

## **Mapping**

Many forms of maps can be created in the diagram program: intersections, large facility and plant layouts maps, trailer parks, and complete city maps. Maps are very useful in providing quick and relevant information of the incident area.

### **Location and Information**

Designate street names, dwelling addresses, building names, and apartment numbers. You can also point out the location of hydrants, gates, fences, railroad tracks, and anything else important to the scene.

### **Direction**

It's also important to designate dead-ends, one-way streets, low clearance areas, and alternate routes. In some cases it may be necessary to highlight areas that cannot accommodate large vehicles. Many complexes for housing are notorious for not having enough turn around space for large fire fighting rigs. Maps can also be used to designate vehicle locations in multiple alarm fires. You wouldn't want to end up with two vehicles blocking each other in a narrow alley way.

### **Drawing Your Map**

Before you start drawing maps freehand you might want to do a little detective work to see if there are some existing maps available through your city's planning department, previously drawn in your office, or an outside source that sells electronic map files.

### **Importing Existing CADD Files**

More often than not your city will have maps they've created electronically (usually in AutoCAD), that contain street, dwelling, water, and hydrant information. If these files have been created in AutoCAD (dwg or dxf format) then you can import them directly into the diagram program (Fire Zone, Insurance Zone, Crime Zone, or Crash Zone). If they've been created in a CADD program other than AutoCAD then ask them to export their files out as a DXF file. You can then import these files into your program.

If you can't get diagrams from your city engineer you should try to obtain CAD drawings from many of the architects working on projects within your city. These drawings would most likely include new subdivisions and buildings. This will limit the need for you to compile the necessary information to create your own drawings.

The process is simple. Open the drawing in the diagram program (Fire, Insurance, or Crime Zone), remove any layers which are not needed, rename the remaining layers to conform with your existing diagram. You can then insert the new information (diagram) into your master diagram. Either use the Copy and Paste features or use the Merge feature from the File menu. Line the streets up and your done. Drawings of buildings can follow much the same process for

incorporation into your pre-fire surveys. You should find that architects were very willing to supply a copy of the CAD file after you explain why you need it. As most Fire Departments routinely review project blueprints, it is easy to establish a professional relationship with your local architects. This is critical in obtaining their CAD files. If for some reason the architects are not willing to provide your Fire Department with the CAD files, talk with your city planning commission or city engineers. They are often supplied with drawings in electronic form for the same reason you want them.

### **Information Overload and Layers**

Files created outside of your agency (by the city) will probably contain more information than you need or want (too much clutter). You can request the map file supplier to only save the information you want for your purposes. If not, you can usually isolate that information and delete what you don't need. If your city has created maps in a CADD program then the different information (features) of the map diagram will be built on layers. Using the layer feature in your diagram program will allow you to separate what you need from what you don't need.

**Tip:** To learn more about layers, read “Working with Layers” from the Learning Center.

If your city does not have map files you can access, then go to other outside sources to find usable electronic map files.

Another source for electronic map files is The Gemi Store (Geographic, Earth, Mapping Information). 1-888-333-GEMI or [www.gemistore.com](http://www.gemistore.com)

A magazine that covers geographic, mapping, and earth information is EOM (Earth Observation Magazine). [www.eomonline.com](http://www.eomonline.com)

### **Dividing the Map Into Workable Segments**

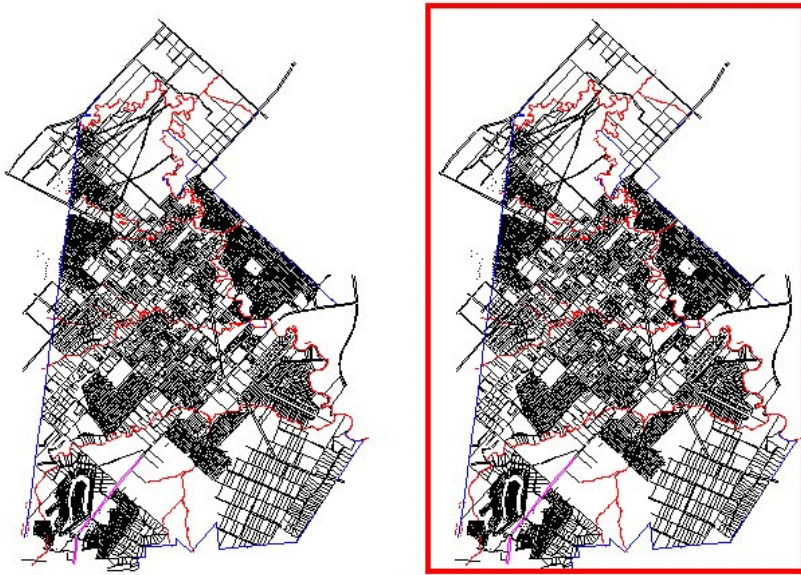
If you do get a map file you can work with in the diagram program you'll probably want to divide it up into sections you can print out and read on letter size sheets for your map book.

**Tip:** For more information on determining a good section size (single printed page size) go to the “Readability” section of this paper (a few paragraphs down).

The following steps show one example of how you can section off your map. Feel free to come up with your own method. Pick and choose portions of this method that will help you achieve the results you're looking for.

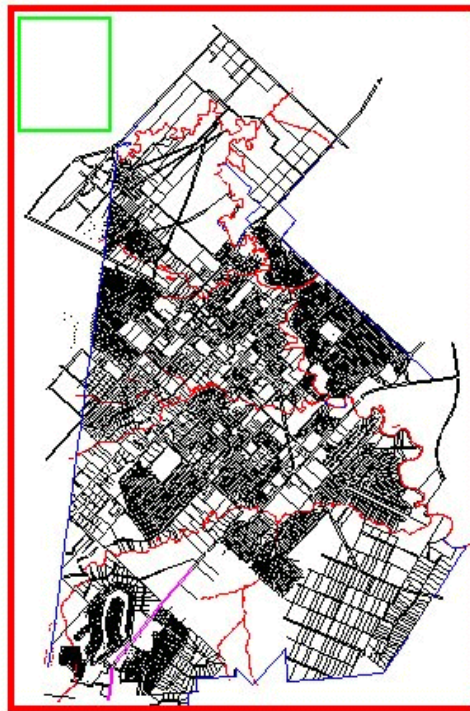
1) Open the map diagram in the Cad Zone diagram program. This may be a map you've already converted to czd (Cad Zone) format or you may be importing an AutoCAD dwg or dxf file.

2) Draw a rectangle around the extent of the map.



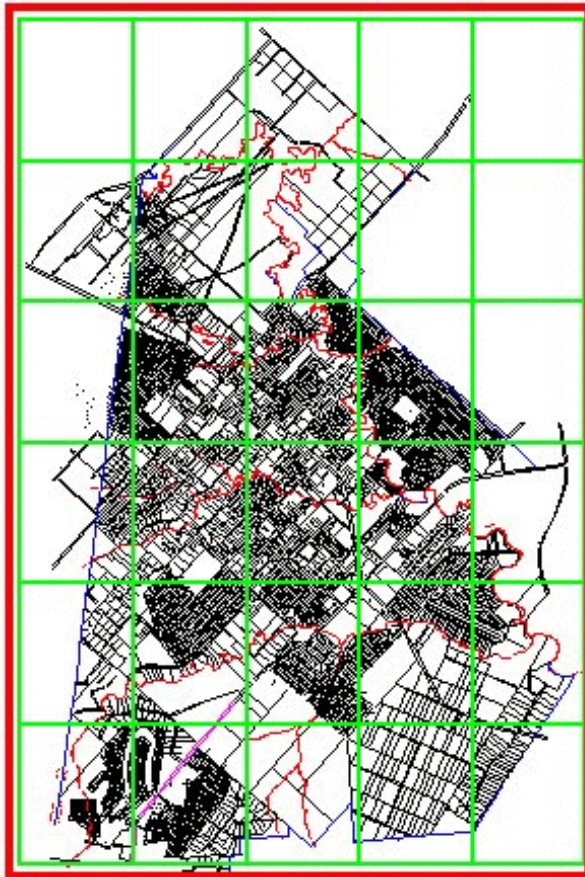
3) Draw or merge your single (printed sheet extent) rectangle.

4) Position the print rectangle in the upper left-hand corner of the map extent rectangle.



5) Copy the single sheet across and down to form a grid. The **Array Copy** (Edit/Modify menu) command works well here. The overall map extent rectangle is just a guide to help you position your individual sheet rectangles. It doesn't matter if the smaller rectangles do not fit perfectly inside the large rectangle. In the example shown here the smaller rectangles fit just right in the larger rectangle so no further adjustments were made.

Make a quick sketch on paper of your grid and number each sheet. You'll use these numbers to name your map sections when you save them.

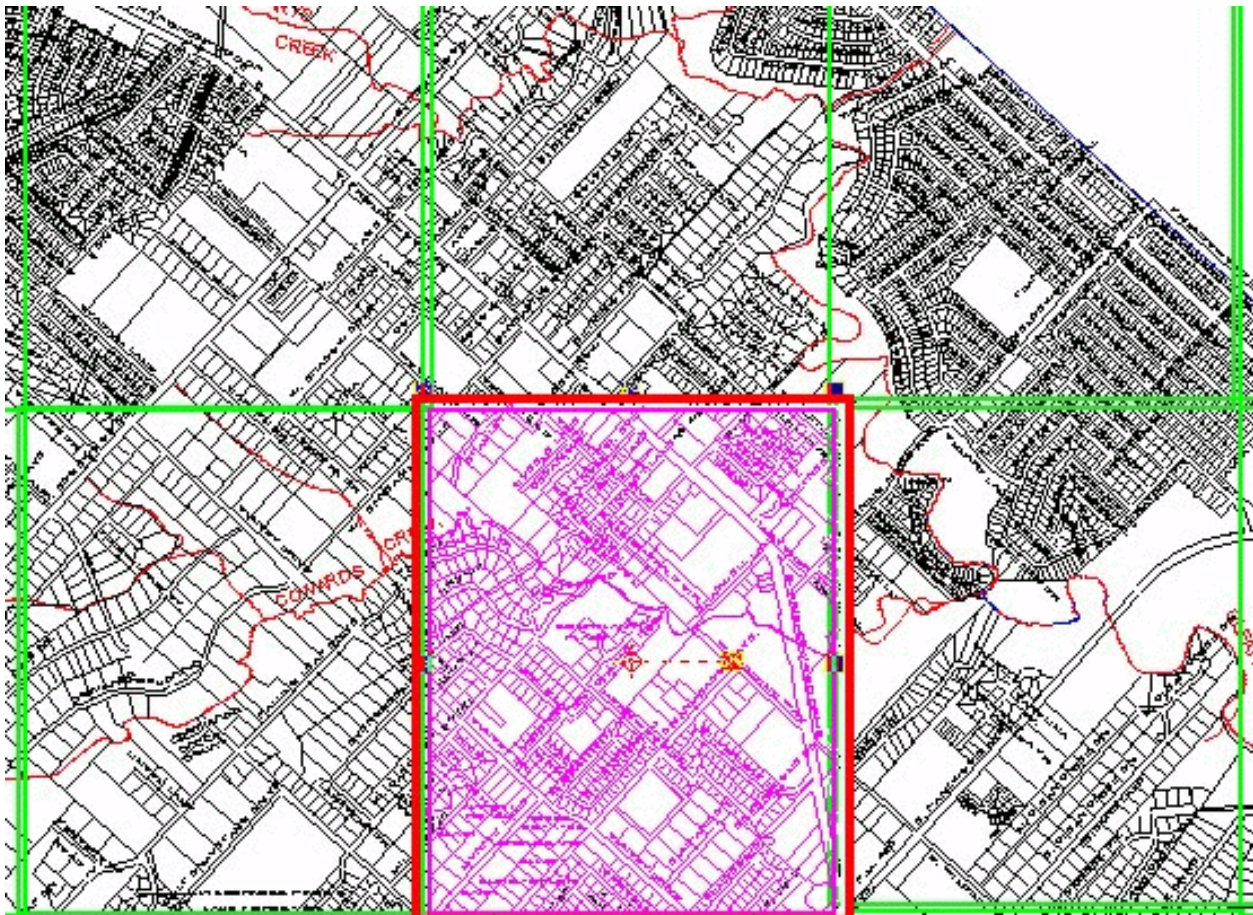


1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

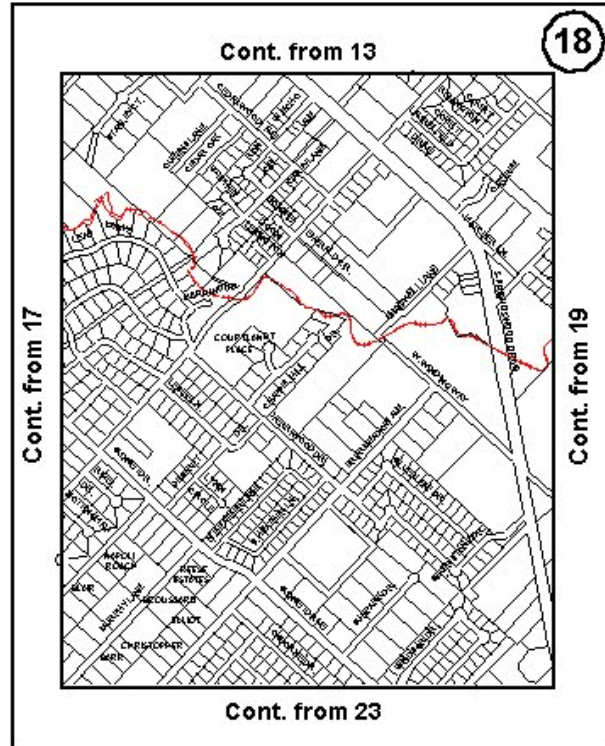
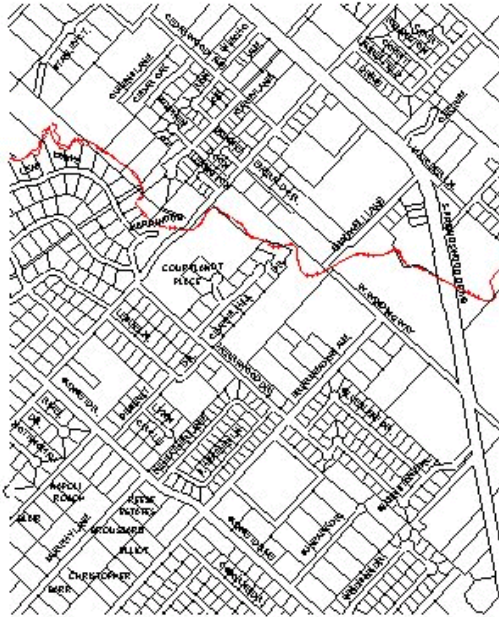
6) Use the **Cut Out** (Edit/Modify menu) feature to cut out a section of your map. Use the grid rectangle as a guide for the Cut Out command. The Cut Out command will break the selected section out from the rest of the drawing and then it will select it (highlight it). Once the cut out section is highlighted do the following:

a) Select **Save As** from the **File** pull-down menu. Because your section of map is selected a message will pop up stating, “You have selected entities in your drawing. Only save the selected entities? Yes or No”. Click on Yes. Give your map section a name that makes sense. In our example we’ll name our map section, “Map Section 18”.

b) Repeat the above steps and save the rest of the map sections.



7) Now that all the map sections have been saved you can finish up by opening each map section (one at a time) and doing the final touch up work. Clean up any lines you didn't intend to be saved with that section. You may also want to place a border around your map for reference purposes in the map book.



### Existing Hard Copies

If you have previously drawn maps on paper then you can scan them and save as a jpeg (jpg) file, import them into the diagram program and trace over them. Once you've traced over what you need from the image you can erase the image and add any final details to the map.

You could place notes and symbols on top of the image and use that for your map, but scanned images (bitmaps, photos, etc..) cannot be edited other than being moved or scaled up or down. Creating your map with actual entities from the program (lines, arcs, curves, etc...) allows you much more control over the map. You'll be able to edit the map, delete or modify incorrect data, change existing data, add new streets, and any other data.

**Tip:** To learn more about working with images in the diagram program, read "Photos - Bitmaps - Scanned Images" from the Learning Center.

## Drawing from Scratch

The diagram program has all the tools needed to create map diagrams. Whether you're starting from scratch, modifying an existing map, or tracing over a bitmap image you will need to use the basic drawing tools and methods outlined in this section.

## Readability

First determine the settings that will ensure the map is easily readable on a printed sheet of paper. In the following example overall size of the drawing area, road width, and text height are set as follows:

Text Height = 20 ft

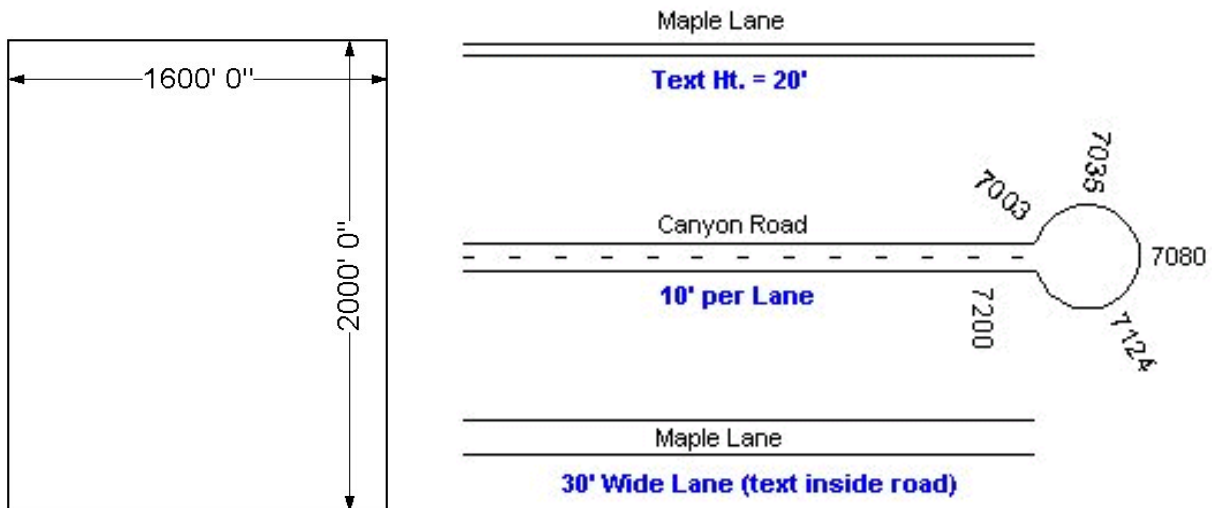
Road Width (Text Outside of Road) = 10 ft wide per lane

Road Width (Text Inside of Road) = 30 ft wide per lane

Map Section Border = 1600 ft x 2000 ft

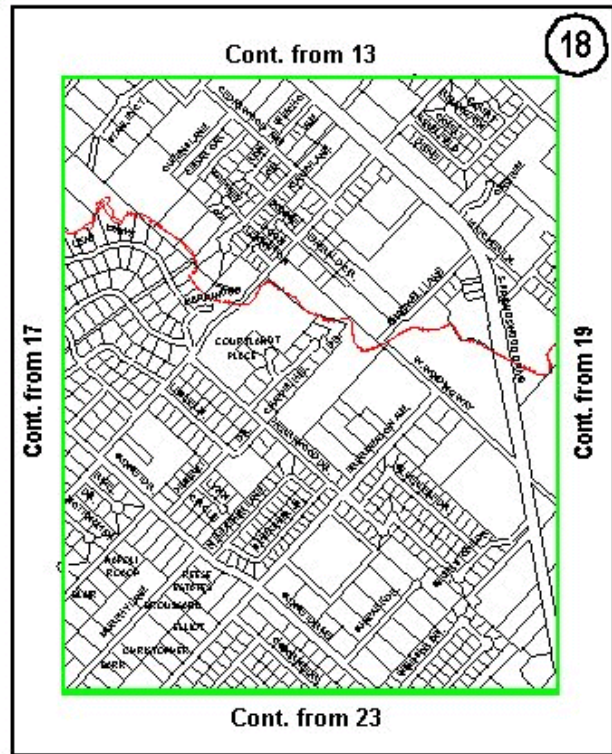
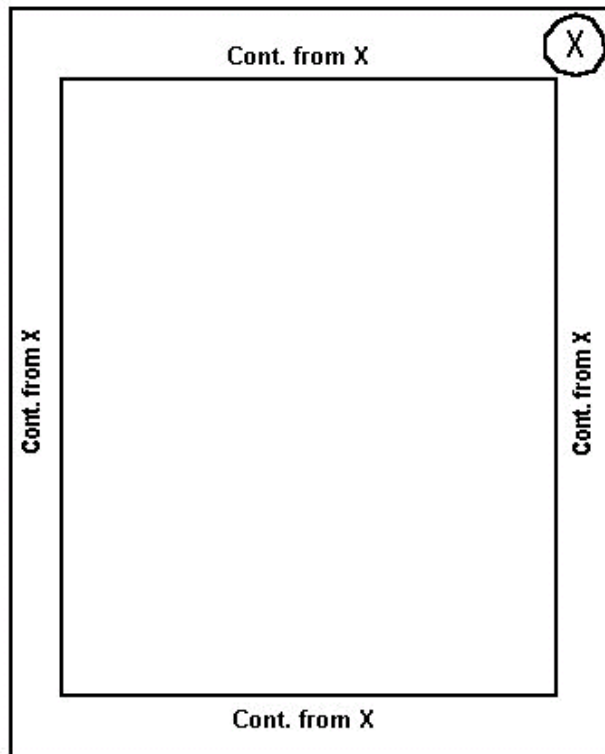
After setting these variables create a quick drawing with a road and some text and print it out. Create your drawing inside your map section border and then print out using the "Fit to Paper" check box in the Print dialog.

Note: These settings are just guidelines to help you get started. There's nothing magic about these numbers. Find what works best for you and use it. If you're working with a map file you imported from someone else then use it as a guide to determine the best size for a single section of the map. For example, if the text size is 60 ft tall in the imported map then you might want to make a border that's three times larger than the example we've shown here that uses text at 20 ft.



## Finished Border

Another consideration is a border to position your map section on. This border could be used to label the map section and show its connection to other sections of the map. If you use a border then there will be less room available for the map display, you might need to adjust your map section border size to compensate.

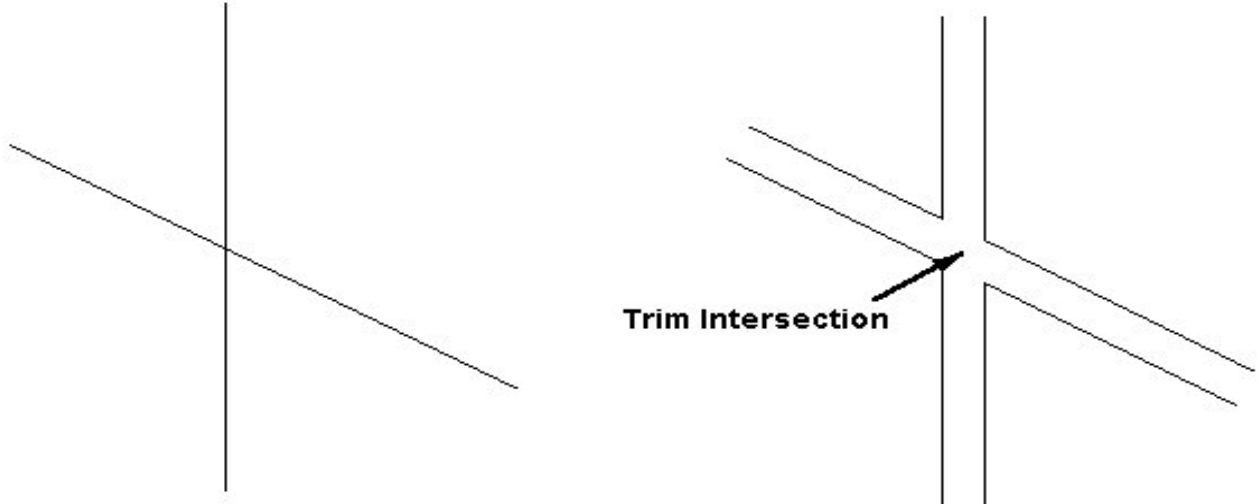


## Basic Drawing and Editing Tools You Will Use When Drawing a Map

The most common drawing entities you'll use when creating maps are Lines, Arcs, Circles, Curves, 3pt Rectangles and Text. Using these drawing entities and other features in the program we'll explore different methods of creating map diagrams. You decide what will work best for you.

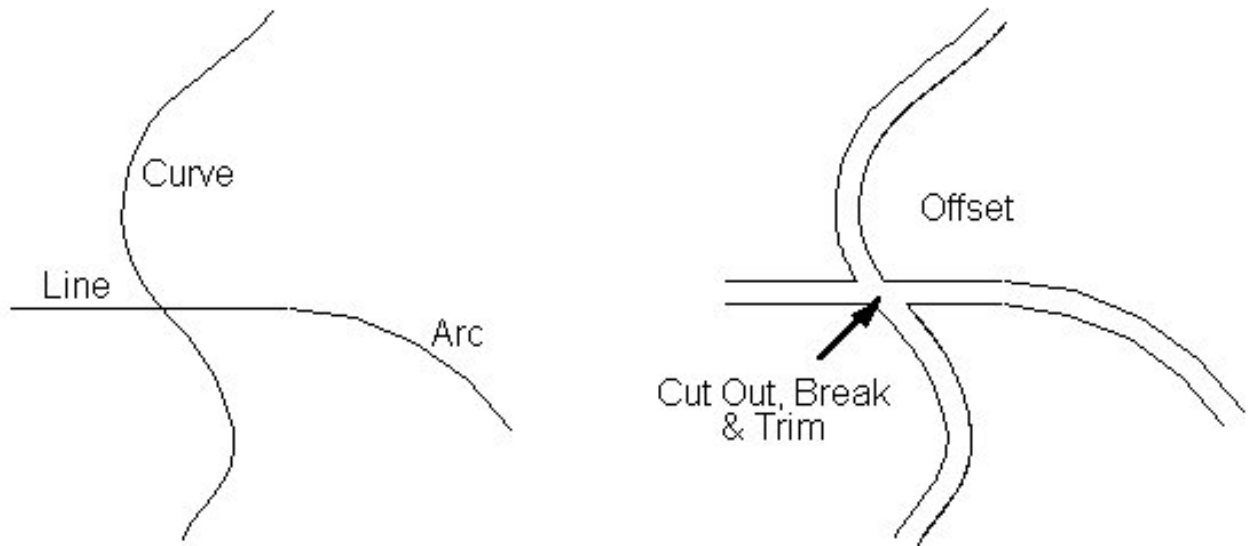
### Basic Lines and Double Lines

We'll start out using simple lines and work our way through to more complex features. This first example shows two lines intersecting. The **Offset** (Edit/Modify menu) command can be used to double up the lines or the **Double Line** (Draw menu) command could be used to draw the roads in the first place. The **Trim Intersection** (Edit/Modify menu) command can be used to quickly clean up the double line intersection.



## Other Entities

You can also use arcs and curves to help you draw your map. Curves come in handy when drawing rural area back roads. The Trim Intersection command does not work with curves that have been doubled up with the Offset command. So, if you have a double line curve passing through an intersection you'll have to use some different tools to clean it up. The best tools for the job is the **Cut Out** feature, the **Break** feature, and **Trim** feature. All three of these tools can be found on the Edit/Modify menu.

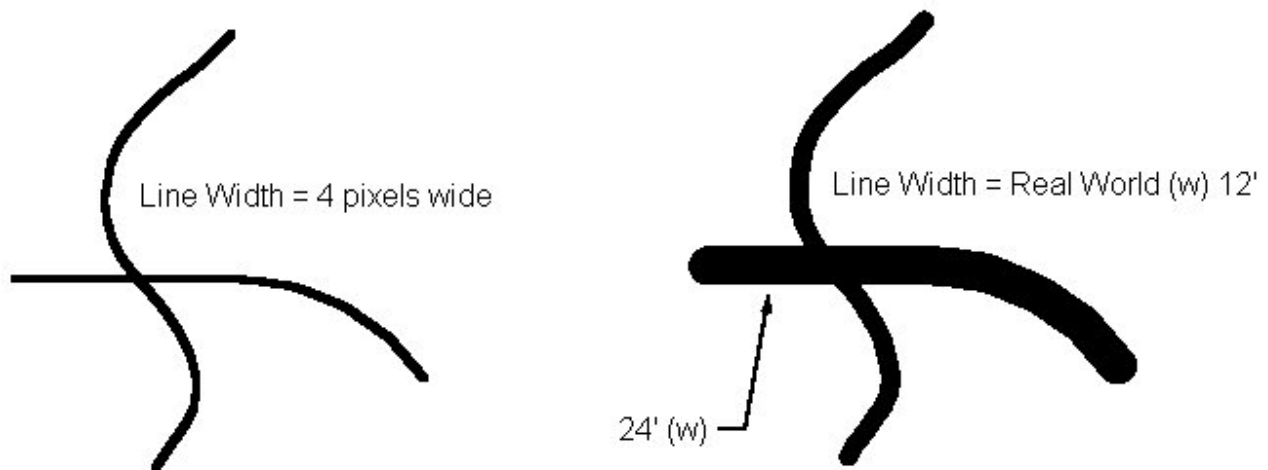
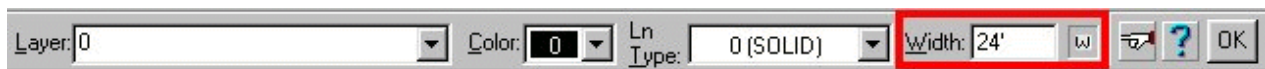


## Working with Thick Lines

If you want to avoid working with double lines you can always thicken (bold) the lines to simulate roads. There are two types of line thicknesses, the first is windows standard method of stacking pixels on top of each other to bold the line, the second is the ability to actually specify a real world line thickness.

The Line Types menu found on the Right Toolbox has some basic line width settings, Normal Width, Medium Width, and Heavy Width. Normal Width is set to a line width of zero, Medium Width is set to a line width of 2 pixels wide, and Heavy Width is set to a line width of 4 pixels wide. These settings are great if you just want to bold something up so it will stand out. No matter how much you zoom in or out will change how bolded lines are displayed on the screen. 4 pixels is 4 pixels regardless of the current view in the program.

You can set your lines to have a real world thickness such as 12 feet or 24 feet from the **Set Properties** (Draw pull-down menu or double wide button on the Speedbar) dialog. In the Properties dialog go to the Width settings. Just to the right of the Width setting is a button with a w (Real World Line Widths). Click on the “w” and then enter the actual width of the line.

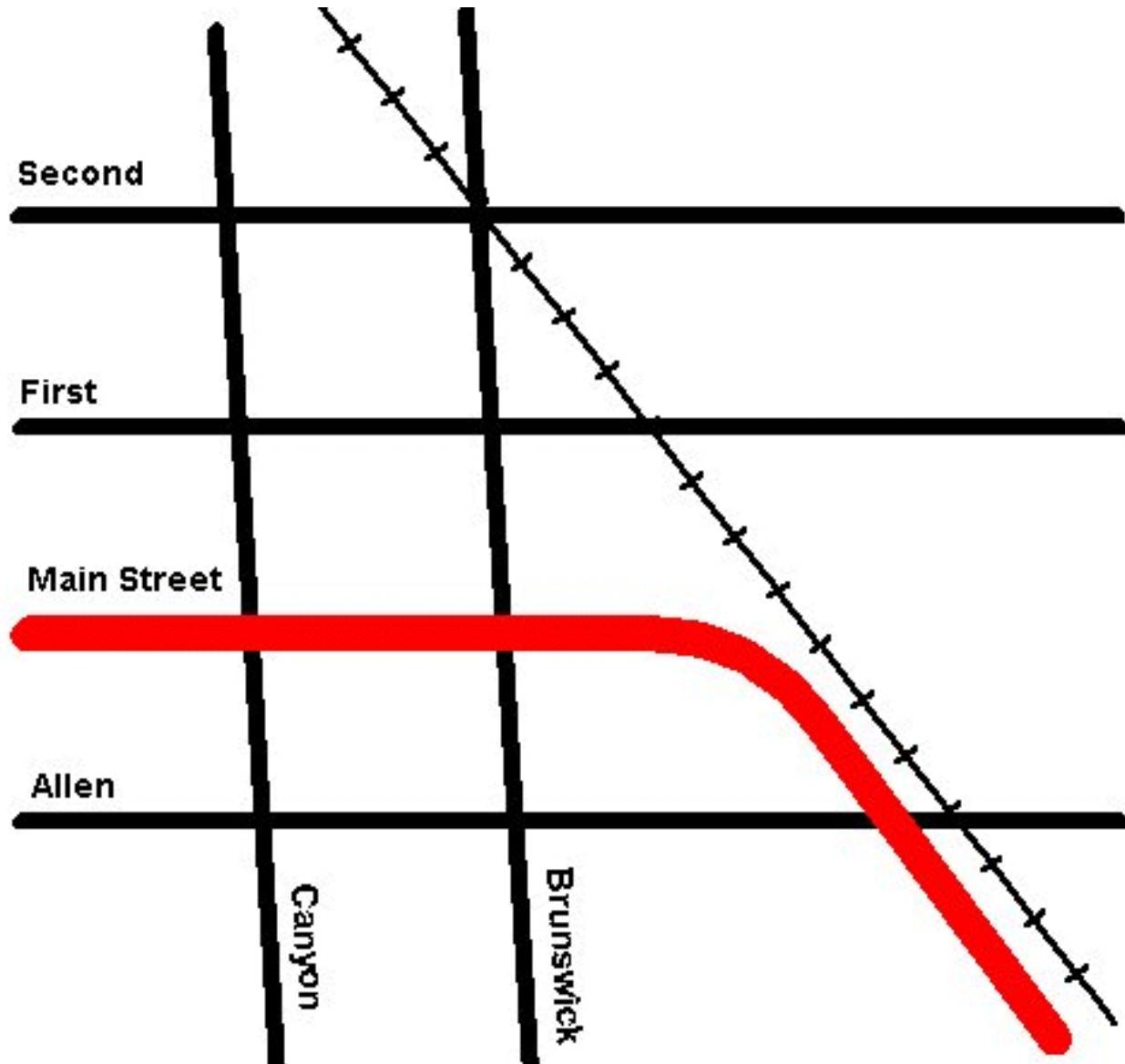


Thick lines stand out, are easy to work with, and don't require any intersection cleaning. Because you're working with individual entities you can easily color code, and change actual line types to be dashed, dotted, or arrows, and any other custom line types found on the Line Types menu.

**Note: You're not limited to just thickening lines. You can thicken any of the drawing entities;**

arcs, curves, circles, etc...

This is an example of a map using thick lines. You could easily add hydrants, buildings, and addresses.



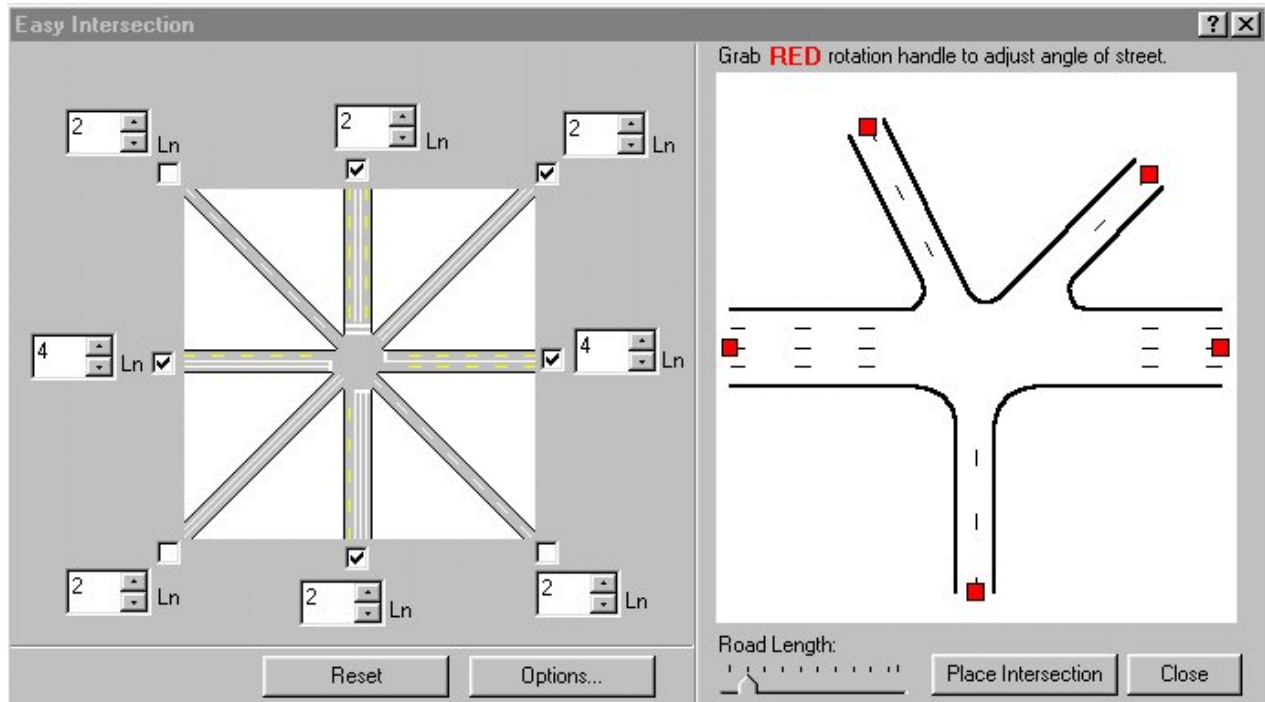
Tip: Keep in mind, all of the various methods of drawing a map in the diagram program still involve using the same tools available to do anything else in the program. These methods can be mixed and matched to meet your needs. There's no reason you can't add thick lines to double line maps and visa versa.

## Road Building Power Tools

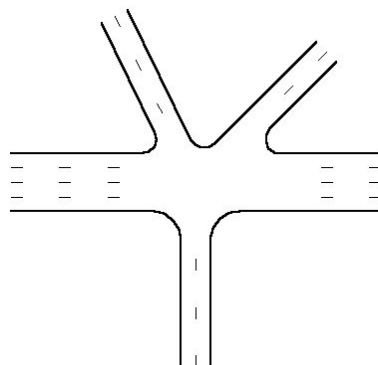
If you need a little more power when building your roads then you need to look at the **Easy Street** and **Easy Intersection** features. Both of these features can be found on the Right Toolbox.

### Easy Intersection

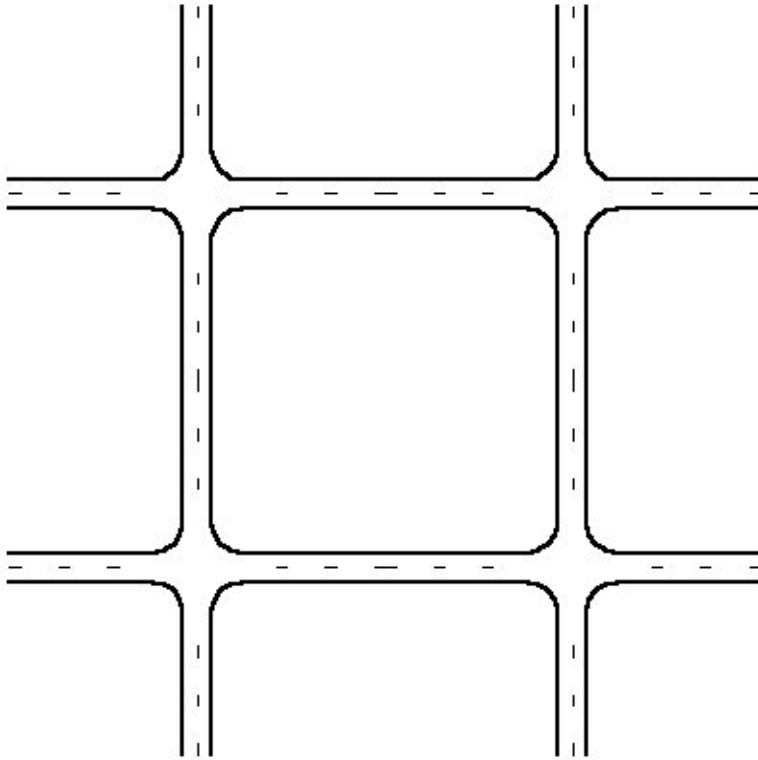
Easy Intersection is a unique dialog designed specifically for easy and quick modeling of intersections and small sections of road. You can build one to eight sections of road up to ten lanes each. You can adjust the angle of each section of road. You can set lane width and center line type. You can also set the overall length or size of the model. The following examples show the Easy Intersection dialog and examples of roadways built with Easy Intersection.



This example is the intersection placed in the diagram program after it was modeled in the Easy Intersection dialog.



This example shows four, 4-way intersections that were created individually in Easy Intersection and then attached together in the drawing.



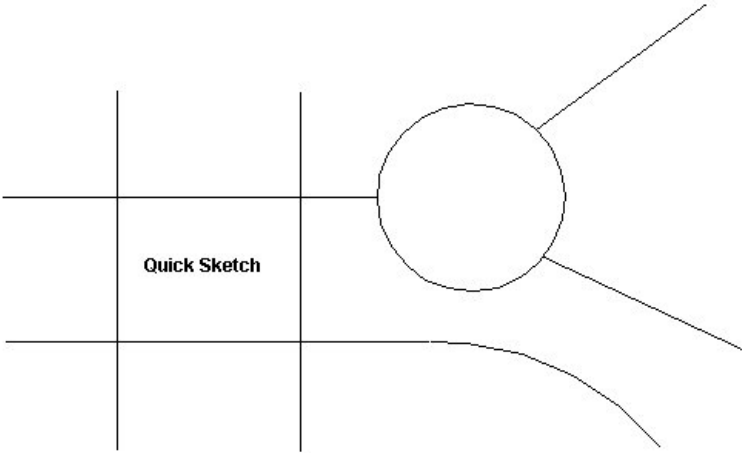
### **Easy Street**

The Easy Street dialog allows greater control over the road model than Easy Intersection. Separate width values can be set for each lane of the road. You could create a four lane model, making the two outer lanes 3 feet wide and the two inner lanes 12 feet wide giving you a two lane road with a sidewalk on each side. Every line in the model can be set to it's own line type (solid, dashed, double, and no passing).

Once the model is complete you can then apply it to existing (selected) entities in the drawing. Use basic drawing entities to create the skeleton of your road way. Select one section of the road and apply the Easy Street model to it.

The following examples show the Easy Street dialog and some examples of putting Easy Street to work building road ways.

This example shows the Easy Street dialog and basic roadway skeleton.

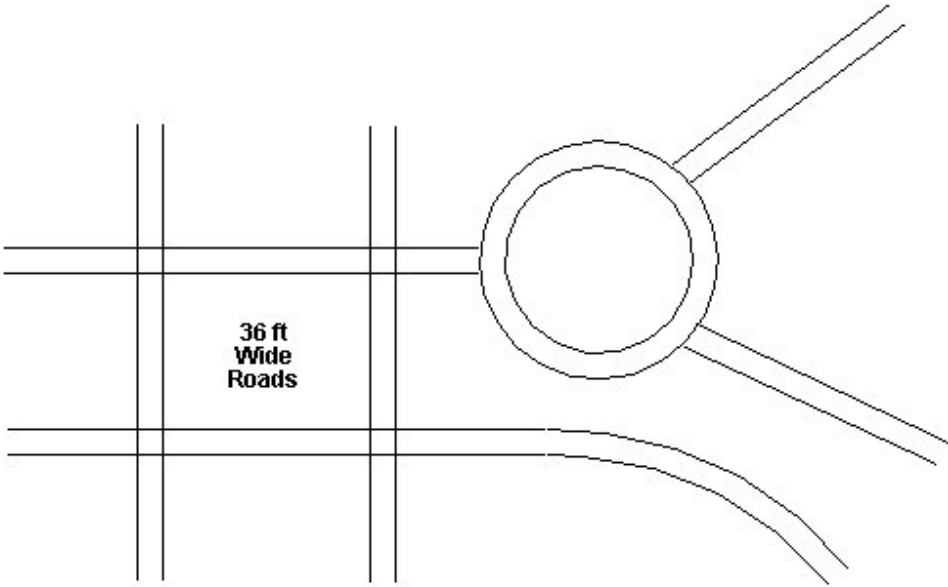


The "Easy Street" dialog box is shown on the right. It has a title bar with "Easy Street", a question mark, and a back arrow. Below the title bar is a preview area showing a roadway cross-section with dashed lines. The main area is a table with columns "Width", "x", and "LType".

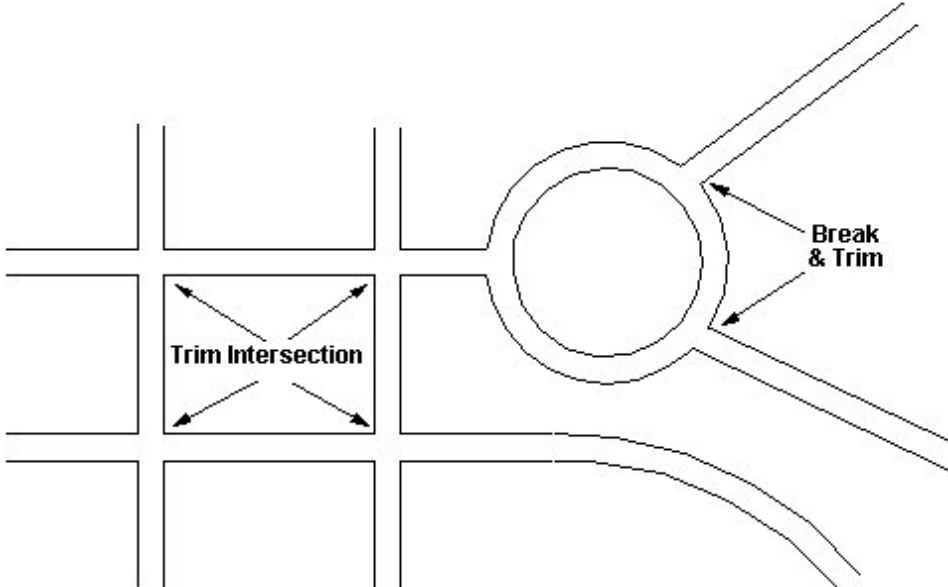
Width	x	LType
xxxx	<input checked="" type="checkbox"/>	————
12' 0"	<input checked="" type="checkbox"/>	- - - -
12' 0"	<input checked="" type="checkbox"/>	====
12' 0"	<input checked="" type="checkbox"/>	- - - -
12' 0"	<input checked="" type="checkbox"/>	————
	<input type="checkbox"/>	
	<input type="checkbox"/>	
	<input type="checkbox"/>	
	<input type="checkbox"/>	
	<input type="checkbox"/>	
	<input type="checkbox"/>	

Below the table are three icons for lane markings: a red dashed line, a red solid line, and a red dashed line with a yellow center line. Below these are four icons: a blue crosshair, a yellow "flip" button, a blue "R" button, and a red circle with a slash. At the bottom are "Apply" and "Back" buttons.

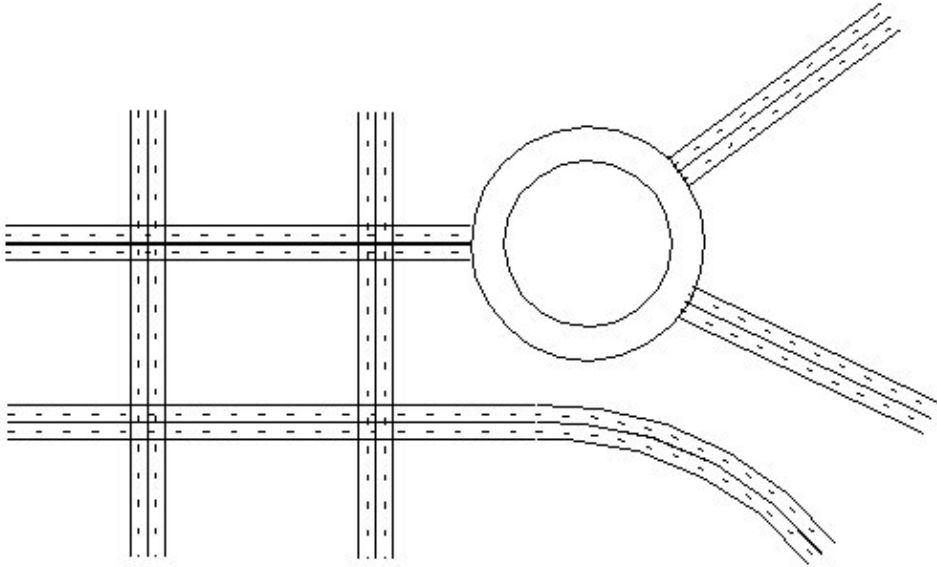
This example shows the applied model to the initial single line map sketch. The model was set to a 36 ft single lane road.



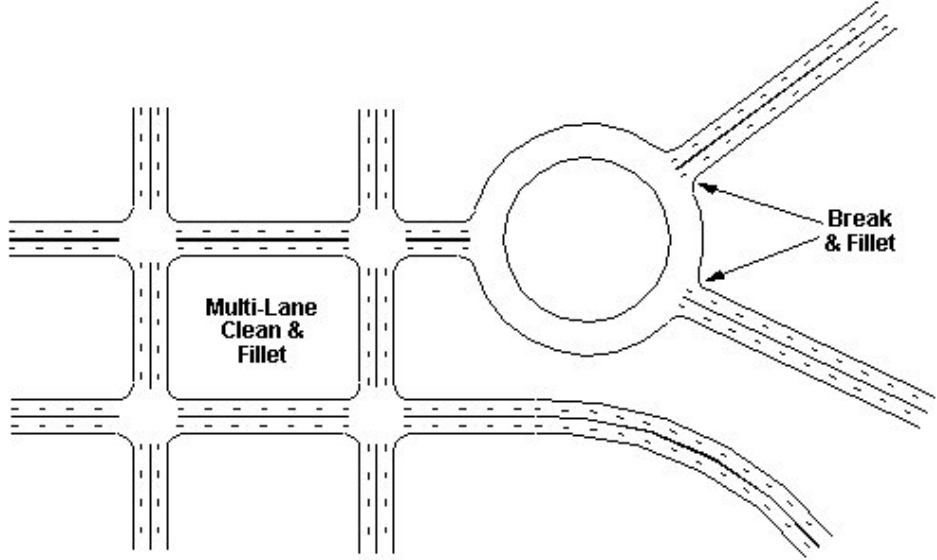
This example shows the streets with the intersections cleaned up. The **Trim Intersection** command was used where the double lines cross each other and **Break** and **Trim** were used to clean up the traffic circle.



This example shows the applied model to the initial single line map sketch. The model was set to four 12 ft wide lanes separated by a double solid centerline. As you can see



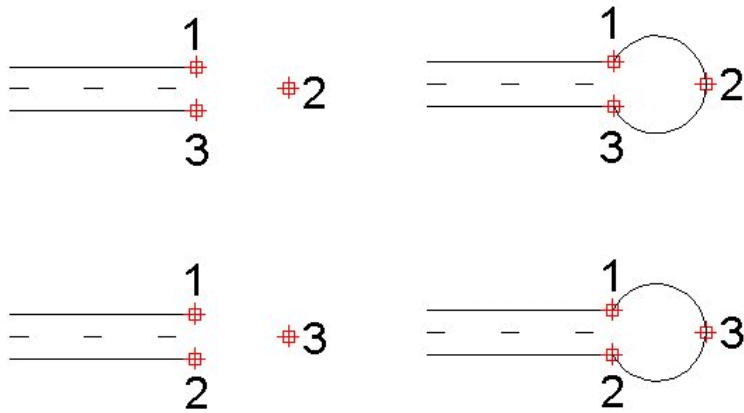
This example shows the streets with the intersections cleaned up. The **Multi-Lane Intersection Clean** command was used where multiple lane lines cross each other and **Break** and **Fillet** (used to round corners) were used to clean up the traffic circle. The Multi-Lane Clean tool is found on the Easy Street dialog and the Edit/Modify pull-down menu.



## Cul-de-Sacs

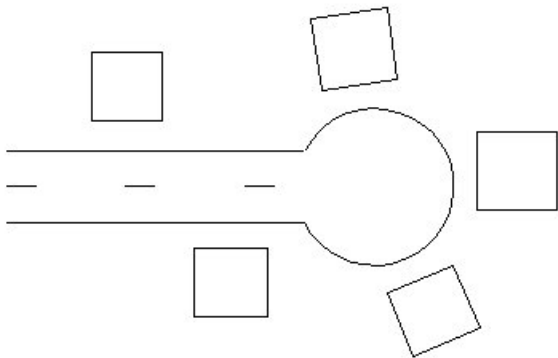
Adding a cul-de-sac to the end of a roadway is very simple with the use of **3 Point Arcs**. In the following example a cul-de-sac is created with both three point arcs. The first three point arc is created by clicking on a start point, middle point, and end point. The second three point arc is created by clicking on a start point, end point, and then middle point. You decide which works best for you. Either way gives you the same results.

**Tip: Make sure AutoSnaps is ON** when placing arcs so the endpoints of the arc snap to the endpoints of the line.



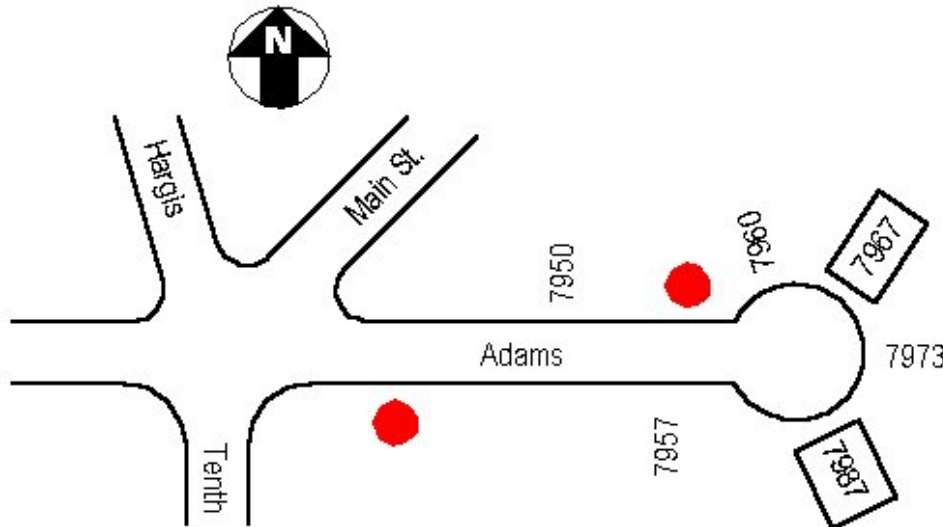
## Quick Buildings

If you want to create some quick buildings to place next to streets and around cul-de-sacs you can use the standard **Rectangle** command or the **3 Point Rectangle** command. The 3 Pt. Rectangle lets you set the angle of the rectangle which is perfect for aligning to angled streets and around cul-de-sacs.



## Labeling Streets and Addresses

Label the streets and addresses using the **Text** command in the program. The angle of the text can be set dynamically during placement. The first point clicked anchors the text and the second point clicked sets the angle. Place your text inside or outside the street. Finish up your map with hydrant symbols, a north arrow, and whatever else you need to locate in your map.



## Wall Maps - Print Tiling

If you would like to print out your entire map at a scale large enough to be easily read and place on a wall you can use the **Print Tiling** feature. Print Tiling is part of the printing tools and dialog. Since most people don't have access to a plotter or any other print device big enough to print a wall size drawing we've got Print Tiling. The Print Tiling feature automatically fits the drawing on multiple sheets of paper when the scale set is too large for a single sheet.

The full size map (real world scale) map we used earlier in this paper was approximately 8 miles long top to bottom. In the print dialog we need to determine a scale that will print out the correct number of panels to fit on the wall. For this example lets say the wall is 6 feet tall and just as wide. We need to determine the scale that will reduce 8 miles down to 6 feet and enter that value in the 1" = \_\_\_\_\_ ft dialog box in the Print Dialog.

Map length = 8 miles (42,000 feet)

Wall length = 6 feet

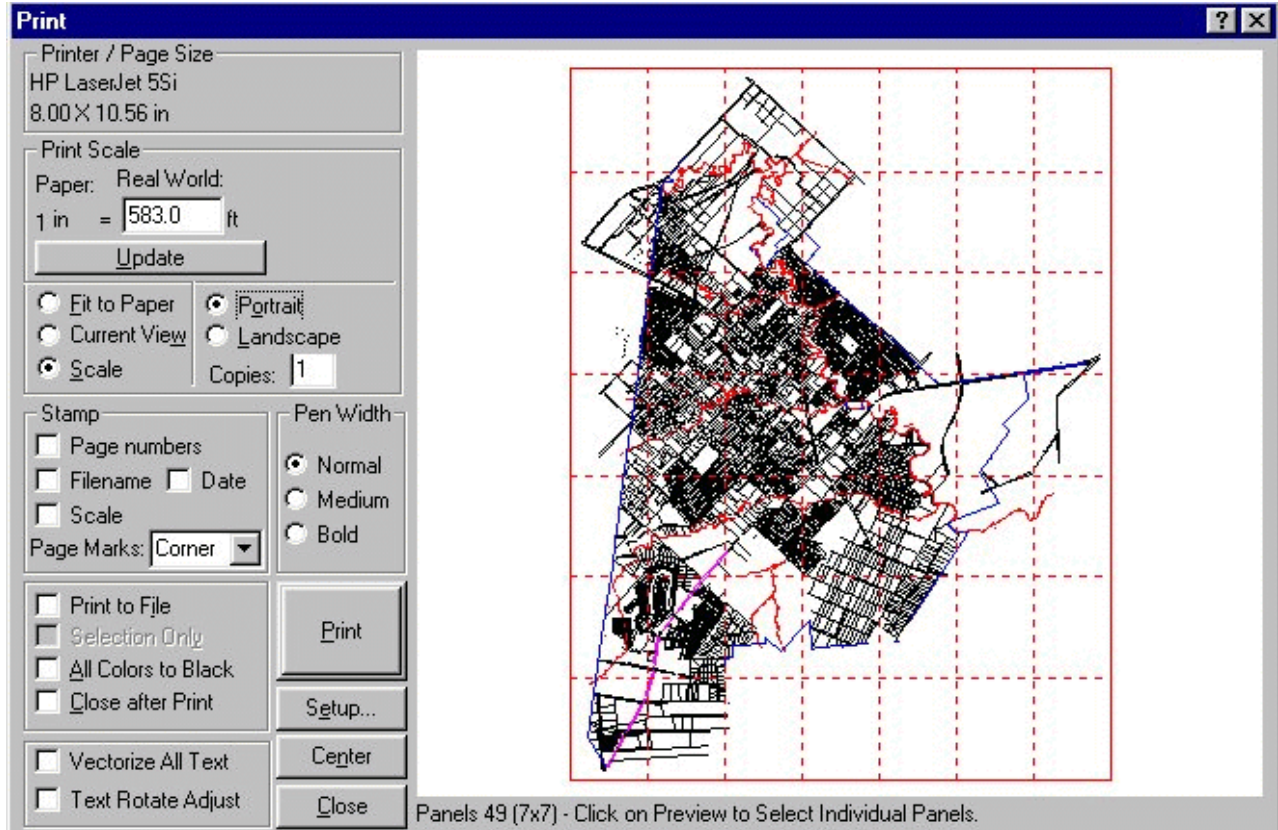
6' = 42000'

1' = 7000'

12" = 84000"

1" = 7000" or 583'

Using a little algebra we were able to determine the value we needed for the 1" = 583 ft dialog box. To fill up our six foot high wall with our map we ended up with 7 sheets by 7 sheets or 49 panels.



The following is a message and photograph sent to The CAD Zone from the Bowling Green Fire Department. They imported and updated their map in The Fire Zone and used Print Tiling to generate their wall map.

“This is a photo of the wall map of our city, produced with the tiling feature in 4.5. It is comprised of 30 panels of 13"x19" paper. When updating is required we simply replace a single panel.”

Thanks for all you help,

Captain Meredith  
Bowling Green Fire Department  
Bowling Green, OH



