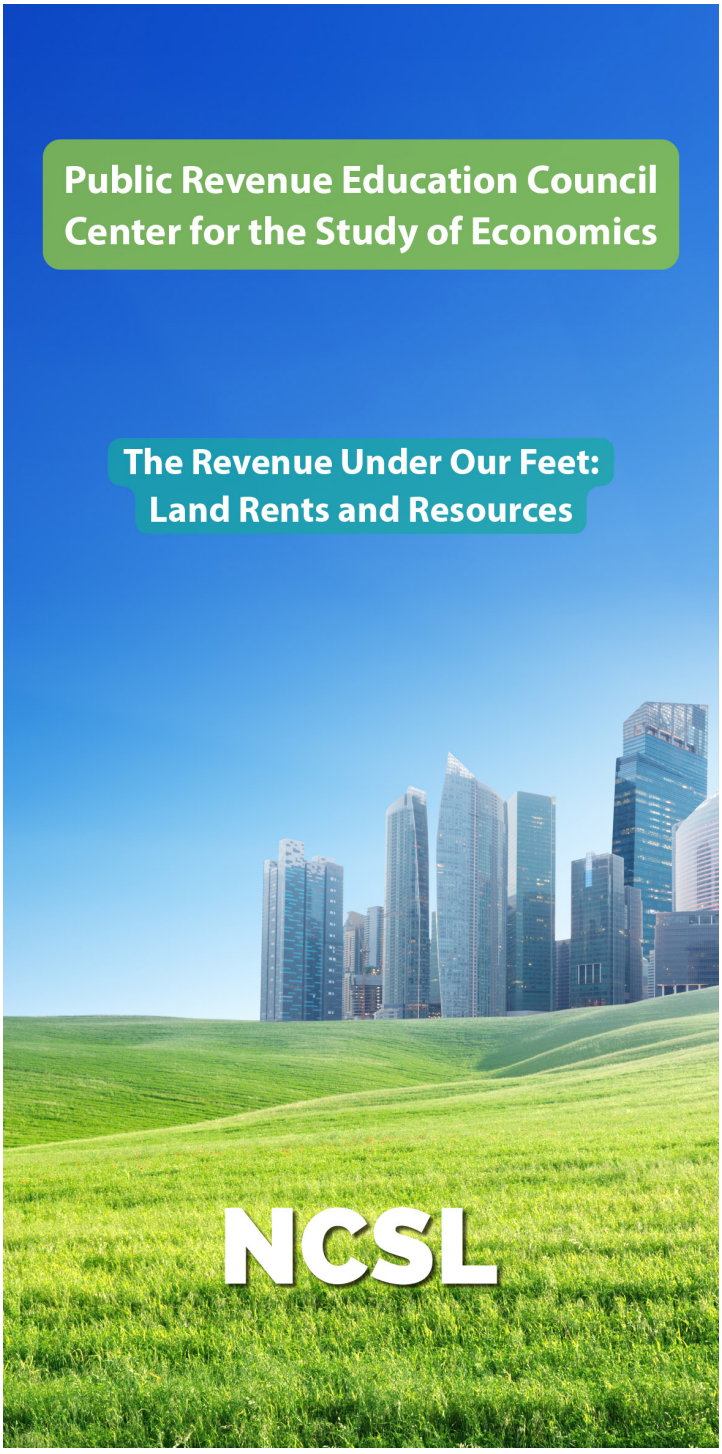

Methods Used to Assess Land Value

ABSTRACT

"A Sustainable Revenue Base for Funding Local Government." An introduction to the value and importance of current assessments with the allocations of land and building values and the importance of state monitoring and oversight.

Ted Gwartney, MAI

Three Approaches to Valuing Real Estate

The first step in the valuation of land is determining the highest and best use of the site. The four criteria that highest and best use must meet are: physically possible, legally permissible, financially feasible, and maximally productive. Two types of analyzes are made in determining the highest and best use. The first is the highest and best use of the site, if vacant; the second is the highest and best use of the site as improved, or if undeveloped as proposed to be improved.

There are three standard approaches to estimating market value that form the foundation for current appraisal theory: the *cost approach*, the *sales comparison approach* and the *income approach*.

The cost approach is based upon the principle that the informed purchaser would pay no more than the cost to produce a substitute property with the same utility as the subject property. It is particularly applicable when the property being appraised involves relatively new improvements which represent the highest and best use of the land or when relatively unique or specialized improvements are located on the site and for which there exist no comparable properties on the market.

The sales comparison approach utilizes prices paid in actual market transactions of similar properties to estimate the value of the site. This appraisal technique is dependent upon utilizing genuinely comparable market or sales data which have occurred near enough in time to reflect market conditions relative to the time period of the appraisal. This method could also be used to estimate the rental value.

The income capitalization approach is widely applied in appraising income-producing properties. Anticipated present and future net operating income, as well as any future reversions, are discounted to a present worth figure through the capitalization process. This approach also relies upon market data to establish current market rental and expense levels to arrive at an expected net operating income.

The resulting indications of value from the three approaches to value are correlated into a final estimate of value for the site. It is not always possible or practicable to use all three approaches to value. The nature of the property being appraised, and the amount, quality, and type of data available dictate the use of each of the three approaches. Variations of the three approaches to value can be devised. Several will be presented in this paper.

Specific Methods Used in Appraising Land Value

In the valuation process the land value estimate is a separate step accomplished by applying either sales comparison or income capitalization techniques. The most reliable way to estimate land value is by sales comparison. When few sales are available or when the value indications produced through sales comparison require substantiation, other procedures may be used to value land. In all, seven procedures can be used to obtain land value indications.

1. *Sales comparison* — Sales of similar, vacant parcels are analyzed, compared, and adjusted to provide a value indication for the land being appraised.
2. *Proportional Relationship* — Relating a site to a known standard site. The difference can be expressed as a percentage. This procedure can be used when there is little sale value evidence in existence.
3. *Land Residual Technique* — It is assumed that the land is improved to its highest and best use. From gross income all operating expenses and the return attributable to

other agents of production are deducted, and the net income imputed to the land is capitalized to derive an estimate of land value.

4. *Allocation* — Sales of improved properties are analyzed, and the prices paid are allocated between the land and the improvements.
5. *Extraction* — Land value is estimated by subtracting the estimated value of the depreciated improvements from the known sale price of the property.
6. *Ground Rent Capitalization* — This procedure is used when land rental and capitalization rates are readily available, as in well-developed areas. Net ground rent — the net amount paid for the right to use and occupy the land — is estimated and divided by a land capitalization rate.
7. *Subdivision Development* — The total value of undeveloped land is estimated as if the land were subdivided, developed, and sold. Development costs, incentive costs, and carrying charges are subtracted from the estimated proceeds of sale, and the net income projection is discounted over the estimated period required for market absorption of the developed sites.

With the appraisal process and the approaches to value understood, it is appropriate to consider the methods and procedures used to analyze and interpret the land data. The choice is based upon what data is available, its reliability and usefulness in making a value estimate.

Sales Comparison

This is the best method to use when appropriate data is available. This example is based upon estimating land market data for a large district based upon a limited occurrence of market sales but with data available on various site characteristics for all properties. This is based upon the actual site data and sales evidence within the assessed district.

For 12 years, the author was the Assessment Commissioner for the Province of British Columbia, Canada. During this time, significant data was collected for each parcel of land. This enabled a more detailed analysis of land value and the development and use of land valuation systems. Computer programs were written that allowed the annual update of land values.

The assessment profession has benefitted from the existence of land valuation rules based upon previous analysis. The basic intent is to provide a means of measuring and applying a rule of valuation by sales comparability for assessment purposes.

The land market is not a perfect market but is made up of the expressions of all different types of persons in terms of money in relation to potential land use. The assessor uses market sales and site data to estimate what value would be paid for a site, assuming a competitive market, involving knowledgeable people who are typically motivated and acting in their own best interest.

Standard Units of Measure

Land markets can be estimated on the basis of a certain value per unit and the unit is often one of the followings:

1. Per Dwelling Unit site
2. Per square-foot
3. Per acre
4. Per front-foot

The selection of the most appropriate unit, or combination of units, is important. It is a decision which can only be made after a careful analysis of the market and the available data.

Land is not always sold on the same basis, but rather on the value in the eyes of the user. No amount of mathematics can override the main objective of achieving fair economic value, as reflected by market behavior. This relegates the unit of measure to the role of a means to an end. The measure can be used to assist in the interpretation of market evidence for a few sites (the sample), so that all of the sites can be properly estimated (the population).

The choice of a particular Unit of Measure will be dictated by expediency. For example, the user of a condominium Dwelling Unit will share the use of a large site, but a certain air space will belong to them and command a different market value due to height, access, view and preference. In urban land valuation, many of the sites to be valued will be of similar sizes and arranged in more-or-less orderly rows on streets, avenues, boulevards and cul-de-sacs. Many will be of identical size with minor departures arising from topography and shape. The assessor will probably wish to adopt a standard site value, which includes the majority of sites, for the particular area under review — standard both as to probable market value and to characteristics.

The standard residential site may respond well to a value *Per Dwelling Unit Site*. A commercial use may be better estimated by using a value *Per Square-Foot* or *Per Front-Foot*. A farm or rural site may be better estimated by using a value *Per Acre*. Once the market value per unit of measure has been established for the standard site representative of the area, the value will become a base to which all other sites can be compared.

Adjustments will have to be made for differences between the standard site and every other site. The assessor will want to study the typical differences and make individual refinements. There may be reasons for an increase in value for characteristics which are better than the standard site. They would make a positive adjustment for desirable characteristics, such as superior location, view, topography, services or access.

There can also be reasons for loss of value for characteristics which are inferior to the standard site. They would make a negative adjustment for undesirable characteristics, such as poor location, longer distance to transportation, longer distance to the civic center, wet ground in the winter, over-abundance of rock or poor access

Site valuation may be summed up in the manner of a Unity Rating which will be X% greater or lesser than unity (1.0) when compared with the base standard site characteristics adopted for tile area.

Standardized Adjustments

A standardized method is the application of the comparative method to land markets under review. Adjustments are made for divergences from the standard site by the use of a specific set of rules. The most common examples are those used for distance and size. The methods were born out of the necessity to produce sound and impartial market estimates in a limited amount of time recognizing the accepted principles of valuation.

It is essential to use discretion and judgment and only treat standardized methods as guides. The use of formulas should be the result of local market analysis and testing. Sales are sought that are similar except for the one difference that is being analyzed. A value for this difference will result. The main virtue of the method is its administrative adaptability, permitting land markets to be estimated on the basis of strict comparability. Mistakes become more easily detectable, particularly in cases of errors of judgment and mathematics.

Following is an example of an adjustment grid and the procedures which are commonly used to estimate site value after considering all differences. This shows how market values increase or decrease due to distance, size, frontage and other important characteristic differences.

Per Dwelling Unit Site — Sale evidence will frequently indicate that minor variations in sites, whether frontage or size, have little effect on markets. The assessor could select the standard Dwelling Unit site, both as to location and market. They would proceed to make judgment decisions in relating the other sites to the site that was selected as the standard site—rating them as standard, superior or inferior. An individual site could have some characteristics that are superior and others that are inferior. The per Dwelling Unit site method is useful in the valuation of apartments and homes. It may also be combined with the use of another method such as the per square-foot method.

Adjustments for Unique Features

After the base value has been estimated, the individual sites must be considered. Some sites have unique advantages or disadvantages compared to other sites. Actual real estate market values vary for each site and are dependent upon numerous individual features, qualities, characteristics and restrictions such as:

location **utilities** **topography** **traffic**	**zoning** **use density** **river** **regulations**	**site** **view** **transportation** **noise**	**access** **frontage** **parks** **utilities**

People would tend to be willing to pay additional value for a land site with special advantages and would pay less value for a land site with disadvantages. The market value for the unique differences would be determined by how much more or less site users in general were willing to pay for those features. This market difference must be determined for each significant variable feature.

The difference can then be converted to an adjustment of value. For example, if a site were better than the standard in a district because of distance to downtown of 5% ($4.000), site size of 5% ($4,000), location of transportation 10% ($8,000) and convenience of recreation of 5% ($4,000), the site being appraised would be 25% ($20,000) superior to the standard site. In reality most sites have many small differences both positive and negative from a standard site.

Sales Adjustment Grid

Per dwelling unit site

VARIABLE	=	STANDARD	>	SUPERIOR	<	INFERIOR
Base Value - $		$80,000		$80,000		$80,000
Downtown - miles	5	0	3	+ 4,000	7	- 4,000
Size - square feet	10,000	0	12,000	+ 4,000	8,000	- 4,000
Transport - blocks	3	0	1	+ 8,000	6	- 6,000
Recreation - blocks	6	0	3	+ 4,000	10	- 3,000
Adjusted value - $		$80,000		$100,000		$63,000

Per Square-Foot — The value per square-foot unit of measure has application in estimating value for commercial and industrial lands where the applied rate will be more constant over the entire site. The size of the site limits or enhances the use and market value of a site. The application of a market value per square-foot to residential lands is less common.

Per Acre — Beyond the limits of the urban area, there will be those parcels that are so much larger that they will not respond well or at all to dwelling unit site value, a square-foot or front-foot unit measure. Where these larger parcels are the norm, the unit of measure can best be expressed as a value per acre. The adjustment factors would be completely different however. They might relate to agricultural benefits, such as soil fertility, distance to markets or water supply.

Per Front-Foot — This method has been useful in the downtown portion of intensely developed cities where people pay a premium for exposure to customers. For those sites that are not identical to the standard site, it will be necessary to make appropriate adjustments for variations in width, depth and other attributes that differ from the standard site. The total departures from standard front-foot market can be expressed as an adjusted frontage. It is against this adjusted frontage that the adopted front-foot value will be applied.

There is a principle of commerce that commodities are cheaper by the dozen. By the same token it could be that frontage feet are cheaper per unit when the total exceeds the average, or standard width. A width table is a series of percentage adjustments greater or less than 1.0 needed to adjust the actual Market per Front-Foot of any site and equate it to the Front-Foot value of the adopted Standard Site.

Proportional Relationship

One method to secure a land assessment system, when sales or rental data is limited, is to make an estimate of value based upon the experience in other locations where land data is abundant. This is a variation on the Sales Comparison method. It could be used to measure land market value or the rental value of land.

Adjustments for Use and Location

If a jurisdiction has very limited land data, such as permitted use (zoning) and density of population, and a limited assessment system, it might be possible to build a simple model. An assessor might draw a grid, showing the potential use on the Y axis and the resulting land market value on the X axis.

In this instance, a typical home unit site in a major city could be assigned a base market value of 1.00 to which all other sites would be compared. Moving toward a superior location and potential use would influence the land market value in a positive manner. Moving away from the base location and use to one which was inferior would influence the land market value in a negative manner.

Adjustments for additional attributes and deficiencies could be made for each individual site, after the base market value had been estimated by the comparative method. The experience from a comparative city could be borrowed and tested in the local area to verify the results.

A chart that illustrates the relationship of one type of land use and location, to another site of differing potential land use, can be created. The relationships in the chart that follows have been found to be common in many areas of the world. However, every area is different and a new-suitable model should be designed by local experts.

This model could be a basis for considering the distinctions that are part of the local society of a city. It should be modified to conform with the local experience. This can be accomplished by performing a local investigation

which draws upon the expertise of individuals who understand the advantage that one location has compared to another. A base factor which was equal to the comparative difference could be determined for each use and location. Individual sites could then be adjusted for superior or inferior conditions as compared to the base. A determined value could then apply to all sites resulting on equitable treatment for varying qualities.

Proportional and Market Values

USE - LOCATION	MAJOR CITY	SUBURBAN	DEVELOPING	RURAL
COMMERCIAL				
Prime business	20.00+			
Downtown area	10.00	5.00	2.50	
Standard	**3.00**	**2.00**	**1.00**	**.75**
Secondary	1.50-	1.00	.60	.50
INDUSTRIAL				
Superior	2.50+	1.75	1.50	.95
Standard	**1.50**	**1.00**	**.75**	**.65**
Inferior	.75-	.50	.40	.25
HOME				
Superior	1.50+	1.00	.75	.50
Standard	**1.00**	**.75**	**.60**	**.40**
Inferior	.65-	.45	.40	.25
RURAL AND FARMING				
Acreage close-in	**.20+**	**.15**	**.10**	**.05**
Acreage distant		.10	.05	.02
Intense farming			.03	.02
General farming			**.02**	**.01-**

Basis for comparison: A home site of standard quality in a major city = **1.00**

Developmental Analysis: Capitalize net land residual income

Hypothetical Building

A theoretical method to achieve a land assessment system, when market or sales data is unavailable, is to make an estimate of the market value of land, based upon the net land residual income (total income, less all costs except land value). This would result from the development of a hypothetical building of the highest and best use for a given site. The developmental analysis technique would be used, when the following data can all be reasonably estimated: the best use of the land site, the hypothetical building value, the hypothetical net income to the development and the appropriate capitalization rate.

First, an assessor would determine what hypothetical improvements would represent the highest and best use (greatest net land value) for the site.

Second, to determine the net land income, the assessor would have to estimate the gross possible income which could be earned from the use of the improvements and site combined. An allowance for the average vacancy (non-use) over the life of the investment would be subtracted. Then the probable operating expenses (but excluding income attributable to the land) would be evaluated and deducted.

Third, the assessor would have to estimate the cost of the proposed building. A portion of the net income would be required to recapture the investment in the hypothetical building and furnishings. The remaining income would be income residual to the land.

The residual land income would be available as the revenue source (tax base) to fund public improvements and services. The entire amount may be accumulated and utilized for the benefit of all citizens. If a portion of the net land value were not collected, it would be converted into a selling price and privately appropriated.

The selling price would be determined by capitalizing the remaining net income which was not collected for land taxes. The net markets were capitalized at a land rate of, say, 6% to estimate the market value of the land. This rate would vary for different types and ages of property. Using a financial calculator, an amount of $12 would have to be paid for a period of 50 years if interest were at, say, 6% per year. The land price is what a potential future user would have to pay a land owner in order to use the site, unless all of the net rent is used for general community purposes.

An example on a *per square foot basis*	**Land Income**	**Land Value**
Gross possible income	$24	
Vacancy allowance	-1	
Operating expenses	-5	
Net income before land taxes	$18	
Recapture of building cost	-12	$190
Land Residual	$6	-$100
Land Tax	-5	-$83
Net Land Income	**$1**	**$17**

Allocation: Ratio of land value to property value

When it is difficult to find vacant land sites that have sold or are offered for sale, the assessor can use an allocation approach. There tends to be a typical ratio of land value to property (land + buildings) value for specific categories of real estate, with similar characteristics, in specific locations.

The individual values for the total property (both the land and building) may be known and available on public records, but there is no allocation made between the land and buildings. Time might best be spent in analyzing a sample of homes to estimate the typical proportion of value which represents land as compared to buildings. This percentage factor could then be applied to all of the total market values for the similar type of homes in a given district, to estimate the individual site land values.

If the existing practice for assigning total values has been arbitrary or not based upon valid market conditions, this method will not be useable. Fairness and justice would require that all markets be based upon a competitive system where all individuals were given an equal opportunity to use a given site. As an interim step, an estimate of competitive total value could be made for different types of property and locations, then an allocation could follow.

The analysis of many units, which represent a random sample, would be conducted, perhaps by using some of the other techniques that are discussed. From this analysis a typical land factor (relationship), for each type of property and location, would be determined. The land portion would be allocated from the total value. In the sample below, an assessor might conclude that the typical land factor was .40 (40% land and 60% buildings).

Sample Analysis

Unit number	Total value	- Building portion	= Land portion	Land factor Land/Total %
212	$190,000	$114,000	$76,000	40%
321	$181,000	$105,000	$76,000	42%
222	$192,000	$117,000	$75,000	39%
311	$192,000	$119,000	$73,000	38%
Conclusion: Indicated Land Portion:				40%

Once the portion was determined and tested for accuracy, it could be applied to the entire population of market data for a particular category of real estate in a specific location. The calculation might be made as follows:

Population application

Unit number	Total value x	Land factor =	Land value
215	$193,000	.40	$77,200
305	$185,000	.40	$74,000
301	$189,000	.40	$75,600

Extraction: Value of the residual land

The extraction method is a variant of the allocation and developmental methods where the market rent contribution of a building is estimated, then subtracted from the total rent with the balance being assigned as land rent. This was reviewed earlier and accomplishes a land value analysis in a simplified manner. This could best be used where the improvements or buildings made a small contribution to the rent, and the majority of the value was land value.

	Land Rental Income	Land Market Value
Gross possible income	$24	
Vacancy allowance	-1	
Operating expenses	-5	
Net income before land taxes	$18	$300
Recapture of building cost	-1	-$17
Land Value Residual	$17	$283
Land Tax	-12	-$200
Net Land Income	**$5**	**$83**

In this example, $5 per square foot is the net land market allotted to the land. The land tax is $12 per square foot and the land value is $83 per square foot.

Ground Rent Capitalization

In many parts of the world, including areas within the United States, land is owned by an individual or government agency and leased to tenants who construct buildings and pay an annual rental fee. These rental fees can be analyzed just like sales and a market rental fee estimated. This lease fee can be capitalized by an appropriate rate to estimate market value.

This procedure is used when land rental and land capitalization rates are readily available, as in well-developed areas. Net ground rent — the net amount paid for the right to use and occupy the land — is estimated and divided by a land capitalization rate.

Comparable ground rents	Per SF	Location	Traffic	Parking	Adj. SF
Comparable ground rent 1	$10.00	-$0.50	-$0.50	+$0.75	+$9.75
Comparable ground rent 2	$9.50	-$0.25	+$0.50	-$0.25	+$9.50
Comparable ground rent 3	$10.00	-$0.00	-$0.50	+$0.00	+$9.50
Subject market ground rent	$9.50 rent per square foot / 10% = $95.00 value per square foot				

Rent 3 was the best comparable located in the same area and required only one adjustment for traffic, Rent 2 required three small adjustments and Rent 1 required larger adjustments. I conclude that the subject land has a value of $9.50 rent per square foot capitalized at 10% = $95.00 value per square foot.

Subdivision Development

The total value of undeveloped land is estimated as if the land were subdivided, developed and sold. Development costs, incentive costs and carrying charges are subtracted from the estimated proceeds of sale,

and the net income projection is discounted over the estimated period required for market absorption of the developed sites. This is the method used by developers to estimate the price they can pay for raw land.

Total sales proceeds, 50 sites at $50,000	$2,500,000
Discounted at %15 over 50 months	$1,850,000
Subdivision cost, $1,000 per site	$50,000
Development cost, $15,000 per site	$750,000
Sale cost, 10% of gross sale price	$250,000
Taxes, interest, carrying cost, 10% of net value	$50,000
Incentive cost and profit, 10% of gross sale price	$250,000
Net value of undeveloped land	$500,000
Net value per acre, 12.5 acres	$40,000
Net value per site, 50 sites	$10,000

Land Value Maps

The market values which have been calculated should be displayed on a land market map. This will allow the assessor to review the market data and market value conclusions. They can then judge whether equity has been achieved. A field review will allow them to make further necessary adjustments — for other variables observed in the review — and finish the project. The assessor will find that when the results of the analysis are presented, and the major adjustment criteria utilized, the public can understand the logic of the assessments.

Computer Estimated Land Values

There are many jurisdictions that have both prior market value estimates and some site data available on a computer. They may be capable of using this data as a basis for updating market estimates.

Many government agencies have already collected some data about land on a computer system. By analyzing market trends, new land market estimates could be made with a single updating factor for each permitted land use within a neighborhood.

An entire country would be capable of annual reassessments, updated by computer data entries. A simple model used for computer calculation of land value or market values for 1,000,000 land sites could be based upon a careful analysis of the market value of a sample of 12,000 sites. A local valuation committee of land experts could define the land use classes, neighborhood areas and market values for each standard site in the area. A Geographic Information System can be used to display land values, characteristics and statistical data.

The advantages to using a computer-assisted market update include the abilities to:

1. Facilitate frequent update of markets ensuring equitable treatment of all sites.
2. Eliminate arithmetic errors in land value calculations.
3. Improve the assessor's productivity in land value assessment.
4. Employ standardized assessment techniques that have proven to be effective.

Ted Gwartney retired as the Assessor of Greenwich, Connecticut in 2012. Formerly he served as City Assessor of Bridgeport, Connecticut; Southfield, Michigan; Hartford, Connecticut; and the Deputy County Assessor of Sacramento, California. From 1975 until 1986, he organized and was the Assessment Commissioner and Chief Executive Officer of the British Columbia Assessment Authority in Canada. He implemented the annual Province-wide revaluation of the 1,500,000 parcels, currently valued at over one trillion dollars.

He is President of the American Journal of Economics and Sociology and associated with the Robert Schalkenbach Foundation since 1970. He served as the Executive Director of the Foundation from 1996 to 2000. Gwartney has written articles on "Estimating Land Values;[1]" "Land Rent Assessment;" "Reducing Sprawl;" and "Public Finance." He was a Professor, in the Department of Law, on Real Estate Appraisal, at Baruch College, New York. He is an expert witness in the Connecticut Superior Courts.

Gwartney graduated from California State University at San Diego in 1964 with a Bachelor of Science degree in Real Estate Economics. He received an Associate Degree from the University of California at Los Angeles in Real Estate Appraisal in 1966. He holds an MAI Professional Designation, from the Appraisal Institute.

In retirement, Mr. Gwartney makes fee appraisals of land and commercial property and consults with Governments on assessment, municipal finance, and legal cases. He lives in Anaheim, California.

tgwartney@aol.com