



A Practical Guide to Carlson Survey 2020

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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 2020

Introduction

Congratulations on choosing this course to help you learn how to use Carlson Survey 2020. 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 2020*. 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_SURVEY2020.zip** directly to the C drive. The dataset will be copied to the folder:

C:\Carlson Projects

A folder called **APG Survey 2020 Data** is created that contains several folders with source data for the exercises in this book.

There are folders called **APG Survey 2020 Chapter X** These folders contain project files and drawings that are used to start the corresponding Chapters.

There are also folders created called **APG 2020 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.

Table of Contents

Chapter 1	A First Look at Carlson Survey 2020	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 Coordinate Geometry and Survey	19
2.1	Introduction to Coordinate Geometry	20
2.2	Lesson: Setting up and Configuring Carlson Survey	24
2.2.1	Setting up Carlson Survey to Work with External Data	28
2.2.2	Create a New Drawing	32
2.2.3	Configure General Settings and Points Default Settings	35
2.3	Lesson: Two Methods for Entering Field Survey Data	38
2.3.1	Entering Traverse and Sideshot Data Using Carlson COGO	42
2.3.2	Entering Data Using the Carlson Raw Data Editor	50
2.4	Lesson: Adjusting and Modifying Field Data	54
2.4.1	Adjusting a Traverse	55
2.5	Lesson: Entering Deeds and Record Information	60
2.5.1	Setting up Deed Defaults	62
2.5.2	Entering Record Deed Information	63
2.6	Lesson: Creating a "Fit"	70
2.6.1	Creating New Points for Record Locations	71
2.6.2	Making an Initial Analysis of Field vs Record Data	74
2.6.3	Deed Correlation	75
Chapter 3	Data Collectors and Post Processing	83
3.1	Lesson: Introduction to Data Collectors	84
3.1.1	Working with the Data Collector Programs	88
3.2	Lesson: Working with the Raw Data Editor	93
3.2.1	Processing, Editing and Reporting a Traverse Closure	94
3.3	Lesson: SurvNET	100
3.3.1	Creating a SurvNET Project	108
3.3.2	Processing Data with SurvNET	115
3.3.3	Adding Additional Traverse Data	122
3.3.4	Constraining the Network	125
3.3.5	Add Sideshot Ellipses	131
3.3.6	Generating Final Coordinates	133

Chapter 4	Area/Layout	135
4.1	Lesson: Offsets, Intersections and Cul-De-Sacs	136
4.1.1	Creating Right of Way and Offset Lines	139
4.1.2	Creating a Cul-De-Sac	141
4.2	Lesson: Creating and Sizing Lots	143
4.2.1	Creating Lots	145
4.2.2	Resizing Lots with Hinged Area	146
4.2.3	Resizing Lots with Sliding Side Area	147
4.2.4	Modify a lot by using AutoCAD Grips	148
4.3	Lesson: Lot Areas, Annotations and Setback Lines	150
4.3.1	Setting the Area Defaults	152
4.3.2	Annotating the Lot Areas	156
4.3.3	Setting up the Auto Annotate by Layer defaults Geometry (<i>by Layers</i>)	157
4.3.4	Alternate Setup - Load the Supplied Default Settings.	178
4.3.5	Annotating the Plan	181
4.3.6	Cleaning up The Annotations	182
4.3.7	Creating Setback Lines	190
Chapter 5	LotNET	193
5.1	Lesson: The Automated Process of Creating Lots and Roadways	194
5.1.1	Setting up LotNET	196
5.1.2	Designing a Subdivision	201
5.2	Lesson: Modifications and Redesign	209
5.2.1	Modifying Lots Created by LotNET	211
5.2.2	Checking your Design for Conformance	216
5.2.3	Storing your design as an external .LOT file	216
5.3	Lesson: Annotations, Cleanup and Subareas	220
5.3.1	Annotating the Subdivision	221
5.3.2	Renumber Lots	223
5.3.3	Sub-Areas	224
Chapter 6	Working with Field to Finish	227
6.1	Lesson: Introduction to Field to Finish	228
6.2	Lesson: Setting up Field to Finish Codes and Settings	231
6.2.1	Creating a New Drawing for Field to Finish	240
6.2.2	Creating a Field to Finish Code File (.FLD file)	243
6.2.3	Creating/Editing a Field to Finish Code	246
6.2.4	Printing the Code List	253

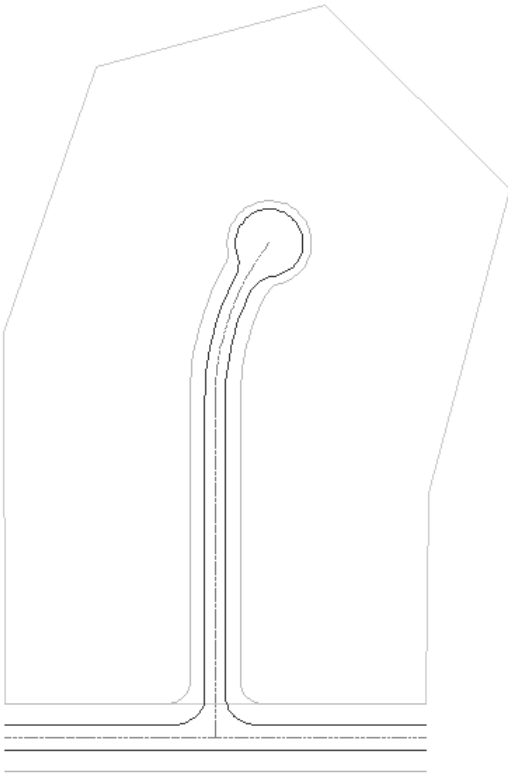
6.2.5	Setting the Special Codes	256
6.3	Lesson: Drawing with Field to Finish	259
6.3.1	Drawing Field to Finish Entities	262
6.4	Lesson: Using the Field to Finish Inspector	264
6.4.1	Using the Field to Finish Inspector	266
6.5	Lesson: Using the Tree Feature	268
6.5.1	Drawing a User Defined Tree Feature	273
6.6	Lesson: High Octane Field to Finish	286
6.6.1	Adding Multiple Codes.....	291
6.6.2	Advanced Special Codes	303
6.6.3	Working with Offset Codes	306
6.6.4	Using Fixed Parameters	307
6.6.5	Working with Companion Codes	309
6.6.6	Cleaning Up Linework with the GAP and JPN Special Codes	313
6.6.7	Customizing Special Codes.....	315
6.6.8	Working with Templates	317
6.7	Lesson: Annotating with Field to Finish	323
6.7.1	Field Code Table Using Attributes.....	326
6.7.2	Creating a Block with Custom Attributes	339
6.7.3	Using a Block with Custom Attributes	342
6.7.4	Field Code Table Using Text.....	347
6.7.5	Adding Text from Field Notes.....	353
6.7.6	Adding Equations to Notes	358
6.8	Lesson: Editing the Plan	362
6.8.1	Setting Drawing Orientation.....	363
6.8.2	Controlling the Display with Layer Filters	365
6.8.3	Editing a Plan with Attribute Labels	367
6.8.4	Setting Drawing Orientation.....	370
6.8.5	Controlling the Display with Layer Filters	372
6.8.6	Editing a Plan with Text Labels	373
6.9	Lesson: Another Example of What Can be Done with Field to Finish	380
6.9.1	Putting it all Together.....	381
6.10	Special Codes Appendix	389
Chapter 7	Ten More Essential Tools.....	397
7.1	Lesson: Using the Carlson Survey Inverse Command	399
7.1.1	Inverse Between Two Points	401
7.2	Lesson: Creating a Coordinate File from an Existing Drawing	404

7.2.1	Update CRD from Drawing	406
7.3	Copying or Merging Two Coordinate Files	410
7.3.1	The Copy/Merge CRD File Command	412
7.3.2	Updating the Drawing.....	416
7.4	Lesson: Creating a Point Comparison Report.....	418
7.4.1	Creating a Point Comparison Report.....	420
7.5	Lesson: Point History and the QA/QC of Coordinate Files	423
7.5.1	Reviewing Point History	424
7.6	Lesson: Aligning Geometry to Points	432
7.6.1	The 2D Align Command.....	433
7.7	Lesson: Calculating Curves.....	435
7.7.1	Using Curve Calc	437
7.7.2	Plotting a Curve.....	438
7.8	Lesson: Creating and Editing Polylines.....	440
7.8.1	Using Join Nearest.....	443
7.8.2	Editing Polylines.....	444
7.9	Lesson: Drawing Special Line Types	448
7.9.1	Change Polyline Linetype	450
7.9.2	Create a Tree Line	452
7.10	Lesson: Legal Description Writer.....	453
7.10.1	Creating a Legal Description.....	460
Index	463

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

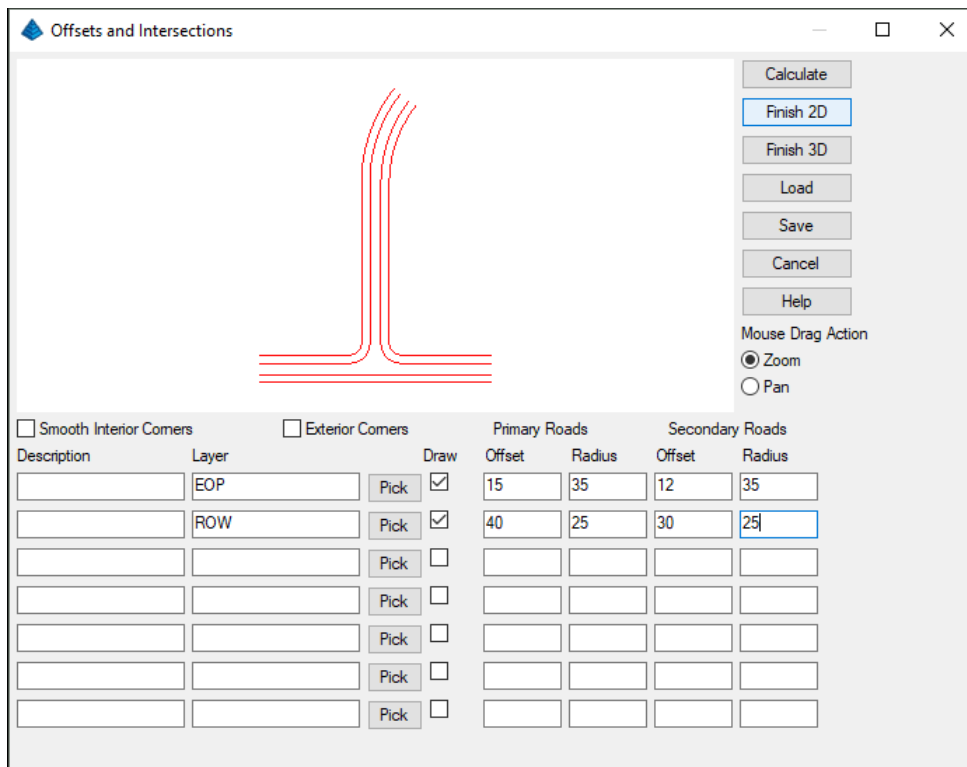
For the surveyor, calculating lot lines within an existing boundary can be a tedious and time consuming task. In days not so long ago, a surveyor or design engineer would sit and "number crunch" entering in COGO commands like bearing/bearing intersections or bearing/distance intersections to create lines,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



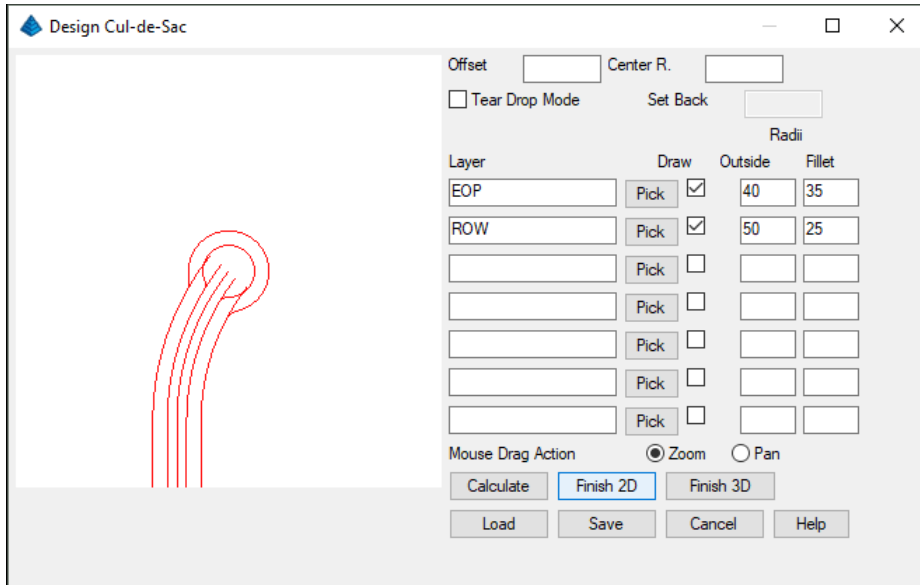
The *Offsets and Intersections* layout utility automates the process of creating geometry for roads, including intersections, based on selected centerlines.

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 of roads 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:

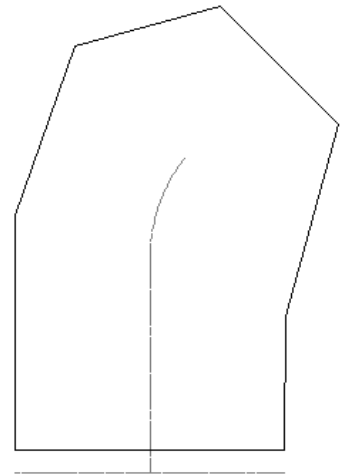
- Open a supplied drawing
- Create Right of Way lines from centerlines
- Create a Cul-de-Sac

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 2020 Chapter 4\DWGS\Lots.dwg**

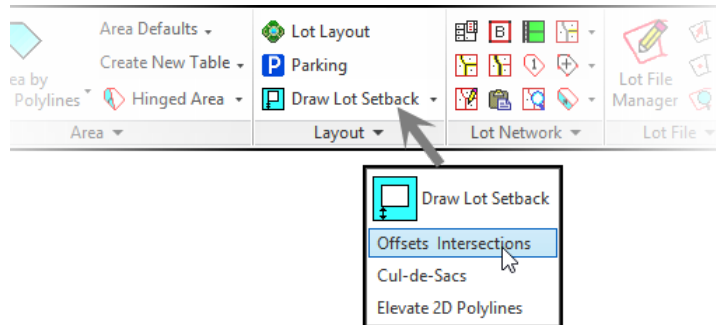
The drawing file contains a perimeter boundary line and two centerlines.



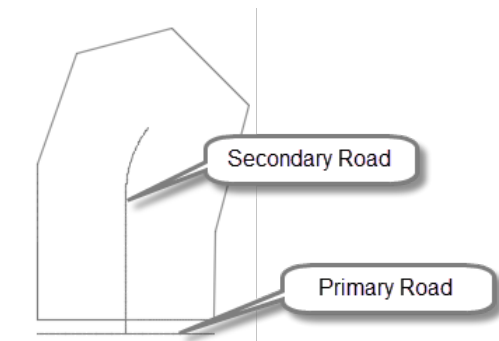
2. Select **Ribbon: Area/Layout ⇒ Layout ⇒ Offsets & Intersections**.

Alternatively, from the pull-down menu:

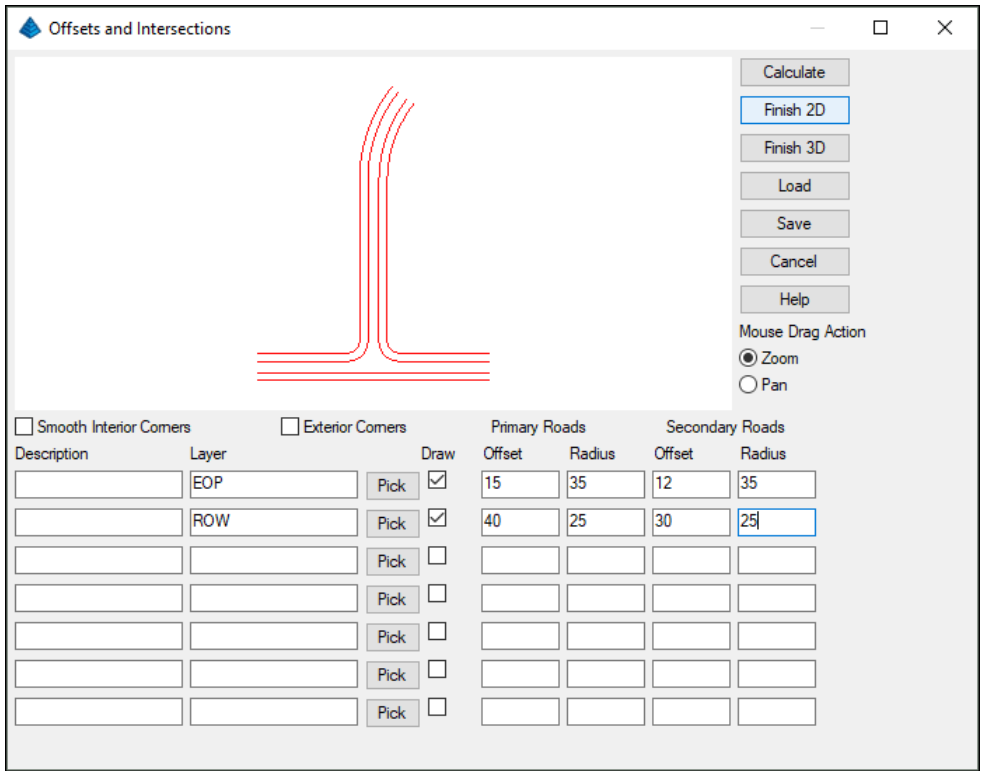
Select: **Area/Layout ⇒ Layout Utilities ⇒ Offsets & Intersections**.



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

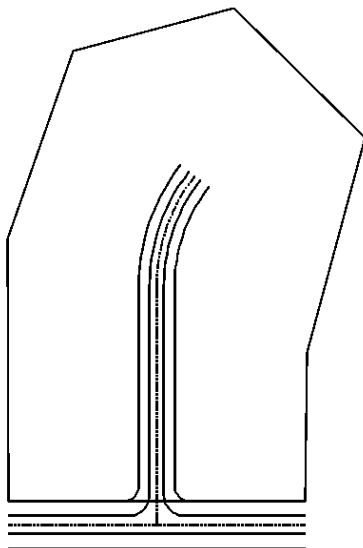
- EOP Offset 15 Radius 35
- ROW Offset 40 Radius 25

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.

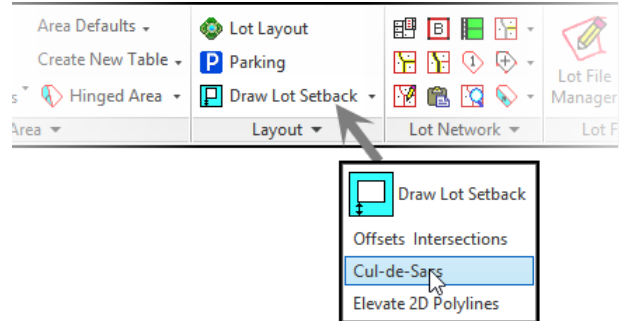


4.1.2 Creating a Cul-De-Sac

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

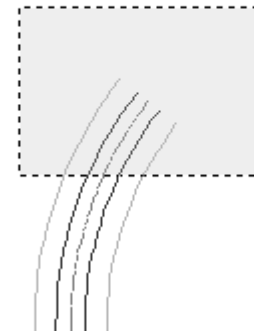
1. Continue working in the drawing from the previous exercise.
2. Select **Ribbon: Area/Layout ⇒ Layout ⇒ Cul-de-Sacs**.

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.

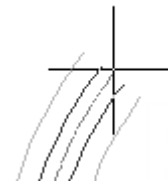


5. At the command line prompt: *Pick cul-de-sac center projection onto centerline*: Select the **End Point** at the end of the centerline.

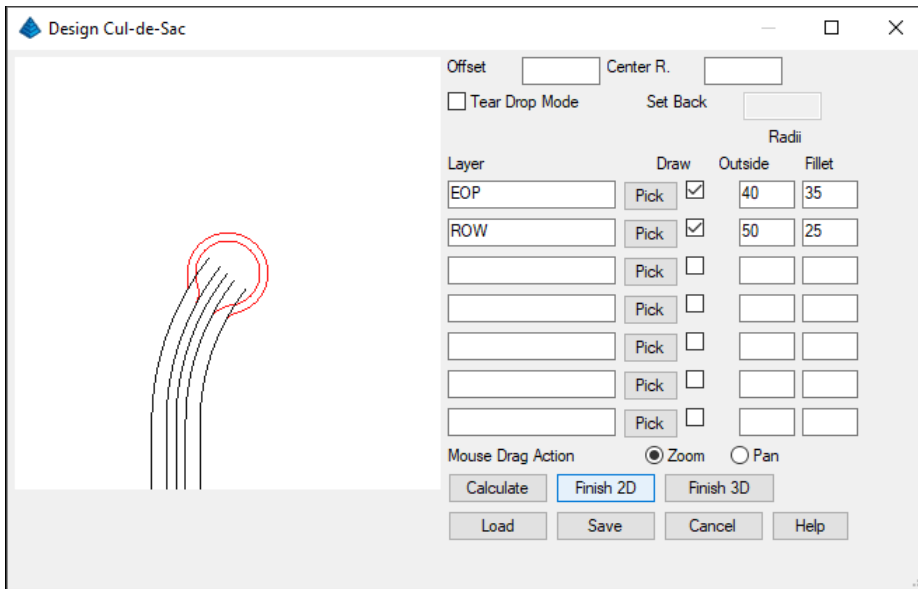
This represents the base point of the cul-de-sac.



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



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



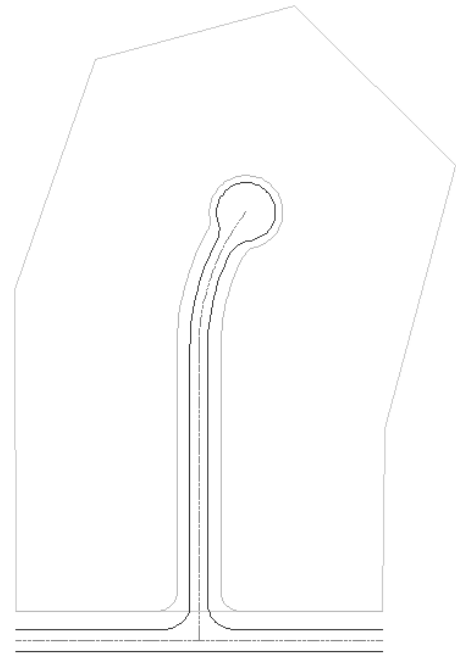
6. Set the EOP **Outside** offset to **40**.
7. Set the EOP **Fillet** to **35**.
8. Set the ROW **Outside** offset to **50**.
9. Set the ROW **Fillet** to **25**.

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.

Index

AAN file	151	Entering Record Deed Information	63
Add or Remove Lot line Edges	210	Equations	358
Add, Remove or modify Lot Line points	210	Field to Finish	227, 228, 229, 259
ADF file	151	Field to Finish Codes	233
Aligning Entities	433	Field to Finish Inspector	264, 265
Angles	21	File Menu	3
Annotate Menu	11	File Tab	15
Annotating	323	Fit	71
Annotating a Line	184	Fixed Folder	26
Annotating Arcs	188	Fixed Parameters	288, 307
Annotating Areas	151	GIS Menu	12
Annotating Lot Areas	156	Inquiry Menu	6
Annotating Point to Point	185	Instances	265
Annotation	221	IntelliCAD	1
Area/Layout Menu	11	Inverse	74, 399, 400
Area/Layout Tab	17	Inverse Options	400
attribute	324	Join Nearest	441
Auto-Annotate by Layer	151	LAY file	151
Begin Codes	288	Layer Filters	365, 372
C&G Survey Menu	13	Legal Description Writer	453
Carlson COGO	39, 42	Lot Layout	144
<i>Carlson Raw Data Editor</i>	50	Lot Line Modifications	210
Centerline Menu	10	LotNET	195
Centerline Tab	17	LTN file	196
closing angle	49	Merge Points	411
COGO	22	Moving Annotations with Leaders	186
COGO Menu	10	Multiple Codes	287
Companion Codes	289, 309	Nearest Found	238
Compare Points	419	Notes	353
Compass Rule	57	Offset Codes	288, 306
Constraining the Network	125	Offsets and Intersections	137
Create or modify a lot by a predetermined area	210	PDD File	61
Creating Lots	145	Point History	423
Cul-de-Sac	138	Points Menu	8
Curve Calculator	436	Points Tab	16
Custom Attributes	339	Polyline Editing Tools	441
Data Collector Programs	85	Polyline Linetypes	449
Data Folder Setup	25	Project Folder	25
Data Type Sub-Folders	26	Project Sub-Folders	26
Deed Correlation	75	Raw Data Editor	39
Deed Defaults	62	Raw Data Editor Menus	40
Deed File	61	Raw Data Toolbars	39
Draw Field to Finish	260	ReNUMBER Lots	223
Draw Menu	6	Renumbering Lots	221
Drawing Folder	25	Resizing Lots	145, 146
Drawing Orientation	363, 370	Ribbon	15
Edit Menu	4	RoadNET	195
Edit Point Attributes	8	RW5	22
End Codes	288	Setting Standard Errors	125

Settings Folder	27	SurvNET	101
Settings Menu	7	Templates	290, 317
Setup Tab	16	The .FLD File	232
Sideshot Ellipses	131	Traverse Adjustment	55
Special Codes	239, 256, 289, 303, 315	Traverse in the Raw Data Editor	94
Special Codes Appendix	389	Tree Description Codes	271
Startup Project/Data Folder	27	Tree Entity Options	269
Sub-Areas	221, 224	Tree Feature	268
Surface Menu	12	Tree Input Values	270
Surface Tab	18	Tree Labels	272
SurvCE	86	Tree Line	452
SurvCom	85	Tree Survey Settings	269
Survey Menu	9	Update a CRD File from Drawing	405
Survey Tab	17	View Menu	5