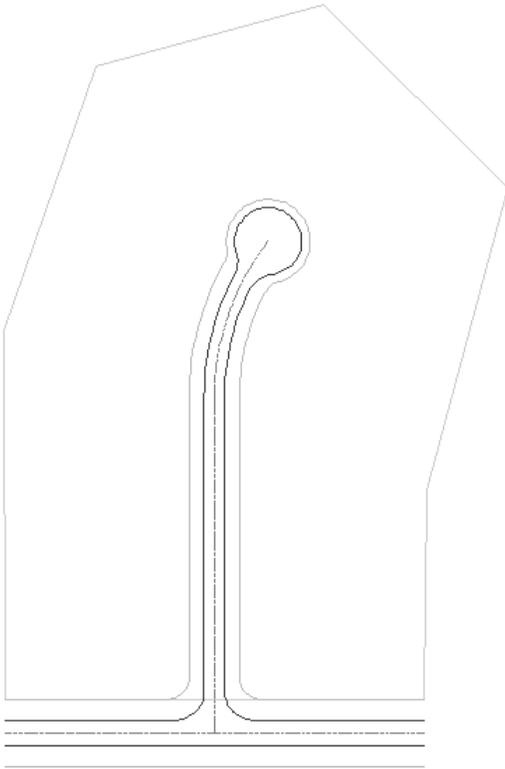
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Sample Lesson

4.1 Lesson: Offsets, Intersections and Cul-De-Sacs

Introduction

Much time is often spent creating roadways and cul-de-sacs. In this lesson you will learn how to utilize some of Carlson's design commands to highly automate these processes and work much more efficiently.



Key Concepts

- Creating offsets and intersections
- Creating cul-de-sacs

Objectives

After completing this lesson you will:

- Be able to efficiently create drawing geometry for roadways and cul-de-sacs using Carlson tools.

Introduction

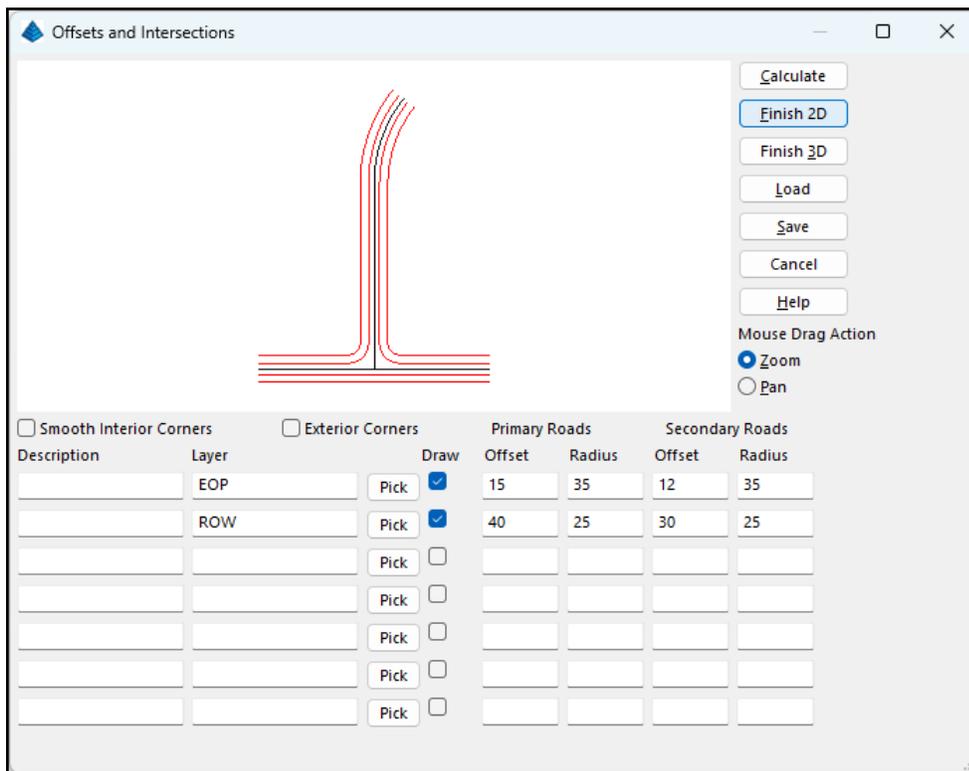
For the surveyor, calculating lot lines within an existing boundary can be a tedious and time consuming task. In days not so long ago, a surveyor or design engineer would sit and "number crunch" entering in COGO commands like bearing/bearing intersections or bearing/distance intersections to create lines, arcs and offsets.

In today's CAD climate, you have graphic tools that can perform those same tasks in a fraction of the time. However, the design of a subdivision (*Roads and Lots*) is still a constantly changing environment, with modifications from clients, overlaying regulations and budget constraints.

It is imperative to learn the many methods of designing a subdivision utilizing every tool available to ensure that the process is completed as quick and accurate as possible and that the inevitable revisions can be made easily.

It is important to mention that in a later chapter, you will be introduced to a powerful program called LotNET. LotNET combines all of the steps in creating roads and lots, automates the process and ties it directly to other civil design programs such as RoadNET.

Offsets and Intersections



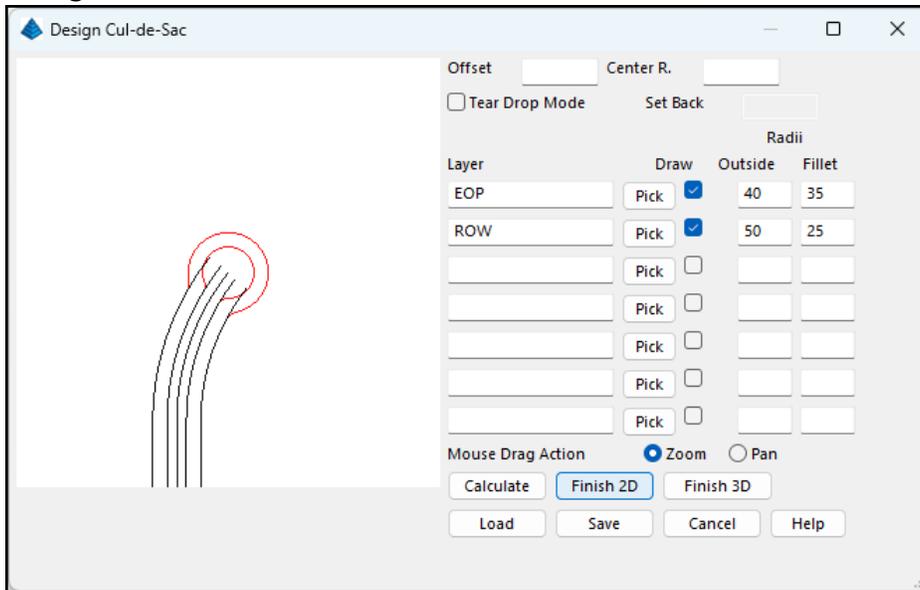
The *Offsets and Intersections* layout utility automates the process of creating geometry for roads, including intersections, based on selected centerlines.

The *Layer column* is the layer on which each offset will be created. In this case the default is **EOP** (edge of pavement) and **ROW** (right of way).

The *Primary Roads* column has two sub columns: **Offset** is the offset distance from the centerline for the corresponding layer. **Radius** is the return radii created at each intersection for the corresponding layer.

The *Secondary Roads* columns are set up identically to the primary roads. Additional offsets and layers may be created as desired.

Design Cul-de-Sac



The *Design Cul-de-Sac* layout utility automates the process of creating geometry for Cul-de-Sacs. Similar to the Offsets and Intersection dialog box, this dialog box is where you set the desired geometric properties for the cul-de-sac.

The **Offset** field is for creating an offset cul-de-sac. The offset is calculated from the picked point in the previous step and is measured perpendicular to the incoming tangent bearing.

The **Center R.** creates an island at the center of the cul-de-sac at the specified radius.

Tear Drop Mode creates a tear drop style cul-de-sac at the specified Set Back.

Under the **Radii** column:

Outside specifies the outside radius for each of the corresponding layers

Fillet specifies the return radii where the cul-de-sac meets the incoming offset lines

Exercises: Create Right of Ways and a Cul-De-Sac

Creating right of way lines and cul-de-sacs can done easily by setting factors like offset widths and radii in the Carlson Offset and Intersection command.

You do the following:

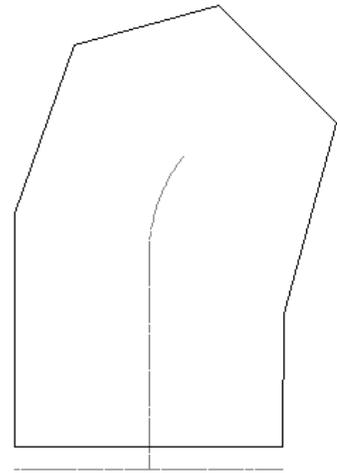
- Open a supplied drawing
- Create Right of Way lines from centerlines
- Create a Cul-de-Sac

4.1.1 Creating Right of Way and Offset Lines

In this exercise you will create right of way and edge of pavement offset lines at specified distances with connecting radii. You will use the Carlson Area/Layout Utilities' Offsets and Intersections command.

1. Open the drawing: **C:\Carlson Projects\APG Survey 2023 Chapter 4\DWGS\Lots.dwg**

The drawing file contains a perimeter boundary line and two centerlines.



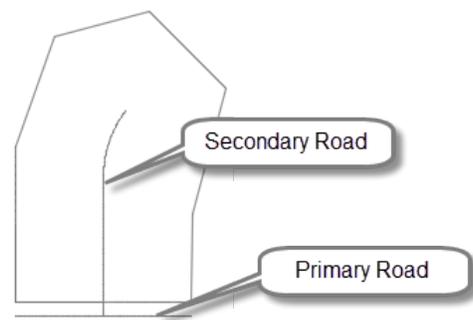
2. Select **Ribbon: Area/Layout ⇒ Layout ⇒ Draw Lot Setback ⇒ Offsets & Intersections.**

Alternatively, from the pull-down menu:

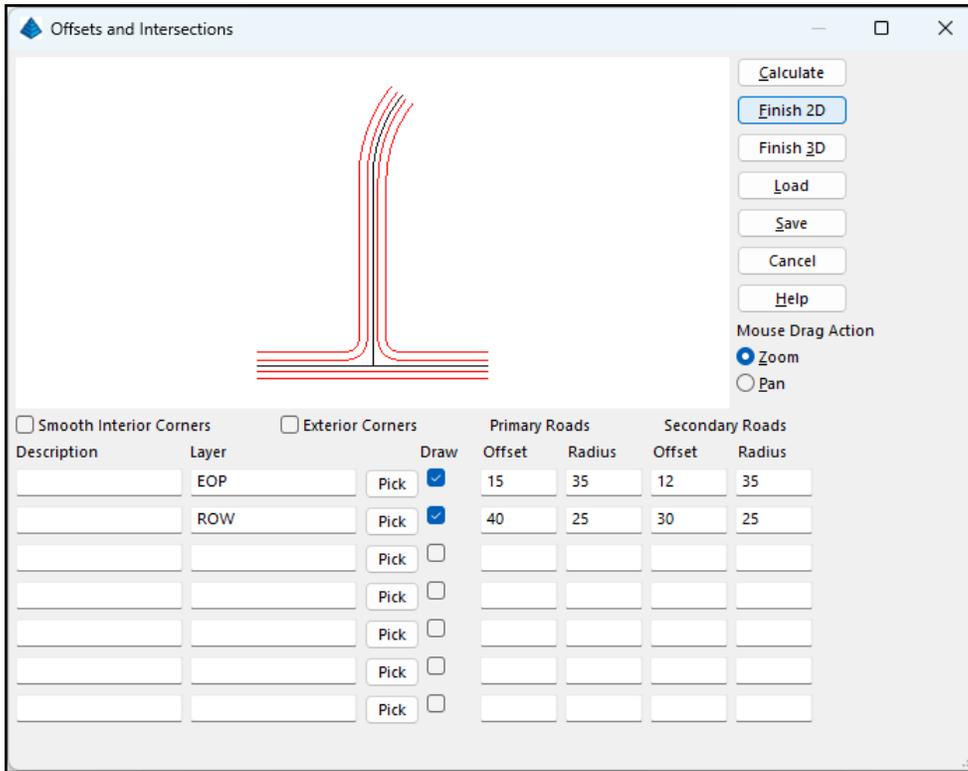
Select: **Area/Layout ⇒ Layout Utilities ⇒ Offsets & Intersections.**



3. At the command line prompt: *Select all PRIMARY road polylines* select the **Horizontal Polyline on the south side of the boundary.**
4. Press **[Enter]** to complete the selection.
5. At the command line prompt: *Select all SECONDARY road polylines* select the **Vertical Polyline within the boundary.**
6. Press **[Enter]** to complete the selection.



This opens the *Offsets and Intersections* dialog box.



7. Enter the offset dimensions as shown:

Primary Roads

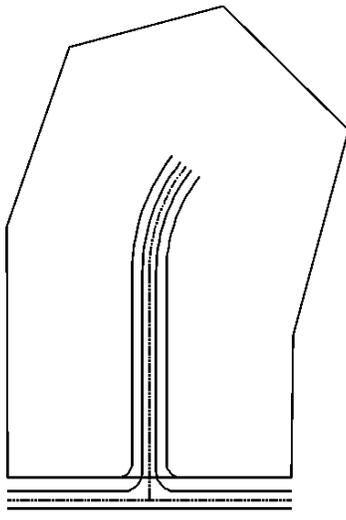
- EOP Offset 15 Radius 35
- ROW Offset 40 Radius 25

Secondary Roads

- EOP Offset 12 Radius 35
- ROW Offset 30 Radius 25

8. Click <<Finish 2D>>.

The 2D polylines representing the Right of Way and Edge of Pavement lines are placed in the drawing and look like the graphic below.



4.1.2 Creating a Cul-De-Sac

In this exercise you will attach a cul-de-sac to the dead end road centered within the boundary lines.

1. Continue working in the drawing from the previous exercise.
2. Select **Ribbon: Area/Layout ⇒ Layout ⇒ Draw Lot Setback ⇒ Cul-de-Sacs**.

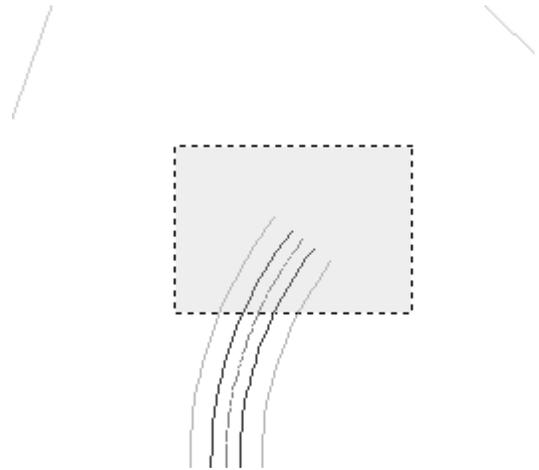
Alternatively, from the pull-down menu:

Select: **Area/Layout ⇒ Layout Utilities ⇒ Cul-De-Sacs**.



3. At the command line prompt: *Select all offset polylines to end with cul-de-sac* Select by a crossing window (upper right to lower left) the 5 lines at the end of the roadway.
4. Press **[Enter]** to complete the selection set.

These are the lines created in the previous step that correspond to ROW and EOP as well as the original centerline.

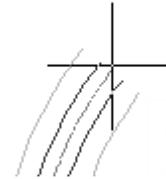


5. At the command line prompt: *Pick cul-de-sac center projection onto centerline*: Select the **End Point** at the end of the centerline.

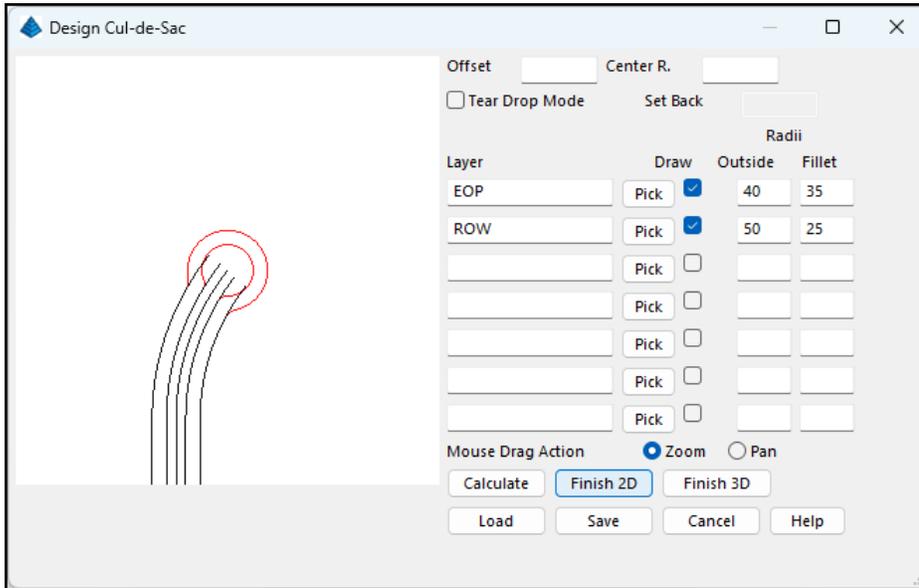
This represents the base point of the cul-de-sac.



Note the **End Point** object snap is provided by the program automatically.



This opens the *Design Cul-De-Sac* dialog box.



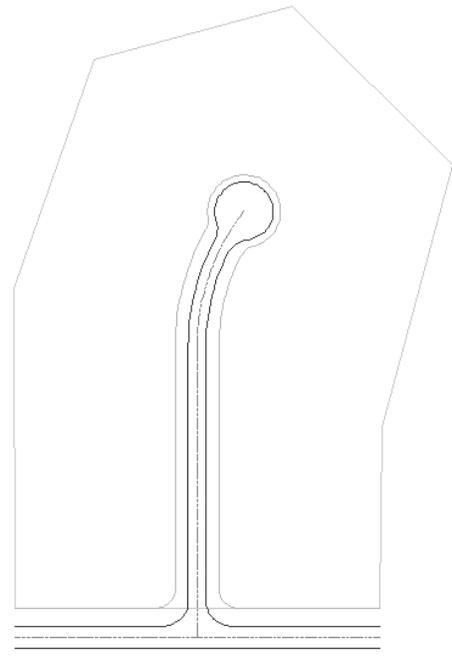
6. Set the EOP **Outside** offset to **40**.
7. Set the EOP **Fillet** to **35**.
8. Set the ROW **Outside** offset to **50**.
9. Set the ROW **Fillet** to **25**.

Note: It is important the layers used are the same as those in the previous exercise.

10. Click <<**Finish 2D**>>.

The resulting cul-de-sac is placed in the drawing and is connected to the previous entities to create a continuous polyline.

11. **Save** the drawing.



Lesson Review:

In this lesson you created right of way lines, edge of pavement lines and a cul-de-sac all from two existing centerlines.

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