

LAND VALUATION

**LAND VALUATION
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LAND VALUATION & LOT SIZING

When appraising real estate, the assessor must consider two separate entities: land, which is the nonwasting portion of the real estate; and improvements, which are the wasting portion subject to various forms of depreciation. Land and improvements are frequently valued separately so that the trends and factors affecting each can be studied. However, the final analysis for an improved property must be as a unit.

The first step in land valuation is identifying the property. The assessor must know the size and location of the subject parcel. Once the land has been properly identified and described, an analysis of the subject can be made. The analysis should include the collection of site-specific data, a study of trends and factors influencing the value, and the physical measurement of the site. The term site means more than just "land". A site is a parcel of land that has been made ready to use for some intended purpose.

Once the subject is analyzed, the assessor must classify the land. Land may be classified as residential, commercial, industrial or agricultural depending on its primary use. Zoning can be important in determining land classification because zoning ordinances often prescribe exactly what uses are permitted for the property.

Land, in a general sense, can be unimproved (raw) or improved (ready for development). Land that is undeveloped, or in agricultural use, is considered unimproved. Land that has been developed to the extent that it is ready to be built upon is considered a site. A site analysis requires the collection and analysis of information about trends and factors affecting value. Site analysis also includes collection and analysis of site-specific data (physical characteristics of the site).¹

Units of Comparison:

1. Square Foot
2. Acre
3. Site
4. Front Foot

The appropriate unit of comparison is typically determined by the marketplace as sites are bought and sold. These units of comparison will be discussed later in this section.

ESTABLISHING UNIT LAND VALUES

There are six acceptable methods of establishing unit land values.

1. Sales Comparison Method
2. Allocation Method
3. Abstraction Method (Also known as extraction or land residual technique.)
4. Capitalization of Ground Rent
5. Land Residual Capitalization
6. Land Build-up Method

Sales Comparison Approach:

This is, by far, the most accurate approach to land values and should be used as when sufficient sales are available. First, the appraiser must gather all land sales and study each one to determine if they are arms length sales. All unusual and questionable sales should be removed from the study. Next, we must reduce the remaining "good" sales to a common unit for study purposes. No two parcels of land are exactly alike. Therefore it is necessary to adjust for these differences. Typical adjustments include time of sale, location, shape, size, and topography. Additional adjustments may be required for atypical financing.

¹ Property Assessment Valuation, Second Edition, International Association of Assessing Officers, Pages 69 and 70.

Allocation Method:

The allocation method is based on the principal of balance, which affirms that there is a normal or typical ratio of land value to the total property value for specific categories of real estate in specific locations. This method of site valuation is helpful when no sales of vacant land are available for comparison.

Under this concept, a percentage of the total property value is allocated to the site. This allocation should be based on knowledge of the market for properties of the class being appraised. Relationships are established from sales of improved properties. Proper ratios can be determined by analyzing site values in previous years, land to improvement ratios in similar neighborhoods, or by analysis of new construction on similarly classified sites.

For example, your analysis determines that the site represents about 15% of the total property value for a given single family neighborhood. For a \$100,000 property, land represents 15% of the total, and would be calculated as follows:

$$\$100,000 \times 15\% = \$15,000$$

Abstraction Method:

Abstraction is a method in which land value is extracted from the sale price of an improved property. This method involves subtracting the depreciated replacement cost of improvements from the actual sale price for that property. The remainder would be an indicated value for the land portion of the property.

Example:

Sale Price:		\$230,000
Replacement Cost:	\$280,000	
Physical Depreciation:	30%	
Functional Obsolescence:	0%	
Economic Obsolescence:	<u>0%</u>	
Estimated Value of Improvements: (\$280,000 x 70%)		<u>196,000</u>
Indicated Land Value (\$230,000 - \$196,000)		\$34,000

This method is not as desirable or accurate as the sales comparison method and should be used only when vacant land sales are not available.

Capitalization of Ground Rent:

Ground rent is the amount paid for the right to use a parcel of land according to the terms of a ground lease. These ground rents can be capitalized at an appropriate rate to indicate a market value of the site.

The capitalization of ground rent method is used when the income from the property is completely independent of any improvements. Assume a vacant parcel of land being rented. The rental fee is \$6,000.00 per year on a net lease having 20 years to run. Also assume 8% is considered to be a fair return on this type of property. To arrive at the capitalized value of this parcel divide \$6,000.00 by 8% results in an indicated value of \$75,000. This can then be converted to a unit price to help determine land values in the area. Lease terms, escalation clauses, renewal options, reversion, and the selection of an appropriate capitalization rate can all affect the reliability of this approach.

Land Residual Capitalization:

Land residual capitalization is used when the income stream is dependent upon land and improvements. This method can be used to estimate land value when 1) The depreciated improvement value can be accurately estimated, 2) The annual net operating income is known or can be estimated, and 3) Both land and improvement capitalization rates can be extracted from the market. The annual net operating income attributable to the improvements is deducted from the total annual income. The residual income remaining to the land is then capitalized into a land value.

Land Residual Capitalization (Continued):

Example:

Net Operating Income:	\$75,000	
Depreciated Improvement Value:	600,000	
Land Capitalization Rate:	8%	
Improvement Capitalization Rate:	<u>10%</u>	
Net Operating Income:		\$75,000
Less Income to Improvements (\$600,000 x 10%)		<u>- 60,000</u>
Income Attributable to Land:		15,000
Indicated Land Value (\$15,000 ÷ 8%)		\$187,500

Land Build-up Method:

The land build-up method may be considered when there is insufficient sales data. This method is seldom used under normal conditions and should be considered only as a last resort in establishing unit land values.

Example:

A developer purchases five acres of raw land at \$15,000.00 per acre; he surveys the lots and ends up with three lots per acre. He puts in sewer, water, streets, curb, and sidewalks.

Land Purchase:	\$75,000
Street:	89,300
Curbs:	19,200
Storm Sewer & Inlets:	38,700
Sanitary Sewer:	21,600
Sidewalk:	8,000
Engineering Fees:	<u>3,500</u>
Total	\$255,300
Developer's Profit (20%)	<u>51,060</u>
Total Value (15 Lots)	\$306,360
Average Lot Price (\$306,360 ÷ 15 Lots)	\$20,424

UNIMPROVED AND IMPROVED SITES

Land that is undeveloped, or in agricultural use, is considered unimproved. Land that has been developed to the extent that it is ready to be built upon is considered a site. The off-site improvements which make undeveloped land a site include streets and utilities. Furthermore, sites can be broken down into unimproved sites and improved sites. When a site is described as "improved" it means it is used in conjunction with an existing structure and has the necessary site improvements. These site improvements include grading and topsoil, landscaping, trees and shrubs, etc. An "unimproved" site will lack some or all of these site improvements.

For assessment purposes the land value conclusions should be for sites that are improved. An unimproved adjustment factor should be determined and applied to all unimproved sites.

Determining an unimproved adjustment factor

The cost of the improvements which make a site "improved" can be found in the analyzed unit cost section. The following is an example of how to determine a proper unimproved adjustment factor.

For this example we will assume that a residential subdivision has been platted into 1 acre lots, measuring 198 x 220 lots. The typical site improvements for this type of residential subdivision are:

Grading & topsoil (\$0.21/SF)	\$9,148
Trees (2 @ \$100.00/each)	200
Shrubs (3 @ \$25.00/each)	75
Seeding (\$.02/SF)	871
Total improved site cost	\$10,294
Rounded	\$10,000

The land values for the improved sites in this subdivision should be the sales prices of the unimproved sites plus the site improvement cost. If the vacant sites are selling for \$30,000 per lot the land values for this subdivision should be \$40,000 (\$30,000 + \$10,000). The unimproved adjustment factor for this subdivision would be \$10,000 if expressed as a lump sum or 25% (\$10,000/ \$40,000) if expressed as a percentage. The improved sites in this subdivision can now be valued using the various units of comparison. Regardless of which unit of comparison is utilized the unimproved adjustment factor will remain \$10,000 or 25%.

When calculating an allowance for grading and topsoil great care should be exercised. The cost for this item can vary significantly. Grading and topsoil cost, for a small level site, will typically run about \$0.20 per square foot. However, it is not uncommon for large, multi acre sites, with a rolling terrain, to cost \$0.75 - \$1.00 per square foot. Sites requiring grade work into solid rock can greatly exceed the \$1.00 per square foot figure. Some sites contain soil types with poor weight bearing capacities. The cost to make these sites buildable can also greatly exceed the \$1.00 per square foot figure.

The landscaping allowance should also be carefully considered. A neighborhood with 4 grade dwellings situated on small sites will typically have a low landscaping cost. Perhaps seeding, one tree and a couple of shrubs are all that would need to be considered. However, a subdivision with 1 grade dwellings located on large 1 acre plus lots can have landscaping cost that exceeds \$10,000. These sites might have sod rather than seeding, multiple mature trees and shrubs, along with extensive retaining walls.

UNITS OF COMPARISON

It is necessary to value land sites in a consistent manner. This is best accomplished by determining a proper unit of comparison for each neighborhood or class of property. The appropriate unit of comparison is usually the method used in the marketplace when sites are bought or sold. Four basic units of comparison will be discussed.

SQUARE FOOT

The square foot method is best used in areas with irregular shaped sites and where frontage is not a dominate factor in the determination of a site value. This method is best used to value outlying residential properties, commercial and small industrial sites. An example of this method is as follows:

Land sales in a subdivision have been selling for \$1.00 per square foot. You have determined that improved sites have an average of \$0.25 per square foot of site improvement cost. The subject property consisting of 20,000 square feet would be valued at \$25,000 (20,000 square feet x \$1.25 per square foot). Sites that are still unimproved would be given a 20% (\$0.25/\$1.25) unimproved adjustment factor.

In many cases the assessor/appraiser will not be able to find comparables of similar size. In these cases it is necessary to develop an adjustment process to reflect these differences. Differences in topography, shape, location and zoning may also need to be considered.

ACRE

The acre method is used in valuing large parcels. Industrial sites, large retail sites, rural properties and agricultural land are well suited for this method. In many instances the assessor/appraiser may wish to transition from a square foot method on smaller sites into an acre method on larger sites. In these instances it is important to maintain a relationship between square foot and acre prices. Acres may be calculated by dividing the square foot by 43,560.

SITE

The site method is used when the marketplace does not indicate a significant difference in lot value even when there is a difference in the lot size. This method is becoming more prevalent. It is typically utilized in residential subdivisions, although it could be used in commercial or industrial subdivision with a large degree of similarity between all the lots within the subdivision.

FRONT FOOT

The front foot method is useful in the valuation of downtown commercial properties and residential properties with uniform lot sizes. This method is based upon the premise that frontage contributes to value. A front foot is a one-foot-wide strip of land that fronts on a street, golf course, body of water, etc. and continues to the rear of a parcel.

The front foot method of land valuation is not a common approach used by many fee appraisers. However, when appraising en masse, or what has become known as mass appraisal, land values must be established in a somewhat different method, due to the number of properties involved and the need for uniformity.

This approach to land valuation will be discussed in detail. The order of procedure is as follows:

1. Determine proper depth chart.
2. Establish front foot prices.
3. Lot sizing.
4. Pricing.
5. Adjustment factors and corner influence.

DETERMINING PROPER DEPTH CHART

Depth charts are selected on the basis of the most common depth within the city or county being appraised. If the "original town" was laid-off in 150' deep lots, then most likely this would be the depth chart you would select. The importance of this selection is not due to value, but merely to simplify the calculation process. The more lots that can be calculated at 100% the less chance for error. If front foot values are properly established, the depth chart will automatically work to provide the desired result. Various depth charts have been pre-calculated and are presented in table format on pages 2-18 thru 2-23.

ESTABLISH FRONT FOOT PRICES

The following is an example of how to develop front foot prices utilizing a land sales analysis. For this example let us assume we are trying to determine a front foot unit price for a one block area of Jones Street. We will also assume all sales used are legitimate, all sales are within an acceptable time lapse and that we have previously established 150' as a standard depth.

Figure A (on the following page) shows four sales of unimproved lots located in a residential area. The details of these sales are as follows:

<u>Sale No.</u>	<u>Date</u>	<u>Purchase Price</u>
1	01/21/2008	\$15,000
2	03/03/2008	14,400
3	06/02/2008	13,500
4	04/22/2008	22,000



Figure A

Before reducing these sales to front foot unit prices, let us discuss the difference between residential unimproved and improved lots. When a lot is described as improved, it means it is used in conjunction with an existing dwelling and has the necessary landscaping, trees, grading, topsoil, etc. If it is unimproved, these improvement features, or portions of them, are yet to be done. All front foot unit values should be established on the basis of improved lots. The cost of these improvements, in a residential neighborhood of average quality, will normally be between 10% and 30% of the value of the land. (See "Establishing unit land values" and "Improved and unimproved sites" for further discussions on acceptable methods of establishing unit land values and how to determine unimproved adjustment factors). This percentage should be established for each community or neighborhood. For the purpose of this example we will establish the normal improvements cost for this neighborhood at 20% of the value of the land. This means when we enter our calculations on the property record card that under "adjustment factor" we will enter 20% on vacant unimproved lots and the calculations will be as follows (the adjustment factor is removed after the lot has been improved):

LAND VALUE COMPUTATIONS

Frontage Computations	Frontage Figured	Average Depth	Depth Factor	Effective Front Foot	Front Foot Price	Total	Unimproved Adjust Factor	Actual Value
	60	150	100	60	\$300.00	\$18,000	20%	\$14,400

It now becomes apparent that we must increase our unimproved lot sales by a factor so that the "actual value" will reflect market value. The formula for this is to divide the unimproved lot sale by 80% before establishing front foot prices.

Example: If the unimproved lot sale was \$14,400.00

$$\$14,400.00 \div 80\% = \$18,000.00$$

The calculations of the unimproved sale prices would be as follows:

<u>Sale No.</u>	<u>Date</u>	<u>Purchase Price</u>			<u>Adjusted Purchase Price</u>
1	01/21/2008	\$15,000	÷	80%	\$18,750
2	03/03/2008	14,400	÷	80%	18,000
3	06/02/2008	13,500	÷	80%	16,875
4	04/22/2008	22,000	÷	80%	27,500

The next step is to arrive at effective front feet. This is merely multiplying the “frontage figured” by the “depth factor”.

<u>Sale No.</u>	<u>Frontage Figured</u>	<u>Factor</u>	<u>Effective Front Feet</u>
1	60	100%	60.00
2	60	100%	60.00
3	60	96%	57.60
4	90	100%	90.00

To arrive at reflected front foot unit prices, divide the adjusted purchase price by the effective front feet.

<u>Sale No.</u>	<u>Adjusted Purchase Price</u>	<u>Effective Front Feet</u>	<u>Reflected Front Foot Unit Price</u>
1	\$18,750	60.00	\$312.50
2	18,000	60.00	300.00
3	16,875	57.60	292.97
4	27,500	90.00	305.56

The completed land sales analysis would appear as follows:

<u>Sale No.</u>	<u>Date</u>	<u>Purchase Price</u>		<u>Adjust Factor</u>		<u>Adjusted Purchase Price</u>		<u>Effective Front Feet</u>		<u>Reflected Front Foot Unit Price</u>
1	01/21/2008	\$15,000	÷	80%	=	\$18,750	÷	60.00	=	\$312.50
2	03/03/2008	14,400	÷	80%	=	18,000	÷	60.00	=	300.00
3	06/02/2008	13,500	÷	80%	=	16,875	÷	57.60	=	292.97
4	04/22/2008	22,000	÷	80%	=	27,500	÷	90.00	=	305.56

It now becomes relatively easy to establish \$300.00 per front foot as the unit price.

LOT SIZING AND PRICING

Nearly all lots can be made to fall into two configurations: triangles and rectangles. Once we have learned this we can figure nearly any lot which we may want to calculate by the front foot method.

In converting irregular shaped lots to triangles and rectangles there are two basic rules to follow:

1. You may exchange rear land for rear land and front land for front land, but never front for rear. (See Figures 1 & 2)
2. Depth is always figured from a right angle to the street line.

Following are a few examples of exchanging land:

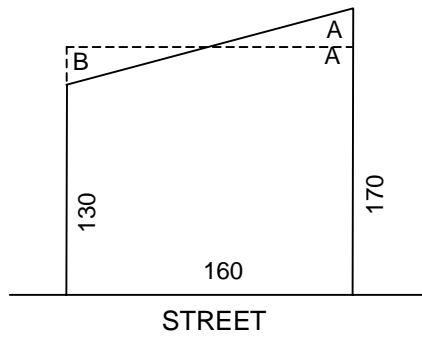


Figure 1

The lot shown in Figure No. 1 has parallel sides but not equal depth. Therefore, we exchange rear land for rear land (place A triangle in B) by averaging the sides. The lot is now a 160' x 150' rectangle.

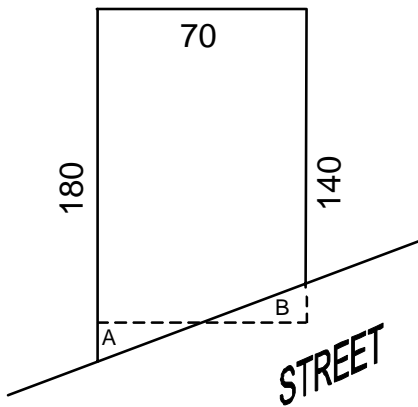


Figure 2

Figure No. 2 is the same theory as Figure No. 1 except we are exchanging front for front and the lot becomes a 70' x 160' rectangle. (Frontage should never be calculated on a diagonal line.)

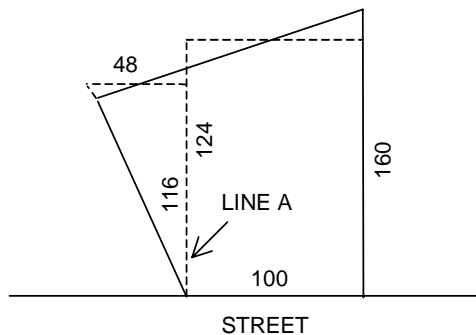


Figure 3

The configuration shown in Figure No. 3 must first be divided to form two right angles to the street. This is done by adding line A, we then proceed to exchange land as previously demonstrated and make a triangle and a rectangle. The lot size is now a 100' x 142' rectangle and a triangle having a 0' front and 48' rear x 116' depth.

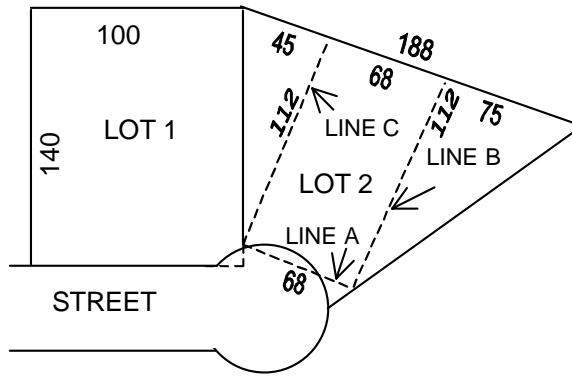


Figure 4

Circle streets usually present some of the more complex problems of lot sizing and it is often more practical to square foot these lots rather than attempt to make rectangles and triangles. However, in the example given in Figure No. 4 we can readily establish lot sizes. It is common to square-off rounded corners and small niches taken from a parcel of land, when it is an insignificant amount as shown above on Lot No. 1 of Figure No. 4. Therefore, the lot size of Lot No. 1 is 100' x 140'.

Lot No. 2 of Figure No. 4 is a little more complicated. We first must establish parallel lines for front and rear. In this case, we exchange a little front for front (line A), next we will establish two right angle lines from the extremities of line A, (lines B & C) this forms a 68' x 112' rectangle, a triangle having a 0' front and 45' rear x 112' depth and a triangle having a 0' front and 75' rear x 112' depth. In actual lot sizing this is simplified to the following formula:

front = 68'

rear = 188'

depth = 112'

We will now lot size a hypothetical block of land.

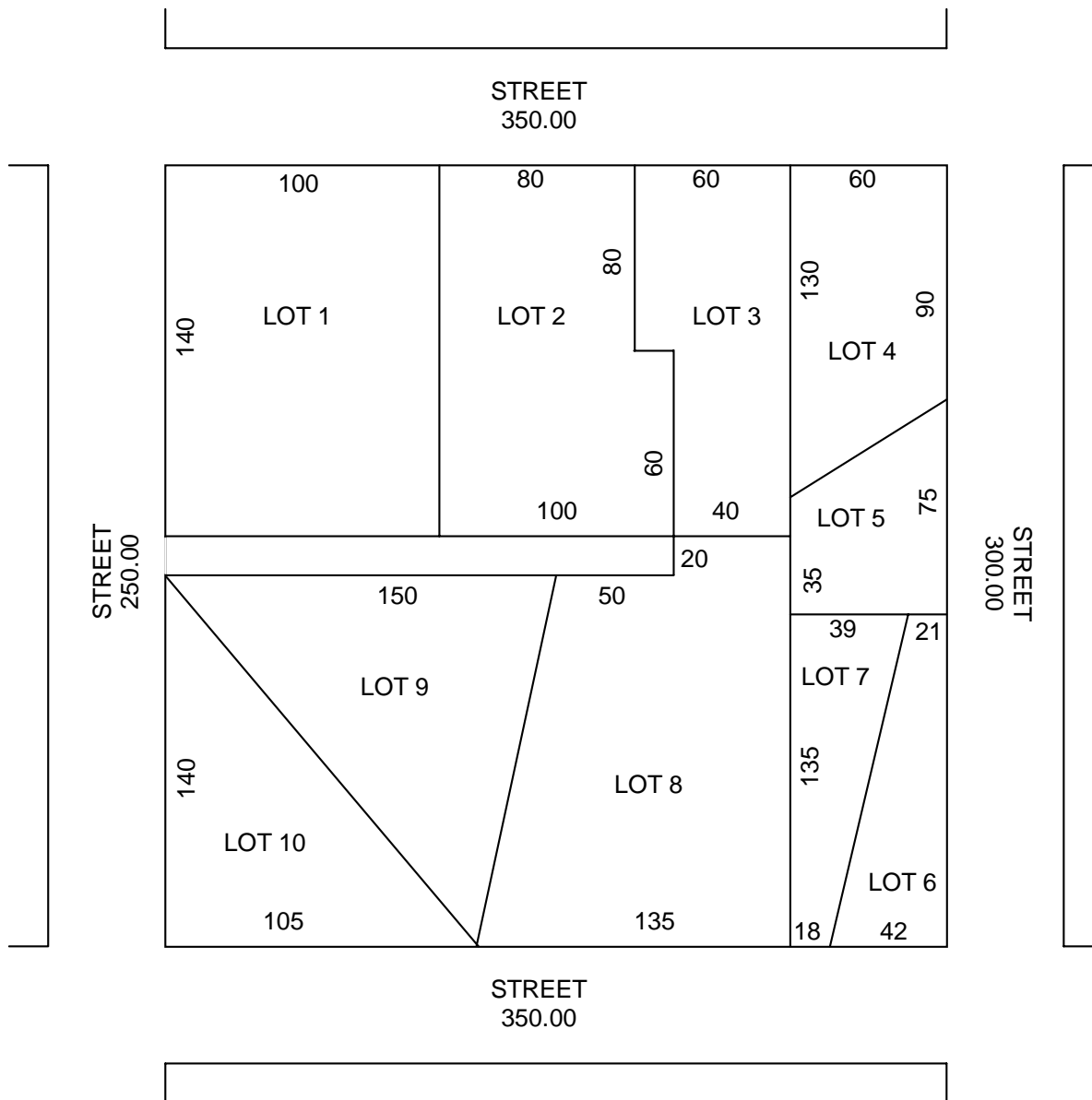


Figure 5

Following is an explanation of lot sizing for each lot pictured in Figure No. 5.

Lot No. 1 - This is a simple rectangle which needs no additional lot sizing:

Lot Size: front = 100' depth = 140'

Lot No. 2 - This is referred to as an L shaped lot and is divided into two rectangles, 80' x 140' and 20' x 60'. The rectangle with street frontage (80' x 140') is the same calculation as Lot No. 1. The second rectangle becomes rear land. Rear land is calculated the same as other lots except in arriving at the depth percent. (Assume 140' standard depth.) This is done in three steps as follows:

1. Find depth percent for distance from street to back line of lot (140' = 100%).
2. Find depth percent for distance from street to front line of the rear lot (80' = 76%)
3. Subtract step No. 2 from step No. 1 and the result is the depth factor to be used (100% less 76% = 24%).

Lot Size: front = 80' depth = 140'
front = 20' depth = 60' (rear land)

Lot No. 3 - This lot is also divided into two rectangles both having frontage.

Lot Size:	front = 20'	depth = 80'
	front = 40'	depth = 140'

Lot No. 4 - This lot is calculated the same as Figure No. 1. Average the two sides ($90' + 130' = 220' \div 2 = 110'$) which automatically exchanges land.

Lot Size:	front = 60'	depth = 110'
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Prior to continuing on examples 5 through 10, let's discuss the theory of calculating lots having a greater frontage than rear or vice versa. This theory is called the "1/3 - 2/3 rule" and is merely a mathematical formula to arrive at "frontage figured". A triangular tract of land having its base on the street might be 30' front and 0' rear. The "2/3 rule" applies when the front is greater than the rear, therefore, the result is as follows: $30' \times 2/3 = 20'$, effective front feet = 20. If this lot were reversed, having the apex on the street it would be 0' front and 30' rear and the "1/3 rule" would apply and the result would be as follows: $30' \times 1/3 = 10'$, effective front feet = 10. A tract having a rear measurement other than 0', such as a trapezoid, (having front and rear lines parallel), the 1/3 - 2/3 rule would apply to the difference between the front measurements and rear measurement and the result would be added to the smaller measurement. Examples 5 through 10 cover variations of the 1/3 - 2/3 rule.

Lot No. 5 - This shape is called a trapezoid and can be divided into two parts. A 35' x 60' rectangle and a triangle having a 40' front and 0' rear and 60' depth. If the problem is approached in this manner the lot sizing would be as follows: (F is for front - R is for rear).

Rectangle	front = 35'	depth = 60'
Triangle (F = 40' R = 0' 2/3 rule)	front = 26.67'	depth = 60'

This lot can also be approached in a different manner which is more simplified and gives the same answer. In this second approach we say front = 75', rear = 35', difference = 40'. We then take 2/3 of 40' (26.67) and add this to the shorter line (35'). Our answer becomes 61.67' for frontage figured, the same as treating it as two configurations. The lot size by this approach would be as follows:

Lot Size: (F = 75' R = 35' 2/3 rule)	front = 61.67'	depth = 60'
(It is common to round to the closest foot, if desired)		

Lot No. 6 - This lot is calculated the same as Lot No. 5. Using the second method shown above we have front = 42', rear = 21', difference = 21'. We then take 2/3 of 21' (14') and add it to the shorter line (21'). Our answer is (14' + 21') 35' for frontage figured. Lot sizing would appear as follows:

Lot Size: (F = 42' R = 21' 2/3 rule)	front = 35'	depth = 135'
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Lot No. 7 - We now have the reverse of lots 5 and 6, that is the rear is greater than the front. This also can be made into two configurations (a rectangle and a triangle); however, we will use the single calculation approach. Front = 18', rear = 39', difference = 21'. We then take 1/3 of 21' (7) and add this to our shorter line (18). Our frontage figured is (18' + 7') 25'. Lot sizing would appear as follows:

Lot Size: (F = 18' R = 39' 1/3 rule)	front = 25'	depth = 135'
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Lot No. 8 - Because of the variation in depth we must divide this lot into at least two configurations, a rectangle (40' x 160') and a trapezoid. The trapezoid would be calculated as follows: front = 95', rear = 50', difference = 45'. We then take 2/3 of 45' (30') and add it to the shorter line (50'). The answer is (30' + 50') 80' for frontage figured. Lot sizing would be as follows.

Lot Size:	front = 40'	depth = 160'
(F = 95' R = 50' 2/3 rule)	front = 80'	depth = 140'

Lot No. 9 - We could divide this into two right angle triangles, however, this is not necessary and we will work the problem as one configuration. Front = 0' rear = 150', difference = 150'. We now take 1/3 of 150' (50') and add this to the shorter line (0'), the frontage figured is (50' + 0') 50'. Lot sizing would appear as follows:

Lot Size: (F = 0' R = 150' 1/3 rule) front = 50' depth = 140'

Lot No. 10 - This is a simple right angle triangle having its base on the street and therefore calling for the 2/3 rule. Front = 105', rear = 0', difference = 105'. We now take 2/3 of 105' (70') and add this to the shorter line (0'). The answer is (70' + 0') 70' frontage figured. Lot sizing would appear as follows:

Lot Size: (F = 105' R = 0' 2/3 rule) front = 70' depth = 140'

We will now apply the front foot prices and depth chart to these lots and arrive at a total value. (For the purpose of these examples we will use a 140' standard depth chart.) The chart below is made similar to the land section appearing on property record cards. Follow these steps to arrive at the total value. Place frontage figured and depth on card, find depth percent from depth chart, place unit price on card, multiply unit price times depth percent to arrive at effective front foot prices, multiply effective front foot price times frontage figured, result is total value of lot.

Lot No.	Frontage Computations	Frontage Figured	Average Depth	Depth Factor	Effective Front Foot	Front Foot Price	Total	Adjust Factor	Actual Value
1		100'	140'	100%	100'	\$350.00	\$35,000	—	\$35,000
2		80'	140'	100%	80'	350.00	28,000		
	Rear Lot (80')	20'	60'	24%	4.80'	350.00	<u>1,680</u>	—	
							29,680		29,680
3		20'	80'	76%	15.20'	350.00	5,320		
		40'	140'	100%	40'	350.00	<u>14,000</u>	—	19,320
							19,320		
4		60'	110'	92%	55.2'	350.00	19,320	—	19,320
5	F=75 R=35 (2/3)	61.67'	60'	62%	38.24'	300.00	11,472	—	11,472
6	F=42 R=21 (2/3)	35'	135'	99%	34.65'	350.00	12,127	—	12,127
7	F=18 R=39 (1/3)	25'	135'	99%	24.75'	350.00	8,662	—	8,662
8		40'	160'	104%	41.60'	350.00	14,560		
	F=95 R=50 (2/3)	80'	140'	100%	80'	350.00	<u>28,000</u>	—	42,560
							42,560		
9	F=0 R=150 (1/3)	50'	140'	100%	50'	350.00	17,500	10%	15,750
10	F=105 R=0 (2/3)	70'	140'	100%	70'	350.00	24,500	—	24,500

Figure 6

ADJUSTMENT FACTORS AND CORNER INFLUENCE

It is said that land does not depreciate and under normal conditions land does not lose value due to age and elements. However, when setting entire streets you must always place the front foot unit value for the best lot on the street. This unit value is applied to all lots to arrive at a total value; therefore, if a particular lot has a characteristic which would affect its market value an adjustment must be made. There are several factors which can cause a decrease in value such as topography, shape and size. The appraiser must determine the amount of effect (if any) these characteristics have on each individual lot. Referring back to Figure No. 5, you will note Lot No. 9 probably has a severe "shape" characteristic by virtue of a "0" front and although the use of the 1/3 rule has already reduced this lot considerably; it perhaps should receive additional consideration. For the purpose of this example let us assume the appraiser determines the "total value" of this lot is too high and he feels a 10% adjustment is necessary. He will enter 10% under adjustment factor (see Figure No. 6) and multiply the total value times 90% to arrive at actual value ($\$17,500.00 \times 90\% = \$15,750.00$). There are no set rules other than experience and common sense in determining the amount of adjustment. If you have five good lots on the street and the next lot is a cliff, ravine, swamp or too small to build on according to zoning you should be sure you are making an adequate adjustment.

Corner influence is the only factor that can increase the value of a lot, assuming the front foot unit value has been properly established. Like the adjustment factors which decrease the value of a certain property, it is impossible to determine the exact amount of influence that is added by virtue of a corner. However, we do have two known factors that assist us in setting guidelines. These are the amount of frontage on side street and front foot unit value of the side street. The following tables and explanations are to be used as guides only.

It is assumed in Table No. 1 on the following page that 20' of depth from the side street (which is frontage on the main street) is all that is effected by corner influence, therefore, the table is only calculated up to 20'. It is also assumed that 100' of frontage on the side street (which is depth from the main street) is the maximum distance affected by corner influence.

The use of these tables will establish the MAXIMUM value to be used for corner influence. Corner influence will vary with the use of the property and adjustments in value must be made accordingly. A retail business which is dependent on display area and additional entrances is the highest example of corner influence. A lesser influenced property could be a warehouse with sufficient ingress and egress without the corner. Perhaps in this instance the appraiser would determine only 50' of the frontage on the side street contributes toward additional value, therefore, he would use only 50% of the formula value. i.e. $\$400.00$ (side street value) times 34% = 136.00 x 50' = $\$6,800.00$.

The lesser the value on the side street usually indicates a lesser amount of influence. Table No. 2 has been prepared to assist the appraiser in establishing a uniform method of arriving at corner influence for lesser valued side streets. This table is to be used as a guide when the side street value is less than $\$150.00$.

Some of the factors to consider when arriving at corner influence are, use, architectural design of structures, importance of protection, needed window area, additional entrance needs, exposure needs, display needs, public habits, etc.

Do not use corner influence on residential properties.

It should be remembered that corner influence is a judgment factor and the tables reflect ideal conditions and usage of each corner. Adjustments must be made when, in the judgment of the appraiser, conditions or usage is less than ideal.

CORNER INFLUENCE TABLE NO. 1

Use only if side street value is \$150.00 per front foot or higher. See Corner Influence Table No. 2 for streets of lesser value.

<u>FEET</u> (Depth from side street)	<u>PERCENTAGE</u>
1	4
2	5
3	8
4	10
5	12
6	14
7	16
8	18
9	19
10	21
11	22
12	24
13	25
14	27
15	28
16	29
17	31
18	32
19	33
20	34

Example:

$$\$400.00 \text{ side street value} \times 34\% = \$136.00 \times 100' = \$13,600.00$$

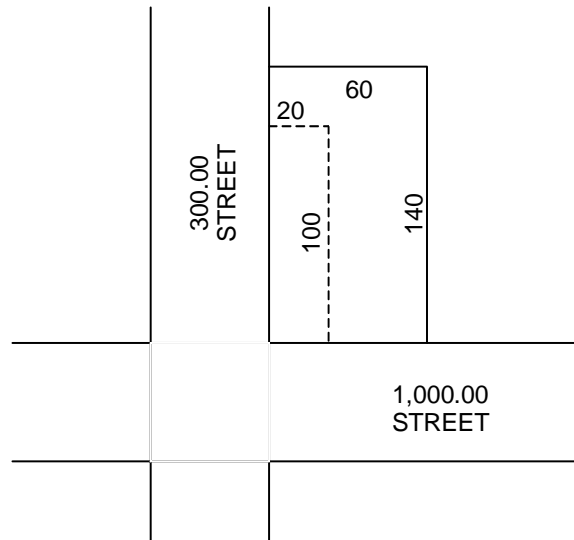
CORNER INFLUENCE TABLE NO. 2

Use only if side street value is \$150.00 per front foot or lower. See Corner Influence Table No. 1 for higher value street.

<u>SIDE STREET VALUE</u>	<u>CORNER INFLUENCE TABLE</u>
\$10	\$136
15	204
20	272
25	340
	34% x 40% of Value
30	408
35	476
40	544
45	612
<hr/>	
\$50	\$850
55	935
	34% x 50% of Value
60	1,020
65	1,105
<hr/>	
\$70	\$1,428
	34% x 60% of Value
75	1,530
80	1,632
<hr/>	
\$90	\$2,142
	34% x 70% of Value
100	2,380
<hr/>	
\$110	\$2,992
	34% x 80% of Value
120	3,264
125	3,400
<hr/>	
\$130	\$3,978
	34% x 90% of Value
140	4,284
<hr/>	
\$150	\$5,100
	34% x 100% of Value

Example for
Corner Influence

Table No. 1



In the example above we have a lot which is 60' frontage x 140' depth. The area outlined with a dash line (20' x 100') is the maximum area to be considered as being influenced. The formula for calculation is \$300.00 side street unit value times the depth percentage from Table No. 1 for 20' (34%) times 100' of frontage on the side street. The total lot valuation would be as follows:

Lot Value (60' front x \$1,000.00).....	\$60,000.00
Corner Influence (\$300.00 x 34% x 100')	<u>10,200.00</u>
TOTAL ACTUAL VALUE	\$70,200.00

Example for
Corner Influence

Table No. 2



Table No. 2 is calculated for the appraiser and can be used (when applicable) as shown.

Lot Value (60' x \$100.00).....	\$6,000.00
Corner Influence (\$50.00 value from Table No. 2)	<u>850.00</u>
TOTAL ACTUAL VALUE	\$6,850.00

LAND DEPTH CHART

100' STANDARD DEPTH

<u>FEET</u>	<u>PERCENT</u>	<u>FEET</u>	<u>PERCENT</u>
1	2	54	74
2	4	55	75
3	5	56 - 57	76
4	7	58	77
5	9	59	78
6	10	60	79
7	12	61	80
8	13	62 - 63	81
9	15	64	82
10	17	65	83
11	18	66 - 67	84
12	20	68	85
13	22	69 - 70	86
14	23	71	87
15	25	72	88
16	27	73 - 74	89
17	28	75 - 76	90
18	30	77 - 78	91
19	31	79 - 80	92
20	33	81 - 82	93
21	34	83 - 85	94
22	36	86 - 87	95
23	37	88 - 90	96
24	39	91 - 92	97
25	40	93 - 95	98
26	42	96 - 98	99
27	43	99 - 101	100
28	44	102 - 105	101
29	46	106 - 109	102
30	47	110 - 112	103
31	48	113 - 116	104
32	50	117 - 119	105
33	51	120 - 123	106
34	52	124 - 127	107
35	53	128 - 132	108
36	55	133 - 136	109
37	56	137 - 141	110
38	57	142 - 147	111
39	58	148 - 153	112
40	59	154 - 158	113
41	60	159 - 164	114
42	62	165 - 171	115
43	63	172 - 179	116
44	64	180 - 186	117
45	65	187 - 194	118
46	66	195 - 204	119
47	67	205 - 217	120
48	68	218 - 233	121
49	69	234 - 249	122
50	70	250 - 265	123
51	71	266 - 282	124
52	72	283 - 300	125
53	73		

Use 2% for each additional 33' depth.

LAND DEPTH CHART

110' STANDARD DEPTH

<u>FEET</u>	<u>PERCENT</u>	<u>FEET</u>	<u>PERCENT</u>
1	2	56 - 57	71
2	4	58	72
3	5	59	73
4	7	60	74
5	8	61	75
6	9	62 - 63	76
7	11	64	77
8	12	65	78
9	14	66 - 67	79
10	16	68	80
11	17	69	81
12	18	70 - 71	82
13	20	72	83
14	22	73 - 74	84
15	23	75	85
16	25	76 - 77	86
17	26	78	87
18	27	79 - 80	88
19	28	81 - 82	89
20	30	83 - 84	90
21	31	85 - 87	91
22	33	88 - 89	92
23	34	90 - 91	93
24	36	92 - 94	94
25	37	95 - 96	95
26	38	97 - 99	96
27	40	100 - 102	97
28	41	103 - 105	98
29	42	106 - 108	99
30	43	109 - 111	100
31	44	112 - 115	101
32	46	116 - 119	102
33	47	120 - 123	103
34	48	124 - 128	104
35	49	129 - 132	105
36	50	133 - 136	106
37	51	137 - 140	107
38	52	141 - 146	108
39	54	147 - 151	109
40	55	152 - 156	110
41	56	157 - 162	111
42	57	163 - 169	112
43	58	170 - 175	113
44	59	176 - 181	114
45	60	182 - 189	115
46	61	190 - 197	116
47	62	198 - 204	117
48	63	205 - 213	118
49	64	214 - 223	119
50	65	224 - 235	120
51	66	236 - 250	121
52	67	251 - 267	122
53	68	268 - 283	123
54	69	284 - 300	124
55	70		

Use 2% for each additional 33' depth.

LAND DEPTH CHART

120' STANDARD DEPTH

<u>FEET</u>	<u>PERCENT</u>	<u>FEET</u>	<u>PERCENT</u>
1	2	58	68
2	3	59	69
3	5	60	70
4	6	61	71
5	8	62 - 63	72
6	9	64	73
7	11	65	74
8	12	66 - 67	75
9	13	68	76
10	15	69	77
11	16	70 - 71	78
12	17	72	79
13	19	73 - 74	80
14	20	75	81
15	21	76 - 77	82
16	23	78	83
17	24	79 - 80	84
18	25	81	85
19	26	82 - 83	86
20	28	84 - 85	87
21	29	86 - 87	88
22	30	88 - 89	89
23	32	90 - 91	90
24	33	92 - 94	91
25	34	95 - 96	92
26	35	97 - 99	93
27	37	100 - 102	94
28	38	103 - 105	95
29	39	106 - 108	96
30	40	109 - 111	97
31	41	112 - 115	98
32	42	116 - 118	99
33	43	119 - 122	100
34	44	123 - 126	101
35	45	127 - 130	102
36	46	131 - 134	103
37	47	135 - 139	104
38	48	140 - 144	105
39	50	145 - 148	106
40	51	149 - 153	107
41	52	154 - 159	108
42	53	160 - 165	109
43	54	166 - 171	110
44	55	172 - 177	111
45	56	178 - 184	112
46	57	185 - 191	113
47	58	192 - 198	114
48	59	199 - 206	115
49	60	207 - 214	116
50	61	215 - 222	117
51	62	223 - 231	118
52	63	232 - 241	119
53	64	242 - 253	120
54	65	254 - 267	121
55	66	268 - 284	122
56 - 57	67	285 - 300	123

Use 2% for each additional 33' depth.

LAND DEPTH CHART

130' - 132' STANDARD DEPTH

<u>FEET</u>	<u>PERCENT</u>	<u>FEET</u>	<u>PERCENT</u>
1	2	62 - 63	68
2	3	64	69
3	5	65	70
4	6	66 - 67	71
5	8	68	72
6	9	69	73
7	10	70 - 71	74
8	11	72	75
9	12	73 - 74	76
10	14	75	77
11	15	76 - 77	78
12	16	78	79
13	17	79 - 80	80
14	19	81	81
15	20	82 - 83	82
16	21	84 - 85	83
17	22	86	84
18	23	87 - 88	85
19	25	89 - 90	86
20	26	91 - 92	87
21	27	93 - 94	88
22	28	95 - 96	89
23	29	97 - 98	90
24	31	99 - 101	91
25	32	102 - 104	92
26	33	105 - 107	93
27	34	108 - 110	94
28	35	111 - 113	95
29	36	114 - 117	96
30	37	118 - 121	97
31	38	122 - 125	98
32	39	126 - 129	99
33	40	130 - 134	100
34	42	135 - 138	101
35	43	139 - 143	102
36	44	144 - 147	103
37	45	148 - 152	104
38	46	153 - 156	105
39	47	157 - 161	106
40	48	162 - 167	107
41	49	168 - 173	108
42	50	174 - 179	109
43	51	180 - 185	110
44	52	186 - 192	111
45	53	193 - 199	112
46	54	200 - 207	113
47	55	208 - 216	114
48	56	217 - 225	115
49	57	226 - 235	116
50	58	236 - 245	117
51	59	246 - 256	118
52	60	257 - 267	119
53	61	268 - 278	120
54 - 55	62	279 - 289	121
56	63	290 - 300	122
57	64		
58 - 59	65		
60	66		
61	67		

Use 2% for each additional 33' depth.

LAND DEPTH CHART

140' STANDARD DEPTH

<u>FEET</u>	<u>PERCENT</u>	<u>FEET</u>	<u>PERCENT</u>
1	1	63	65
2	3	64 - 65	66
3	4	66	67
4	5	67	68
5	6	68 - 69	69
6	8	70 - 71	70
7	9	72	71
8	10	73	72
9	11	74 - 75	73
10	13	76	74
11	14	77 - 78	75
12	15	79 - 80	76
13	16	81	77
14	17	82 - 83	78
15	18	84	79
16	20	85 - 86	80
17	21	87	81
18	22	88 - 89	82
19	23	90 - 91	83
20	24	92 - 93	84
21	25	94 - 95	85
22	26	96 - 97	86
23	28	98 - 99	87
24	29	100 - 101	88
25	30	102 - 103	89
26	31	104 - 106	90
27	32	107 - 109	91
28	33	110 - 112	92
29	34	113 - 115	93
30	35	116 - 118	94
31	36	119 - 121	95
32	37	122 - 125	96
33	38	126 - 129	97
34	39	130 - 133	98
35	40	134 - 137	99
36	41	138 - 142	100
37	42	143 - 147	101
38	43	148 - 152	102
39	44	153 - 157	103
40	45	158 - 162	104
41	46	163 - 167	105
42	47	168 - 172	106
43 - 44	48	173 - 179	107
45	49	180 - 185	108
46	50	186 - 192	109
47	51	193 - 199	110
48	52	200 - 207	111
49	53	208 - 215	112
50	54	216 - 223	113
51	55	224 - 231	114
52 - 53	56	232 - 241	115
54	57	242 - 252	116
55	58	253 - 263	117
56	59	264 - 275	118
57	60	276 - 287	119
58	61	288 - 300	120
59 - 60	62		
61	63		
62	64		

Use 2% for each additional 33' depth.

LAND DEPTH CHART

150' STANDARD DEPTH

<u>FEET</u>	<u>PERCENT</u>	<u>FEET</u>	<u>PERCENT</u>
1	1	65	63
2	2	66	64
3	3	67 - 68	65
4	5	69	66
5	6	70 - 71	67
6	7	72	68
7	8	73 - 74	69
8	9	75	70
9	10	76 - 77	71
10	11	78	72
11	13	79 - 80	73
12	14	81	74
13	15	82 - 83	75
14	16	84 - 85	76
15	17	86	77
16	18	87 - 88	78
17	19	89 - 90	79
18	20	91	80
19	21	92 - 93	81
20	22	94 - 95	82
21	24	96 - 97	83
22	25	98 - 99	84
23	26	100 - 101	85
24	27	102 - 104	86
25	28	105 - 106	87
26	29	107 - 108	88
27	30	109 - 111	89
28	31	112 - 114	90
29	32	115 - 117	91
30	33	118 - 120	92
31	34	121 - 123	93
32	35	124 - 126	94
33	36	127 - 129	95
34	37	130 - 133	96
35	38	134 - 138	97
36	39	139 - 142	98
37	40	143 - 147	99
38 - 39	41	148 - 153	100
40	42	154 - 158	101
41	43	159 - 163	102
42	44	164 - 168	103
43	45	169 - 173	104
44	46	174 - 179	105
45	47	180 - 184	106
46	48	185 - 190	107
47 - 48	49	191 - 197	108
49	50	198 - 205	109
50	51	206 - 213	110
51	52	214 - 220	111
52	53	221 - 229	112
53 - 54	54	230 - 238	113
55	55	239 - 248	114
56	56	249 - 258	115
57	57	259 - 268	116
58 - 59	58	269 - 285	117
60	59	286 - 300	118
61	60		
62 - 63	61		
64	62		

Use 2% for each additional 33' depth.

AGRICULTURAL LAND VALUATION

INTRODUCTION

Iowa law provides that in assessing agricultural realty, the actual value shall be based on its productive and net earning capacity capitalized at a rate specified in the Iowa Code. The law further provides that in counties in which a modern soil survey (1949 and later) has been completed, the results of such a survey must be considered in determining the productive and net earning capacity of agricultural property.

The provisions of Iowa law mentioned above clearly indicate that assessors must be prepared to undertake studies of income capitalization in order to properly assess agricultural property. Following the completion of these studies, it is then necessary to apply the results to individual tracts of land to determine actual value. The analysis of individual tracts of land not only permits the income data to be applied to each tract, but also can determine the existence of certain factors which can affect the value of a particular tract of land.

This section will detail the steps and processes of developing a CSR based valuation. The process can be performed on one agricultural parcel or all agricultural parcels in an assessment jurisdiction. Under current Iowa law and policies, the primary duty of the assessor is to create equity among the agricultural parcels in the assessment jurisdiction. If assessments are equitable, the state equalization process will set total agricultural value in the jurisdiction and agricultural land will be valued at its net productivity value.

SOIL MAPS

Agricultural land values differ primarily because of variation in (a) productivity, (b) buildings, (c) location, and (d) other factors. The goal of a soil scientist in making a soil map is to identify soils and to record their location on a map. Since each kind of soil has unique use, management, and production capabilities, it follows that the soil map, together with the accompanying interpretations, is a valuable tool in the equitable appraisal and valuation of agricultural land.

Soil maps are constructed using an aerial photograph as a base map. Soil surveys are made by careful examination of the soil in the field, and delineation of soil mapping units on the aerial photo base. The scale of the base map is 4 inches per mile. Soil mapping units are presently identified by a three-part symbol, for example 120c2. The 120 portion of the symbol indicates the soil type. Tama silty clay loam. The C indicates the slope group, and the 2 indicates the erosion phase (thickness of A horizon or topsoil). Mapping units that have 0 to 2 percent slope and slight or no erosion are group A, erosion phase 1, would be identified only as 120.

Following is a list of symbols used to identify slope and erosion conditions in Iowa:

SLOPE

No symbol	0 to 2 and 1 to 3 percent	Level and nearly level
B	2 to 5 percent	Gently sloping
C	5 to 9 percent	Moderately sloping
D	9 to 14 percent	Strongly sloping
E	14 to 18 percent	Moderately steep
F	18 to 25 percent	Steep
G	25 to 40 percent	Very steep

EROSION

No symbol	None to slight erosion; no evident exposed subsoil when plowed; more than 7 inches of A horizon remaining.
2	Moderately eroded; usually 3 to 7 inches of total A horizon with some mixing of subsoil.
3	Severely eroded; when plowed the Ap horizon is predominantly subsoil with less than 3 inches of total A horizon remaining.
+	Overwash.

It should be emphasized that slope and erosion phases may have different designations than those given above. Interpretation of a soil map should be made using the soil mapping legend in effect for the time and the area in which the soil map was made. The same statement applies to the soil type number.

The areas mapped in a soil survey are keyed to a classification system. The areas within defined limits have similar physical, chemical, and biological properties as determined by field and laboratory tests. This procedure makes it possible to predict the behavior of the areas mapped, based on past experience with similar soils under various land uses.

SOIL RATINGS

An interpretation provided as a part of the soil survey is a system of rating soils to aid in agricultural land valuation and assessment. Each soil mapping unit is assigned a corn suitability rating, (CSR), and the ratings provide an index for comparing all soil mapping units in the state. An individual corn suitability rating for a soil mapping unit reflects the integrated effect of numerous factors that influence the yield potential and use of the soil for row crop (corn and soybean) production at a specified management level. Yield estimates and corn suitability ratings basically reflect soil and weather differences and differences in response to technology. Soil properties and weather conditions are the dominant factors that affect yield potential. Slope characteristics are major factors that determine suitable land use.

The yield estimates and corn suitability ratings are developed in the following way: First, benchmark soils (soils comprising large acreages with considerable data available) are rated in terms of their suitability for producing corn and their corn yield potential. In the second phase, yields and ratings are developed for soils with more limited data and yield information. Benchmark soils, a knowledge of soil characteristics and their effect on yield potential, and available data provide the basis for these estimates.

The need for adjustments in corn suitability ratings for weather variation is greatest west of the eastern border of the Clarion-Nicollet-Webster soil association area and north of a line tangent to the southern boundary of the same area. Weather is an important factor affecting corn suitability ratings of similar soils in the area described above. Therefore, average annual precipitation and temperatures were used as guides in adjusting the corn suitability rating. Weather adjustments were based in part on deviations of temperature and/or precipitation from a selected benchmark location.

Corn suitability ratings range from 5 to 100, with 100 reserved for those soils (a) located in areas of most favorable weather conditions for Iowa, (b) that have high yield potential, and (c) that can be continuously row cropped with little soil erosion.

The ratings and yields reported are for soil and weather conditions that exist near the geographic center of a particular soil association area. Additional refinements of yields and ratings on an individual county basis are prepared as a part of the soil survey program. The same soil in different locations may have a wide range in yield potential and corn suitability rating, depending primarily on weather conditions. For example, Clarion loam, slope group A, erosion class 1, has a CSR of 87 in Webster County near the center of the Clarion-Nicollet-Webster area. The same soil has a rating of 75 in Dickinson County in the northwestern part of the association area. In Polk County the indicated soil has a rating of 91. Estimated crop yields have similar trends.

SPOT SYMBOLS

Other symbols shown on the soil map, in addition to the mapping unit symbol (soil type-slope class-erosion phase), can be of value in the appraisal of a tract of land. Soil areas or other features less than 2 acres in size that vary significantly from the mapping unit in which they occur are shown by a special symbol. Many of the symbols so used indicate hazards or features that detract from the optimum use of the land and thus must be considered in an evaluation of the tract. Some examples of these hazards are: outcrops of sand, gravel, bedrock, glacial till, or paleosols; wet spots; escarpments; calcareous areas; areas of detrimental deposition; and severely eroded areas. The number and distribution of these areas influence the use and thus the value of the tract. The affect of each of the conditions listed may vary, depending on the associated units and therefore are developed for each survey area.

The drainage pattern of an area is another tract characteristic that can be interpreted from the soil map. In most survey areas the following drainage features are identified by symbols: (1) perennial streams; (2a) intermittent streams (2b) waterway (crossable with tillage implements), (2c) waterway (not crossable with tillage implements), (2d) unclassified; (3) gullies; (4) lakes, ponds, and reservoirs; (5) swamps and marshes. A careful study of the map will provide this additional information that can be of value in evaluation of a tract of land.

IMPROVED AND UNIMPROVED RATINGS

The ratings provided to the county assessors are divided into two categories: improved and unimproved. The improved ratings assume the following conditions:

- a. Natural climatic conditions (not irrigated).
- b. Artificial drainage has been provided where required.
- c. Soils on lower landscape positions are not subject to frequent damaging floods.
- d. No land leveling or terracing.

Unimproved ratings have been provided primarily for poorly drained soils that require artificial drainage and that have not been drained. Unimproved ratings are also provided for those areas subject to frequent damaging floods. Information pertaining to adequacy of artificial drainage or flood protection measures cannot be obtained directly from the soil map, but the soil map will show the areas that potentially can have these conditions. In most Iowa counties, many poorly drained soils that are presently utilized for row crop production and are suitable for drainage have been artificially drained.

Degree and frequency of flooding is variable from one area to another. The improved ratings assigned to soils that occur in areas subject to flooding are slightly less than the ratings for similar soils in the uplands. Improved ratings are assigned to soil areas on which row crops will not be adversely affected by flooding more often than 1 year out of 5 or 6. If the flooding hazard is more severe than this, additional adjustment will be required. The unimproved rating for soils subject to flooding is generally assigned to soils unsuited for row crop production.

SPECIAL CONSIDERATIONS

A basic assumption in the corn suitability rating system is that the ratings are related primarily to the productivity of the land. Thus, any factor that detracts from the agricultural productivity of the land requires adjustment for the system to be used most effectively. The spot symbols and drainage features shown on the map and discussed above are examples of conditions that require adjustments. Adjustments for these features are developed on a survey area basis, and the adjustments are based upon the hazards associated with the most suitable land use and the area occupied by these features.

Other situations warranting adjustment that are not specifically shown on the soil map by symbols are related to those conditions where the soil may not be utilized for the most intensive use, as reflected in the corn suitability rating. In many cases judgment can be applied based on contrasting land use. However, further investigation is recommended for these types of areas.

1. Isolated small areas: Soils that are normally tillable but have use limitations imposed by their small area and/or location. For example, a part of a field may be isolated from the remainder of the field by a drainageway not crossable with tillage equipment. The area may be well suited for intensive row crop production but due to limited accessibility the use of the land is restricted to pasture. Judgment must be applied to properly evaluate this situation. Downward adjustment would be recommended for these isolated tracts.
2. Areas in which soils requiring artificial drainage cannot be drained due to lack of an outlet or other physical limitation.
3. Areas subject to overflow by streams. The problems associated with the use and management of these areas cannot be determined entirely by inspection of the soil map. Rather, observations and records concerning duration and frequency of flooding must be studied. Occasional flooding is addressed within the CSR ratings, but frequent flooding may require additional adjustment.
4. Areas covered with scattered timber or brush. These areas can be rated based on their potential crop productivity and subtracting an appropriate amount to allow for clearing the land.
5. Areas that are heavily timbered. Again, an adjustment can be made but based on the value of the soil with the suitable correction factors applied.

OBTAINING AND INVENTORYING SOIL SURVEY INFORMATION

The first step in the procedure to obtain or update a soil survey is to complete an agreement between the cooperating agencies responsible for soil survey activities and the county conference board. The agreement specifies the approximate starting and completion dates of the survey, total amount of money to be contributed by the county, and the time schedule of their payments. Most survey counties are staffed by two to three soil scientists and are completed within a 4-year period.

Tentative corn suitability ratings are developed for each mapping unit by soil scientists of the Iowa Agriculture and Home Economics Experiment Station and USDA Natural Resources Conservation Service. The ratings are supplied to the assessor for their use during the survey. When the survey is completed, a final set of ratings is given to the assessor. The final ratings may differ slightly from the tentative ratings, depending on the development of new units, the range of mapping units, etc.

Simply defined, the soil inventory process is the steps that are taken to itemize and measure the amount of each soil type within each parcel. This same process is then repeated for each agricultural land parcel. For decades, the only way to inventory soils was a time consuming process using paper maps and a planimeter or grid counter. Since the early 1990's the process has moved from a paper format to a digital format. While the processing medium has changed due to rapid advances in the GIS technology, the basic processes are still the same. For purposes of this manual, only the digital process will be described.

What is a G.I.S.? GIS stands for Geographic Information System and it is basically a computerized mapping system. A GIS has the ability to measure, process, and analyze multiple layers of information at phenomenal speeds and with almost perfect accuracy. Implementation of GIS technology has assisted many assessors in the soil inventory process. Since the recent advancement of digital soil maps and the software that can process those maps, there are now a number of vendors that offer products that will assist you in completing the inventory task. Assessors are encouraged to investigate the vendor's software with current users to make sure it meets their expectations. The first question you will need to decide is if you will want to revise your current assessed acres to match the measured acres within the GIS. Parcel tax maps are not a survey, so you should carefully consider if your parcel layer has a high degree of positional accuracy that would warrant the changing of assessed acres. If you choose to revise the current assessed acreage on agricultural parcels, you should also consult with the county auditor. Tax maps and the assessed acres are under the control of the county auditor, so changes to the assessed acres should be authorized by the auditor.

GETTING THE DATA

There are four main layers that the GIS will need to process parcel information to a conclusion. Those four map layers are parcel polygons, soil maps, spot symbols and an exemption layer (for delineating exempt areas).

PARCEL POLYGONS - This layer can be in a number of different formats (shapefile, personal geodatabase, etc.) This layer can usually be found within existing county computer files. It should be up to date with divisions (plats or splits) and parcel consolidations.

SOIL MAPS - The first digital maps were part of an "ISOIL" Program distributed by Iowa State University. These soil maps were raster images that were scanned from the original paper maps and the soil boundaries had a choppy exterior boundary. The newest maps now have smooth soil line boundaries and are easily downloaded at the web site: <http://www.igsb.uiowa.edu/nrgislib/>. Information about how this map layer was compiled is available by accessing the metadata button on that web site. Embedded within the soil layer is a table that contains, among other things, the name of the soil, the soil symbol, and the corn suitability rating.

SPOT SYMBOLS - A spot symbol layer is part of the digital soils file. It defines those areas that are less than two acres in size and vary from the surrounding soil type. The assessor will need to assign a percentage or acreage deduction for each spot symbol.

EXEMPTION LAYER - This layer will need to be created from exemption forms that are on file in the assessor's office. Each approved exempt area needs to be drawn on the land use layer. Digital imagery can be very valuable when determining the boundaries of forest reserve or other exempt areas. This layer will also be a valuable resource in future years because it will provide an accurate view at what areas are exempted after new aerial photographs are taken. Since 1983 there has been a one time sign up for Forest Reserve and other land exemptions. When drawing this layer you may want to review the drawn acres verses the current exempted acres. This parcel by parcel entry using the newest aerial imagery available is an excellent way to validate the current exempt acres. Field review will most likely be required but the amount of field time can be reduced by using aerial photography.

THE PROCESSING STEPS

A review of the differences between the assessed acreage and the drawn acreage is the next step in the process. A large difference between these two amounts will probably mean that a parcel is drawn incorrectly or that the assessed acreage needs to be reviewed. After reviewing the tolerance errors and placing all four map layers in the GIS, it is now time to let the software inventory the soils. The GIS will “cut” each soil type on the boundary. It will then measure the amount of each soil type in the parcel. If there are some exempt areas, such as forest reserve, the software should also “cut” each soil on the exemption layer as well. Now that the program knows how much of each soil type is in each parcel, it will multiply the CSR rating times the number of acres of that soil type. The resulting answer is the total amount of CSR’s that are present in that soil. The process is repeated for the rest of the soils in that parcel. The final GIS process is to make adjustments for any spot symbols on that parcel. As mentioned above, these can be either an acreage or percentage adjustment that is loaded into the software. This process is then repeated for each agricultural parcel.

A sample parcel map, soil map and soils calculation report are shown below.



Parcel Map



Soil Map

SOILS CALCULATION REPORT

Parcel Number	04-14-200-004	Assessed Acres	38.4	Unit Price	10.7500	Average CSR	29.68
Exemption	Soil Code	Soil Name	Spots	Net Acres	Adj. CSR	Total Units	Assessed
Taxable	163E	Fayette Silt		3.13	50	156.50	1,682.38
Taxable	163E2	Fayette Silt		4.66	48	223.68	2,404.56
Taxable	478G	Nordness-Rock		0.42	5	2.10	22.58
Taxable	499F	Nordness Silt		1.48	5	7.40	79.55
Taxable	563D2	Rozetta-Eleroy	20	8.59	54	463.86	4,986.50
Taxable	563E2	Rozetta-Eleroy	20; 22	4.20	45	189.00	2,031.75
Taxable	712F	Schapville Silt		0.79	5	3.95	42.46
				23.27	Totals	1,046.49	11,249.77
Forest Reserve	163E	Fayette Silt		0.28	50	14.00	150.50
Forest Reserve	478G	Nordness-Rock	7	2.67	5	13.35	143.51
Forest Reserve	499G	Nordness Silt		5.41	5	27.05	290.79
Forest Reserve	499F	Nordness Silt		6.67	5	33.35	358.51
Forest Reserve	563D2	Rozetta-Eleroy		0.10	54	5.40	58.05
				15.13	Totals	93.15	1,001.36

CALCULATING THE DOLLAR PER CSR AMOUNT

After determining the total amount of CSR points on each parcel, you should now determine the total number of CSR Points in the assessment jurisdiction. To calculate the assessment per CSR point you would divide the total CSR points in the jurisdiction by the actual or projected value. A sample calculation is shown below.

Total number of CSR points in jurisdiction		\$1,961,875,428.25
Divided by the projected assessment	÷	<u>\$ 182,500,000.00</u>
Equals the assigned dollar per CSR point		\$ 10.75

The total parcel CSR's will now need to be multiplied by the assigned dollar amount to arrive at the parcel assessment. At this point you will have two options to process the final calculations. Which software does this final calculation will be decided by the GIS and administrative software packages that you are using. Whichever process that works best for the assessor should be used. This final conclusion to value is then loaded into the administrative software package and the taxpayer is notified about the change in value with an assessment roll.